IN SILICO EVALUATION OF BIOACTIVE PEPTIDES FROM *PYROPIA ORBICULARIS*

MD IMRANUL ISLAM

Roll No. 01-20/05

Registration No. 0834

Session: 2020-21

A thesis submitted in the partial fulfillment of the requirements for the degree of Master of Science in Applied Human Nutrition and Dietetics

Department of Applied Food science & Nutrition

Faculty of Food Science & Technology

Chattogram Veterinary and Animal Sciences University,

Chattogram-4225, Bangladesh

AUGUST 2022

Authorization page

I hereby declare that I am the sole author of the thesis. I also authorize the Chattogram Veterinary and Animal Sciences University (CVASU) to lend this thesis to other institutions or individuals for the purpose of scholarly research. I further authorize the CVASU to reproduce the thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

I, the undersigned, and author of this work, declare that the electronic copy of this thesis provided to the CVASU Library, is an accurate copy of the print thesis submitted, within the limits of the technology available.

IN SILICO EVALUATION OF BIOACTIVE PEPTIDES FROM *PYROPIA ORBICULARIS*

MD IMRANUL ISLAM

Roll No. 01-20/05

Registration No. 834

Session: 2020-21

This is to certify that we have examined the above Master's thesis and have found that is complete and satisfactory in all respects, and that all revisions required by the thesis examination committee have been made.

……	……..……
SUPERVISOR	**CO-SUPERVISOR**
Dr. Indrajit saha	**Nilufa Yeasmin**

……

Kazi Nazira Sharmin

Chairman of the Examination Committee

Department of Applied Food science & Nutrition

Faculty of Food Science & Technology

Chattogram Veterinary and Animal Sciences University,

Chattogram-4225, Bangladesh

AUGUST 2022

PLAGIARISM VERIFICATION

TITLE of THESIS: *In Silico* evaluation of bioactive peptides from *pyropia orbicularis*.

Name of the Student: Md Imranul Islam

Roll No.: 01-20/05

Reg. No.: 0834

Department of Applied Food Science and Nutrition

Faculty of Food Science and Technology

Chattogram Veterinary and Animal Sciences University

Supervisor: Dr. Indrajit saha

This is to report that as per the check % of the content of the above thesis is stated to be plagiarized and is covered /not covered as per plagiarism policy and institutions issued from CASR, Chattogram Veterinary and Animal Sciences University.

The thesis may/may not be considered for the evaluation.

Dr. Indrajit Saha

Associate Professor & Head

Department of physical & mathematical science

Faculty of Food Science and Technology

Chattogram Veterinary and Animal Sciences University

ACKNOWLEDGEMENT

I am ever grateful and very much obliged to the Almighty without whose grace it would have never possible to pursue this study in this field and to complete this thesis writing for the degree of Master of Science in Applied Food Science & Nutrition.

I also express my profound appreciation and heartfelt gratitude to Professor Dr. Goutam Buddha Das, Vice Chancellor, Chittagong Veterinary and Animal Sciences University (CVASU), and, Dean, Faculty of Food science and Technology, CVASU, for their tremendous effort to arrange the Industrial Placement in collaboration with reputed food industry, Bakery etc. to improve our practical knowledge and for the degree of Bachelor of Food Science and Technology (BFST).

I would like to show my deepest sense of gratitude, sincere appreciation and profound regards to my respective supervisor, Assosiate professor & Head **Dr.Indrajit saha**, **Dept. of Physical & Mathematical Science**, CVASU & my co-supervisor ,Assistant professor **Nilufa Yeasmin, Dept. of Applied Food science & Nutrition** for their keen inspiration and permission to conduct this study.

It is my pleasure to express my sincere to **Kazi Nazira Sharmin** (Associate professor & head, Dept. of Applied Food science & Nutrition) for providing me an opportunity to do my MS. Thesis research work.

Last but least I express my deepest sense of gratitude, cordial respect of feelings to my beloved family members for their immense sacrifice, blessings, and encouragement.

The Author

August 2022

TABLE OF CONTENT

LIST OF ABBREVIATION

ACE	-	Angiotensin-converting enzyme
ACC	-	Auto cross covariance
DPP IV	-	Dipeptidyl peptidase IV
E/S	-	Enzyme to substrate ratio
EU	-	Experimental unit
HCL	-	Hydrochloric acid
KCL	-	Potassium chloride
EDTA	-	Ethylene di-amine tetra acetic acid
Ala	-	Alanine
Arg	-	Arginine
Asn	-	Asparagine
Asp	-	Aspartic acid
Asx	-	Asparagine or aspartic acid
Cys	-	Cysteine
Glu	-	Glutamic acid
Gln	-	Glutamine
Glx	-	Glutamic acid
Gly	-	Glycine
His	-	Histidine
Ile	-	Isoleucine
Leu	-	Leucine
Lys	-	Lysine
Met	-	Methionine
Phe	-	Phenylalanine
Pro	-	Proline

Ser	-	Serine
Thr	-	Threonine
Trp	-	Tryptophan
Tyr	-	Tyrosine
Val	-	Valine
Kda	-	Kilodalton
%	-	percentage
&	-	And
et al	-	Et alii/et aliae/et alia

LIST OF TABLES

ABSTRACT

Some of the proteins in *pyropia orbiculars* could serve as starting points for creating bioactive peptides. Peptides as a structural component of bioactive proteins In this virtual experiment, selected 12 proteins from the *pyropia orbicularis.* perfornrd as potential precursors to bioactive peptides. The most promising bioactivities were found to be those that inhibited dipeptidyl peptidase-IV (DPP IV) and angiotensin-converting enzyme (ACE). Papain, thermolysin, and stem bromelain were all used for *in-silico* proteolysis. For this reason, 63 different tripeptides or novel peptides were tested to see if any of them could be considered novel bioactive peptides. PeptideRanker, PepCalc, Peptide Cutter, ToxinPred, AllerTop, and AHTpin were also utilized in order to investigate the peptides' unique characteristics. The bioinformatics tools predicted that most of all the peptides were safe to use, and an additional 28 were predicted to be non-allergenic and highly promising. These findings provide support for using *pyropia orbicularis* as a source of bioactive peptides and lay the groundwork for further in-vitro and in-vivo research into these compounds.

Keywords: ACE inhibitor , DPP IV inhibitor ,*Pyropia orbicularis*, Bioactive peptides, *in silico*

CHAPTER 1: INTRODUCTION

Algae found in salt water, which can be either green, red, or brown. Root-like "holdfasts" serve only to bind seaweeds to the sea floor or other solid structures; unlike the roots of higher plants, they do not absorb water and nutrients(Tailor et al., 2013).

Studies to far have primarily focused on milk proteins, however bioactive peptides can range in length from 3-20 amino acid residues. Bioactive peptides, which are produced from dietary proteins and have health-promoting qualities, have a beneficial effect on humans. Once absorbed, bioactive peptides have the potential to affect a variety of physiological processes, including disease prevention and regulation. Bioactive peptides have many different roles depending on their sequence, including anti-obesity and satiety peptides, cardiovascular system peptides like antihypertensive and antithrombotic peptides, antioxidant and hypocholesterolemic peptides, immune system peptides like cytomodulatory and immune-modulatory peptides, and nervous system peptides like opioid peptides.(wang et al., 2013)

In recent years, it has come to light that numerous bioactive peptides are either naturally present in or can be synthesized from the proteins found in a wide variety of foods, including milk, eggs, soy, fish, and meat. In this regard, antihypertensive action as measured by Angiotensin I-converting enzyme (ACE) inhibitory activity has been the most investigated bioactivity over the past decade. The leading cause of death in industrialized nations is cardiovascular disease, and high blood pressure is a key independent risk factor for this condition. Peptides with this activity fall under the umbrella term of bioactive peptides, which also includes peptides with other types of activity, such as antioxidant, antibacterial, opioid, antithrombotic, antidiabetic, etc. There has been a great deal of research into bioactive peptides because of the specific bio functional properties they possess. Bioactive peptides produced from bovine milk proteins have been revealed in the present literature to contain extraordinary biological activities and health-promoting characteristics due to their nutritional flexible multifunctional properties. It appears that bioactive peptides produced from milk proteins can be employed as an orally effective healthy component, and may be utilized in the manufacture of function foods with health-promoting effects. To

evaluate the health-promoting effects and bioavailability of bioactive peptides generated from milk protein in human subjects and to define their molecular mechanisms of action, additional study in this field is, it appears, required. There are red algae in the Bangiaceae family, and the genus Pyropia is one of them. It inhabits the world's shallow seas and intertidal zones. There are red, brown, and green frond-like blades in this genus. Some Pyropia species are utilized to manufacture nori, and are hence valuable subjects for aquaculture. Species of Pyropia are red algae characterized by a discoid holdfast and a short stipe. They feature membranous, monostromatic blades that fold in various directions and come in red, brown, and dark green. It's possible that, when folded, these blades could pass for fronds. These slats can be as long as a meter in some species and as wide as 20 centimeters on average. Depending on the water's quality and substrate, pyropia can be found growing anywhere from the shoreline to depths of ten meters. It spreads rapidly and covers the ground by clinging to rocks and shells(Sharmin et al., 2022) The genus Pyropia is found worldwide in both tropical and extratropical (cool) seas.

Pyropia's nutritional value comes from the abundance of protein, vitamins, minerals, and dietary fibers it contains. The red pigment r- phycoerythrin, which is used as a fluorescent 'tag' in the medical diagnostic industry, is also extracted from this alga and is a major commercial source. Various writers from around the world have estimated the protein, lipid, carbohydrate, mineral, dietary fiber, vitamin, and fatty acid content of Pyropia. Seven species from the Porphyra and Pyropia genera have so far been documented in India. After their formal description, many of these described species have been overlooked for further study. *Pyropia Vietnamensis* was found in large numbers along the coast of the Indian Ocean, making it one of the locally recorded species. The nutritional value of *Pyropia vietnamensis* was evaluated in this study from 18 sites across India's west coast and a small portion of Tamil Nadu. (Zhang et al., 2007)

Multiple studies have demonstrated the efficacy of the *in silico* method by demonstrating agreement between their findings and hydrolysis results obtained in a laboratory setting. *In silico* hydrolysis was performed using a panel of enzymes, and the researchers settled on thermolysin as the best enzyme for in vitro analysis, which was validated by hydrolysis in vitro(Cheung et al., 2009). In addition to assisting in the discovery of new bioactive peptides, this strategy could also be useful in a number

of other ways. Phe-Cys, a peptide produced from *in silico* thermolysin-hydrolyzed Ribulose-1,5- bisphosphate carboxylase oxygenase(RuBisCo), was discovered to be possibly active because of the high value assigned by the PeptideRanker tool in a research on cereal crop RuBisCO, where several peptides that were not recognized as bioactive were explored. A further in vitro study demonstrated the potent antioxidative properties of the Phe-Cys dipeptide (Udeniqwe et al., 2013). New Angiotensin I-converting enzyme (ACE) and Dipeptidyl peptidase IV (DPP-IV) inhibitor peptides in bovine serum albumin were discovered recently (Lafarga et al., 2016). In addition, they utilized computational methods, such as BIOPEP and PeptideRanker, in their investigation. These results demonstrate conclusively the importance of performing in silico investigations prior to conducting in vitro enzyme action experiments under traditional wet-lab conditions.

1.1 Significance of study

The *pyropia sp.* genome has been sequenced in its entirety, and the 12 main proteins have been isolated using 2-DE. There has been no published *in-silico* study of *pyropia orbicularis* proteins as potential building blocks for bioactive peptides. Therefore, the goals of this research were to identify the proteases responsible for the increased release of a dominant bioactive peptide from previously identified *pyropia orbicularis* proteins, and to determine the likelihood of the peptides' biological activity. In addition, the study investigated the feasibility of predicting novel peptides and their potential characteristics using *in-silico* bioinformatics tools.

1.2 objectives

1. To evaluate the bio active peptide from *pyropia orbicularis* protein.
2. Identification of novel peptides from *pyropia orbicularis*.
3. To understand the pharmaceutical & functional food value of *pyropia orbicularis*.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Sea weed

Countless types of marine plants and algae are collectively referred to as "seaweed," and they can be found in the ocean, rivers, lakes, and other bodies of water.

2.1.1 Characteristics of sea weed

Phytoplankton, a type of microscopic seaweed, floats freely in the water column and serves as the foundation for many marine food webs. Some of these seaweeds are enormous, like the giant kelp that forms dense "forests" and rises hundreds of feet from its seafloor roots like a forest of underwater redwoods(Sharmin et al., 2022) Most are about the size of a softball, come in a rainbow of colors, and wash up on shorelines and beaches all over the world at random.

The common name "seaweed" is inaccurate, as true "weeds" spread so rapidly that they cause damage to the ecosystems in which they are established. (Think of kudzu, the notorious "mile-a-minute vine" that clogs waterways across the Southeastern United States. The sea's "weeds," both those that are rooted to the bottom and those that float freely, are crucial not only to the survival of countless marine organisms, but also to the well-being of terrestrial life, especially humans.

2.1.2 Nutritional composition of sea weed

Seaweed can be tasty and is a great source of vitamins, minerals, and fiber. Japanese people have been wrapping a mixture of raw fish, sticky rice, and other items in nori for at least 1,500 years. The outcome is a delicious sushi roll.

Seaweeds are abundant sources of anti-inflammatory and anti-microbial substances. The ancient Romans used them to cure wounds, burns, and rashes; they have a long history of documented medical benefits. According to anecdotal evidence, the ancient Egyptians may have employed them to cure breast cancer.(Hagen et al., 2004).

In fact, some seaweeds contain potent anti-cancer compounds that scientists believe may one day be used to cure human leukemia and malignant tumors. The low risk of cancer in Japan has long been linked to dietary soy, but this sign of good health is

now given to dietary seaweed.These adaptable marine plants and algae have also aided in the expansion of the economy. They are popular softeners (emollients) in organic cosmetics and skin-care products, as well as efficient binding agents (emulsifiers) in commercial items like toothpaste and fruit jelly.

2.2 *Pyropia Orbicularis*

Individuals of the genus *Pyropia sp* are red algae characterized by a discoid holdfast and a relatively short stipe. They have membranous, monostromatic, and bifid blades in shades of red, brown, and dark green. When these blades are folded, they can resemble fronds. These fronds can be as long as a meter in some species and as wide as 20 centimeters**.**

2.3.Red seaweed protein sequences (*pyropia orbicularis*)

The NCBI database (https://www.ncbi.nlm.nih.gov/) was used to verify the existence of 12 proteins identified by the UniPort database (https://www.uniprot.org/) was mined for the 12 proteins' FASTA sequences and other general characteristics.

Through the use of the BIOPEP-UWM database, we assess the protein from *Pyropia orbicularis* as a possible precursor of bioactive peptides.

2.4 Evaluation of *pyropia orbicularis* as potential precursor of bioactive peptides through BIOPEP-UWM database

Using data from the BIOPEP-UWM database, which contains 4330 known bioactive peptides with 58 biological activities, we calculated the likelihood that the chosen protein sequences would release bioactive fragments (accessed on 23rd August, 2022). Using the 'profiles of potential biological activity' menu item in BIOPEP-UWM, the number of bioactive peptides was determined. Each protein's predicted activities were analyzed in detail. We manually tallied the number of fragments exhibiting the target activity. The most common events were selected for the report. The frequency of bioactive fragments occurrence (A) in *pyropia orbicularis*. protein sequence was calculated using the following equation

$$A=a/N$$

where a is the fraction of the protein sequence that exhibits the desired activity, and N is the total number of amino acids in the protein. In addition, the average occurrence of bioactive fragments (A) across all 12 protein sequences was determined. Pyropia species have been found to contain bioactive fragments. Sequence was determined independently for the ACE inhibitor, DPP IV inhibitor, and alpha glucosidase inhibitor. Potential biological activity refers to the protein's useful effects (such as ACE inhibition, antioxidant properties, DPP IV inhibition, etc.). Two bioactivities were analyzed using BIOPEP-UWM, and the number of probable bioactives in each subclass bioactivity was counted by hand (bioactivities where B values is available). The potential biological activity of protein (B) was calculated using the following equation:

$$B = \frac{\sum_{i=1}^{k} \frac{a_i}{EC_{50i}^*}}{N}$$

where a_i is the fraction of the protein sequence occupied by the i-th bioactive fragment, $*EC_{50i}$ is the concentration of the i-th bioactive peptide corresponding to half-maximal activity [M] or half-maximal inhibition (IC_{50}) in the case of inhibitory peptides, k is the number of distinct fragments with the given activity, and N is the number of amino acid residues. Only ACE inhibitor, DPP IV inhibitor, hypotensive, alpha-glucosidase inhibitor, and opioid B values are provided by BIOPEP-UWM (Sharmin et al., 2022)

2.5 *In silico* proteolysis

The 'enzyme action' tool on BIOPEP-UWM enabled the *in-silico* proteolysis to be carried out. Peptides were released from the most abundant protein sequences using papain, ficin, and stem bromelain in a completely decentralized fashion. The database calculated the predicted degree of hydrolysis (DH%). The frequency of bioactive fragments released by the chosen enzymes (A_E) and the relative frequency of released peptides with a given activity (W) were calculated using the following formula to evaluate the efficacy of fragment release:

$$W = \frac{A_E}{A}$$

where d is the fraction of the protein sequence that is converted into active peptides when treated with the enzyme of choice, and N is the total number of amino acid residues.

$$A_E = \frac{d}{N}$$

2.6 Virtual screening and characterization of novel tri-peptide

It was determined manually how many bioactive fragments were predicted to be released from pyropia sp. protein based on their known activity. In order to find fragments with known bioactivities, BIOPEP-UWM lists those that are stored in the database. The majority of the DPP-IV inhibitory activity sequences reported in BIOPEP-UWN were di- or tri-peptides. Dipeptidyl peptidase IV (DPP-IV) inhibitors have been found to be effective when they are five amino acids or shorter. Therefore, the tri-peptide fragments with three amino acids were submitted to rank for the potential activity, as described. This allowed for further investigation into novel tri-peptides that resulted from proteolysis with the chosen enzyme. Visit http://distilldeep.ucd.ie/PeptideRanker/ to use Peptide Ranker. This bioinformatics resource uses an N-to-1 neural network algorithm to predict and rank the likelihood that a given peptide will have bioactive properties. Inaccurately identifying the best course of action is one of the tool's drawbacks. The potential properties of peptides were also analyzed in a computer simulation. Studies on water solubility, gastrointestinal tolerance, toxicity, allergenicity, and IC50 were performed. PepCalc, which can be found at http://pepcalc.com, was used to calculate the predicted water solubility. PeptideCutter, found at http://web.expasy.org/peptide cutter, was utilized to foretell the digestive process in the gastrointestinal tract. Resistant levels were evaluated with various enzymes, including chymotrypsin (low specificity), chymotrypsin (high specificity), pepsin (pH 1.3), pepsin (pH > 2), and trypsin. ToxinPred and AllerTOP, two bioinformatics tools that can be found at (http://www.imtech.res.in/raghava/toxinpred/) & (http://www.pharmfac.net/allertop/), were used to evaluate the toxicity and allergenicity of the compounds under consideration. A support vector machine (SVM) based prediction method was

selected for the toxicity prediction, with a threshold value of 0.0. The estimated IC50 was calculated with AHTpin, which can be found at https://webs.iiitd.edu.in/raghava/ahtpin/index.php. . Antihypertensive peptides in particular can be predicted, screened, and designed with the aid of a program called AHTpin. Quantitative structure activity relationship (QSAR) based regression models are the basement for the inhibitory activity estimation of tiny (di and tri) peptides in AHTpin. The OECD's principles on economic cooperation have been incorporated into this base. For this reason, the IC_{50} value is expressed by AHTpin as IC_{50} value = -log (IC_{50} x10-6)(Sharmin et al., 2022).

2.7 MALDI-TOF mass spectrometry

The field of clinical microbiology has benefited greatly from the application of matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) mass spectrometry (MS) for the rapid and accurate identification of bacteria, mycobacteria, and certain fungal pathogens. Matrix-assisted laser desorption/ionization (MALDI) is a method of ionization used in mass spectrometry that involves the use of a laser energy-absorbing matrix to produce ions from large molecules with minimal fragmentation. The matrix-assisted laser desorption/ionization (MALDI) technique is a form of soft ionization that works by launching the analyte molecules into the gas phase via a laser strike to a matrix of small molecules.Traditional methods often result in the fragmentation or destruction of macromolecules due to their inability to withstand heat, making them unusable for the study of certain biomolecules. Time taken for an ion to travel the length of the flight tube is used to calculate the m/z ratio during MALDI-TOF analysis.Some TOF analyzers have an ion mirror at the end of the flight tube, which redirects the ions back through the tube and into a detector.

2.8 Protein hydrolysis

The goal of protein hydrolysis is to release more amino acids and carboxyl groups from peptide bonds. This hydrolysate is easier to absorb and digest (Capuano et al., 2013). Protein hydrolysis can be accomplished by a single enzyme (like trypsin) or a combination of enzymes (e.g., a mixture of proteases known as Pronase, pepsin and prolidase). Protein availability and desired hydrolysis rate dictate which enzymes are used. Hydrolysis, or the cleavage of chemical bonds by the addition of water, is the reaction of an organic chemical with water to form two or more new substances.

2.9 Protein extraction method

Each method was put to the test with 5–7 g (fresh tissue) and 300 mg of E. siliculosus. Ultrasonic cleaner; Model 575T, Cortland, NJ, USA) for 30 seconds before being rinsed in filtered seawater.Following this, the tissues were homogenized in the appropriate extraction buffer after being pulverized in liquid nitrogen using a mortar and pestle. Results from five approaches were compared to determine which one provided the most reliable data.

2.9.1 Phenolysis buffer Extraction

15 mL of lysis buffer containing 5g of E. cottonii powders (1.5% w/v polyvinylpyrrolidone, 0.7 M sucrose, 0.1 M potassium chloride, 0.5 M Tris-HCl pH 7.5, 250 mM EDTA, 20 L/mL complete protease inhibitor cocktail, 2% v/v 2-mercaptoethanol, and 0.5% w/v CHAPS) were used. An equivalent volume of Tris-HCl saturated phenol, pH 7.9, was then added, and the mixture was re-homogenized for a further 15 minutes. The top phenol phase was then transferred to a fresh 50 mL falcon tube after the mixture was spun at 10,000 g for 15 minutes.

2.9.2 Enzyme assisted extraction (EAE)

A cellulase preparation was used to perform the EAE of protein. For this, 1.64 UI mg of dried seaweed was added to 5 mL of sodium acetate buffer (0.1M, pH 4.5) along with 0.1 g of dried seaweed, and the mixture was incubated at 50 °C for 10 minutes. At pH 4.5 and 50 °C, non-assisted aqueous extraction was conducted in the absence of enzyme. For 16 hours, both enzymatic and non-enzymatic extractions were carried out (blank was enzyme in buffer in absence of dried seaweed). The increased enzyme content to the seaweeds' protein content was calculated as a blank measurement. Additionally, by measuring the rise in absorbance at 348 nm (at 30 °C and pH 7.0) following the hydrolysis of substrate Boc-L-alanine 4-nitrophenyl ester, the proteolytic activities of cellulase preparation and seaweed extracts obtained by EAE were quantified (Taher et al., 2020). Protein concentration in the supernatant was assessed spectrophotometrically following centrifugation for 30 min at 4193 g. For this, 2.7ml of pure water and 300 L of the sample were combined, and the resulting mixture's 280 nm wavelength was measured. Utilizing interpolation within a standard

curve (0.01-1.0 mg ml1 BSA), the protein content was determined as mg/ml BSA equivalents.

2.9.3Extraction with deionized water

In order to facilitate protein extraction and allow osmotic shock-induced cell lysis, the algal powder was suspended in 200 ml of deionized water. At 4 °C, the suspension was gently swirled all night. The slurry was then centrifuged at 10,000 x g for 20 minutes to collect the supernatant for the protein assay.

2.9.4 Extraction with polysaccharidases

There were two different polysaccharidases tested. A commercial polysaccharidases mixture (Rohacent 7005C, obtained from Rohm) containing cellulase, hemicellulase, and beta-glucanase was applied to the algal material in order to study the impact of cellulases (cellulase A, purchased from GistBrocades) on the protein extraction.

2.9.5 Phenol extraction

The phenol extraction method was used to remove proteins from the plants, following existing protocols for difficult-to-cultivate plants (Wang et al., 2003). The extraction buffer was altered slightly, and the reagent concentration was increased. Tissue was ground to a powder and then resuspended in 5-15 mL of extraction buffer (1.5% w/v polyvinylpyrrolidone, 0.7 M sucrose, 0.1 M KCl, 0.5 M Tris-HCl pH 7.5, 250 mM EDTA, 1 tablet for 50 mL extract of complete protease inhibitor cocktail, 2% v/v b-mercaptoethanol, and 0.5% The mixture was rehomogenized for 20 minutes at 4C after adding an equal volume of Tris-HCl pH 7.5-saturated henol. The phenol layer at the top of the mixture was separated by centrifuging at 10,000g for 20 minutes. With the same amount of phenol as before, we repeated the extraction of the lower phase. After incubating the mixture at 20 degrees Celsius for three hours, five volumes of 0.1 M ammonium acetate dissolved in methanol were added to the phenol phase to precipitate the proteins. For 20 minutes at 20 degrees Celsius, the extract was centrifuged at 10,000g, the supernatant was discarded, and the protein pellet was washed in ammonium acetate (0.1 M in methanol). Seven times in four volumes of ice-cold acetone (80%) and once in cold acetone were used to wash the protein pellet.

2.9.6 Extraction in a deionized water and ultrasonic bath

With a few minor modifications, the extraction process was carried out as described by (wang et al., 2003). Algae leaves that had been dried and powdered were suspended in deionized water (1% w/v) and subjected to an ultrasonic bath for an hour (Elmasonic S10, Elma Schmidbauer GmbH, Singen, Germany). Next, the mixture was gently stirred at 4°C for an entire night. The supernatant was collected after centrifugation (10,000 g, 1 hour, 4°C), and then deionized water was added to the sediment. Another round of centrifugation, overnight stirring, and sonication were performed on the mixture. In order to cause the protein to salt out, the supernatants from both cycles were mixed, then solid ammonium sulphate was added (to 85% saturation). The sediment was resuspended in deionized water after being centrifuged (10,000 g, 1 hour, 4 degrees Celsius), dialyzed (2 kDa) against deionized water, and then freeze-dried.

2.10 Bioactive peptides

Bioactive peptides are protein fragments between 2 and 20 amino acids in length, and they have the potential to modulate a wide range of physiologic processes. Bioactive peptides are shorter than proteins (as proteins usually consist of longer sequences of more than 200 amino acids). Hydrophobic residues are abundant in these proteins, making them resistant to digestion by peptidases.

2.10.1 Angiotensin-converting enzyme (ACE) inhibitors

Blood pressure can be lowered with the help of medications called angiotensin-converting enzyme (ACE) inhibitors, which work by relaxing the veins and arteries. Blood vessel relaxing substance angiotensin II is inhibited in the body by the use of an enzyme inhibitor (ACE). Since the heart has to pump more blood through narrowed passageways, the blood pressure rises. There are also hormones released by angiotensin II that contribute to elevated blood pressure.

2.10.2 Dipeptidyl peptidase IV inhibitors

The enzyme DPP-IV is targeted by a class of oral diabetes medications known as DPP-IV inhibitors. Since DPP-IV, an enzyme expressed on the surface of most cell types, is responsible for deactivating several other bioactive peptides, including

glucose-dependent insulinotropic polypeptide (GIP) and GLP-1, blocking it may have various effects on glucose regulation. Compared to administering GLP-1 receptor agonists, the effect of DPP-4 inhibitors on GLP-1 levels and activity is minimal.

2.10.3 Alpha-glucosidase inhibitors

To reduce blood sugar levels, antihyperglycemic drugs called alpha-glucosidase inhibitors are used. They block the enzymes in the brush border of enterocytes responsible for breaking down eligosaccharides into their component monosaccharides in a competitive manner.

2.11 The role of the *in silico* approach

Multiple studies have demonstrated the efficacy of the in silico method by demonstrating agreement between their findings and laboratory hydrolysis results. To validate their in silico results, they performed hydrolysis using thermolysin in a petri dish. New bioactive peptides may be discovered with the aid of this method. As an illustration, the PeptideRanker tool was used to investigate many peptides that had not previously been identified as bioactive, and it revealed that Phe-Cys, derived from *in silico* thermolysin-hydrolyzed Ribulose-1,5- bisphosphate carboxylase oxygenase (RuBisCO), possessed the potential to be active. A subsequent in vitro study demonstrated the potent antioxidative properties of the Phe-Cys dipept. Bovine serum albumin was recently found to contain novel peptides that inhibit ACE and DPP-IV(Lafarga et al., 2020) These analyses demonstrate unequivocally the value of conducting in silico research first, before moving on to more traditional wet-lab methods of studying enzyme activity.

CHAPTER 3: MATERIALS AND METHODS

3.1 Study area

The Chattogram Veterinary & Animal Sciences University (CVASU) was the site of this study.

3.2 Materials

All the raw material was collected from coastal area.

3.2.1 Raw material

Dried seaweed(*pyropia orbicularis*) was collected & stored in chiller at 4°C temperature for further utilization.

3.3 protein extraction

Protocols for extracting proteins from resistant plant species called for the use of phenol extraction (Wang et al., 2003) Extraction buffer concentration and reagent addition were the primary shifts. Tissue was ground to a fine powder and then resuspended in 5-15 mL of extraction buffer (1.5% w/v polyvinylpyrrolidone [PVP], 0.7 M sucrose, 0.1 M KCl, 0.5 M Tris-HCl pH 7.5, 250 mM EDTA, 2% v/v b-mercaptoethanol, and 0.5% w/v CHAPS) at 4°C for 20 minutes. The mixture was re homogenized for 20 minutes at 4° C after adding an equal volume of Tris-HCl pH 7.5-saturated phenol. To separate the phenol, the mixture was centrifuged at 10,000g for 20 minutes. phase using the same quantity of phenol as before. Five volumes of 0.1 M ammonium acetate dissolved in methanol were added to the phenol phase and incubated at 20°C for three hours to precipitate the proteins. After centrifuging the extract at 10,000g for 20 minutes at 20 degrees Celsius, the supernatant was discarded and the protein pellet was washed in ammonium acetate (0.1 M in methanol). Seven times in four volumes of ice-cold acetone (80%) and once in cold acetone were used to wash the protein pellet.

3.4 *In silico* analysis

The NCBI database (https://www.ncbi.nlm.nih.gov/) was used to verify the existence of the 12 proteins. UniPort database (https://www.uniprot.org/) was consulted to obtain the FASTA sequences and general properties of the 12 proteins.

3.4.1 Portparam tools

For any protein in Swiss-Prot or TrEMBL, or for a user-entered protein sequence, ProtParam (References / Documentation) can calculate a wide range of physical and chemical parameters. ProtParam is a program that estimates several chemical and physical characteristics of a protein based on its sequence. This protein under consideration does not require any further elucidation. One can either provide a Swiss-Prot/TrEMBL accession number or ID, or a raw sequence, to identify the protein of interest.Essential amino acid composition are identified by portparam tools (https://web.expasy.org/protparam).

3.4.2 Peptide ranker

Peptide Ranker is a web service that uses an innovative N-to-1 neural network to predict which peptides will have biological activity. Peptide Ranker allows users to input a list of peptides and receive a ranking of the peptides' bioactivity potential. This is not a prediction of bioactivity level. Predicted bioactivity score are identified by peptide ranker(http://distilldeep.ucd.ie/PeptideRanker) .

3.4.3 Peptide calculator

PepCalc is a simple peptide calculator that determines how many milligrams (mg) of research peptides are in each unit or tick mark of a reconstituted insulin or tuberculin (non-insulin) syringe. It's the most convenient method for determining proper peptide dosing. Molecular wt. gm/mol ,solubility in water, net charge at PH 7 is found by using pepcale.com.

3.4.4 Bioinformatics tool for allergenicity prediction

The technique utilizes the Auto cross covariance (ACC) transformation to convert protein sequences into vectors of the same length. To mine protein sequences, (wang et al., 2014) created a method called automatic complementation of sequences

(ACC).Allergenecity probability is found by using allertop (https://www.ddg-pharmfac.net/AllerTOP) .

3.4.5 Peptide cutter

Protein sequences can be analyzed with PeptideCutter [references / documentation] to identify potential cleavage sites cleaved by proteases or chemicals. PeptideCutter provides a mapped representation of potential cleavage sites over the query sequence, as well as a table of cleavage site positions. Resistance to digestion is understand by peptide cutter (https://web.expasy.org/peptide_cutter) .

3.4.6 AHTpin

An in silico approach called AHTpin has been developed to predict and design effective antihypertensive peptides. Using a single amino acid at a time, this module produces every mutant and makes predictions about the peptides' antihypertensive properties. The best mutant peptide for treating hypertension can then be chosen by the user. predicted IC50(I1/4 M) for ACE inhibitor is found by using AHTpin (http://crdd.osdd.net/raghava/ahtpin).

CHAPTER 4: RESULTS

4.1 Extracted protein identified by MALDI-TOFF mass spectrometry

Total twelve protein found in *pyropia orbicularis.* The investigation process by using bioinformatics tools was continued with these protein. Protein accession no is used in bioinformatics database to collect previous recorded data.

Table 4.1: protein name & accession number used in *in silico* analysis

Protein	Organism	Accession	MW (KD)
Phycocyanin beta subunit	Pyropia yezoensis	YP_537058.1	18.2
Ribulose-1.5-bisphosphate carboxylase	Porphyra rosengurttii	ACZ57927.1	52.99
RNP domain-containing protein	Chondrus crispus	XP_005718172.1	23.51
Phycoerythrin beta subunit	Pyropia haitanensis	YP_007947897.1	18.42
Triose-phosphate isomerase	Chondrus crispus	XP_005716285.1	27.03
f GTPase family 11	Galdieria sulphuraria	XP_005708023.1	23.84
Peptidylprolyl isomerase	Galdieria sulphuraria	XP_005705635.1	59.06
Aconitate hydratase	Gracilaria gracilis	P49609.1	83.73
Cysteine synthase	Porphyra purpurea	AAP97124.1	38.69
Allophycocyanin alpha subunit	Porphyra purpurea	NP_053872.1	17.51
Chaperonine 60	Chondrus crispus	XP_005715325.1	59.95
Ferritin	Pyropia yezoensis	AFR78246.1	28.14

4.2 Essential amino acid percentage

With the support of portparam tools ,essential eight & semi essential two amino acid percentage identified. Most of the protein are high in essential amino acids.

Table 4.2: Essential amino acid composition of *pyropia orbicularis*

Accession No	Ile(I)	Trp(w)	Met(M)	Val(V)	Lys(K)	Leu(L)	Thr(T)	Phe(F)	Arg(R)	His(H)
YP_537058.1	4.1	0	3.5	9.3	2.9	9.9	4.1	2.3	5.8	0
ACZ57927.1	6.7	1.7	4	6.5	5	7.9	5.4	3.8	5.4	2.1
XP_005718172.1	4.3	1.9	2.8	6.2	4.3	4.3	5.7	3.8	9.5	2.8
YP_007947897.1	6.2	0	2.8	9	4	7.4	3.4	1.7	5.6	0
XP_005716285.1	7.9	2.4	1.2	9.1	5.5	5.1	7.9	2.8	2.8	0.8
XP_005708023.1	6	0.9	0.9	7	10.2	8.4	6.5	4.2	4.7	2.3
XP_005705635.1	3.8	1.1	4	6.8	4.9	8.4	4.7	2.9	2.7	1.6
P49609.1	5.4	1.1	1.8	7.3	5.2	7.2	5.8	3.4	4.9	1.8
AAP97124.1	6.1	0	4	8.2	5	5.8	6.9	2.9	4	0.8
NP_053872.1	6.2	0	3.1	8.7	4.3	9.3	5	2.5	6.2	0
XP_005715325.1	6.1	0	3.6	9.5	6.6	8.3	6.1	2.1	5.4	0.5
AFR78246.1	1.1	0.8	3.8	9.1	3	5.7	5.7	5.7	3.4	1.9

4.3 *in silico* analysis

Multiple studies have demonstrated the efficacy of the in silico method by demonstrating agreement between in silico and laboratory hydrolysis results. (Cheung et al., 2009) used BIOPEP to look for oats with bioactive proteins. They performed in silico hydrolysis by a variety of enzymes and concluded that thermolysin provided the most accurate results for in vitro analysis; in vitro thermolysin hydrolysis confirmed their simulated results. This method may also aid in the search for new bioactive peptides.

Table 4.3. Number of potential bioactive peptides and potential biological activity (B) of identified proteins using BIOPEP

NCBI Accession no	Number of active fragments					
	ACE Inhibitor (B)	Antioxidative (B)	Alpha glucosidase inhibitor (B)	DPP III inhibitor	DPP IV inhibitor (B)	Stimulating
YP_537058.1	71 (0.0064)	5	2 5.6857	14	104 0.0004	6
ACZ57927.1	223 (0.0188)	34	6 9.3043	52	318 0.0003	15
XP_005718172.1	119 (0.0251)	16	11 0.0002	15	130 0.0003	8
YP_007947897.1	77 (0.0118)	6	2 4.4035	14	112 0.0003	8
XP_005716285.1	118 (0.0419)	18	8 0.0001	13	165 0.0004	7
XP_005708023.1	83 (0.0148)	12	4 8.1064	18	135 0.0003	11
XP_005705635.1	223 (0.0092)	20 3.3330	19 8.3369	35	337 0.0003	31
P49609.1	407 (0.0164)	42	18 9.8974	77	532 0.0004	31
AAP97124.1	198 (0.0143)	16 4.8447	10 1.2480	32	250 0.0002	15
NP_053872.1	77 (0.0160)	9	3 9.7278	16	96 0.0002	11
XP_005715325.1	272 (0.0140)	12 2.7465	17 1.4313	34	372 0.0002	30
AFR78246.1	129 (0.0316)	19	8 0.0003	29	173 0.0003	6

Table 4.4.The frequency of occurrence of peptides with a given activity (A) in selected protein sequences

NCBI Accession no	Number of activities	∑ A	A1	A2	A3
			ACE Inhibitor	DPP IV Inhibitor	Alpha glucosidase inhibitor
YP_537058.1	14	1.2848	0.4128	0.6105	0.0116
ACZ57927.1	17	1.4709	0.4665	0.6653	0.0126
XP_005718172.1	17	1.5543	0.564	0.6161	0.0521
YP_007947897.1	17	1.367	0.435	0.6328	0.0113
XP_005716285.1	13	1.3796	0.4664	0.6522	0.0316
XP_005708023.1	14	1.3676	0.386	0.6279	0.0186
XP_005705635.1	20	1.2952	0.4069	0.615	0.0347
P49609.1	19	1.5275	0.5113	0.6683	0.0226
AAP97124.1	18	1.4989	0.5252	0.6631	0.0265
NP_053872.1	13	1.4596	0.4783	0.5963	0.0186
XP_005715325.1	21	1.3848	0.4714	0.6447	0.0295
AFR78246.1	16	1.538	0.4886	0.6553	0.0303

ACE inhibitor: Angiotensin-converting enzyme inhibitor.

DPP IV: Dipeptidyl peptidase IV inhibitor.

∑ A: Summation of active compound

Table 4.5.1: The predicted efficiency of release of bioactive fragments from selected *pyropia* protein by *in silico* proteolysis for ACE inhibitor

Protein	Papain			Steam Bromelain			Thermolysin			Pepsin			Trypsin			Chymotrypsin		
	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W
Phycocyanin beta subunit	44.44	0.0698	0.0691	62.5731	0.0698	0.1691	43.8596	0.0116	0.0281	12.2807	-	-	8.7719	-	-	23.9766	0.0174	0.0422
Ribulose-1.5-bisphosphate carboxylase	39.9168	0.0498	0.1076	53.2359	0.0458	0.0986	39.0397	0.0354	0.0762	11.6910	0.0104	0.0224	10.4384	0.0063	0.0136	27.5574	0.0312	0.0672
RNP domain-containing protein	44.0758	0.0755	0.1345	53.7736	0.0798	0.1428	29.2433	0.0423	0.0757	8.0189	-	-	13.6792	0.0094	0.0168	20.2830	0.0047	0.0084
Phycoerythrin beta subunit	39.3258	0.0335	0.0779	60.6742	0.0894	0.2074	44.3820	0.0223	0.0518	9.5506	-	-	9.5506	-	-	21.3483	0.0168	0.0391
Triose-phosphate isomerase	37.0079	0.0431	0.0931	55.5118	0.0588	0.1271	40.1575	0.0275	0.0594	7.8740	-	-	8.2677	-	-	18.5039	-	-
f GTPase family 11	35.6481	0.0507	0.1325	53.2407	0.0276	0.0722	36.5741	0.0230	0.0601	12.5000	0.0046	0.0120	14.8148	-	-	23.6111	0.0184	0.0481
Peptidylproly Isomerase	36.6120	0.0327	0.0806	54.5956	0.0440	0.1085	31.6176	0.0183	0.0451	11.3971	0.0055	0.0136	7.5368	0.0037	0.0091	25.5515	0.0257	0.0634
Aconitate hydratase	41.1765	0.0725	0.1425	55.7089	0.0551	0.1080	37.1859	0.0514	0.1004	10.2564	0.0061	0.0124	9.7880	0.0049	0.0100	21.9780	0.0207	0.0422
Cysteine synthase	41.7526	0.0797	0.1598	59.0206	0.0643	0.1289	39.9485	0.0257	0.1241	08.5052	0.0026	0.0052	8.7629	0.0077	0.0154	17.2680	0.0154	0.0309
Allophycocyanin alpha subunit	41.9753	0.0675	0.1429	56.7901	0.0736	0.1558	39.5062	0.0491	0.1039	11.7284	0.0061	0.0129	10.4938	0.0123	0.0260	22.2222	0.0245	0.0519
Chaperonine 60	41.6667	0.0572	0.1213	53.3333	0.0763	0.1619	38.0208	0.0364	0.0772	10.2431	0.0069	0.0146	11.9792	0.0069	0.0146	19.1638	0.0157	0.0322
Ferritin	43.0189	0.0564	0.1163	60.3774	0.0564	0.1163	40.3774	0.0526	0.1085	11.3208	0.0038	0.0078	6.4151	-	-	24.1509	0.0301	0.0621

Table 4.5.2 : The predicted efficiency of release of bioactive fragments from selected *pyropia orbicularis* protein by *in silico* proteolysis for DPP ⅳ inhibitor

Protein	Papain			Steam Bromelain			Thermolysin			Pepsin			Trypsin			Chymotrypsin		
	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W
Phycocyanin beta subunit	44.44	0.1163	0.1905	62.5731	0.1163	0.1905	43.8596	0.0465	0.0762	12.2807	0.0058	0.0095	8.7719	0.0058	0.0095	23.9766	0.0116	0.0190
Ribulose-1.5-bisphosphate carboxylase	39.9168	0.0809	0.1230	53.2359	0.0917	0.1384	39.0397	0.0688	0.1038	11.6910	0.0125	0.0189	10.4384	0.0063	0.0095	27.5574	0.0354	0.0534
RNP domain-containing protein	44.0758	0.1085	0.1769	53.7736	0.1033	0.1693	29.2433	0.0469	0.0768	8.0189	-	-	13.6792	0.0047	0.0077	20.2830	0.0141	0.0231
Phycoerythrin beta subunit	39.3258	0.0894	0.1429	60.6742	0.0950	0.1581	44.3820	0.0335	0.0535	9.5506	0.0056	0.0089	9.5506	-	-	21.3483	0.0168	0.0268
Triose-phosphate isomerase	37.0079	0.0706	0.1091	55.5118	0.1020	0.1576	40.1575	0.0392	0.0606	7.8740	-	-	8.2677	-	-	18.5039	0.0039	0.0060
f GTPase family 11	35.6481	0.0876	0.1408	53.2407	0.0645	0.1037	36.5741	0.0369	0.0593	12.5000	0.0092	0.0148	14.8148	0.0046	0.0074	23.6111	0.0230	0.0370
Peptidylproly Isomerase	36.6120	0.0545	0.0890	54.5956	0.0789	0.1291	31.6176	0.0422	0.0691	11.3971	0.0055	0.0090	7.5368	0.0055	0.0090	25.5515	0.0477	0.0781
Aconitate hydratase	41.1765	0.0950	0.1431	55.7089	0.0827	0.1240	37.1859	0.0552	0.0829	10.2564	0.0110	0.0173	9.7880	0.0012	0.0019	21.9780	0.0280	0.0440
Cysteine synthase	41.7526	0.0977	0.1539	59.0206	0.0951	0.1498	39.9485	0.0308	0.0485	08.5052	0.0026	0.0041	8.7629	0.0051	0.0080	17.2680	0.0154	0.0243
Allophycocyanin alpha subunit	41.9753	0.0982	0.1667	56.7901	0.0736	0.1250	39.5062	0.0552	0.0937	11.7284	0.0184	0.0312	10.4938	-	-	22.2222	0.0307	0.0521
Chaperonine 60	41.6667	0.0936	0.1452	53.3333	0.0901	0.1398	38.0208	0.0451	0.0700	10.2431	0.0087	0.0135	11.9792	0.0035	0.0054	19.1638	0.0174	0.0269
Ferritin	43.0189	0.0902	0.1387	60.3774	0.1128	0.1734	40.3774	0.0752	0.1156	11.3208	0.0113	0.0174	6.4151	-	-	24.1509	0.0338	0.0520

Table 4.5.3: The predicted efficiency of release of bioactive fragments from selected *pyropia orbicularis* protein by *in silico* proteolysis for Alpha-glucosidase inhibitor

Protein	Papain			Steam Bromelain			Thermolysin			Pepsin			Trypsin			Chymotrypsin		
	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W	DH_t	A_E	W
Phycocyanin beta subunit	44.44	0.0058	0.5000	62.5731	-	-	43.8596	0.0058	0.5000	12.2807	-	-	8.7719	-	-	23.9766	-	-
Ribulose-1.5-bisphosphate carboxylase	39.9168	0.0021	0.1694	53.2359	-	-	39.0397	0.0021	0.1680	11.6910	-	-	10.4384	-	-	27.5574	-	-
RNP domain-containing protein	44.0758	0.0047	0.0906	53.7736	0.0047	0.0911	29.2433	0.0094	0.1822	8.0189	-	-	13.6792	-	-	20.2830	-	-
Phycoerythrin beta subunit	39.3258	-	-	60.6742	-	-	44.3820	-	-	9.5506	-	-	9.5506	-	-	21.3483	-	-
Triose-phosphate isomerase	37.0079	0.0039	0.1242	55.5118	0.0039	0.1242	40.1575	0.0118	0.3758	7.8740	-	-	8.2677	-	-	18.5039	-	-
f GTPase family 11	35.6481	-	-	53.2407	-	-	36.5741	0.0046	0.2500	12.5000	-	-	14.8148	-	-	23.6111	-	-
Peptidylproly Isomerase	36.6120	-	-	54.5956	0.0092	0.2636	31.6176	0.0037	0.1060	11.3971	-	-	7.5368	-	-	25.5515	-	-
Aconitate hydratase	41.1765	0.0025	0.1111	55.7089	0.0013	0.0575	37.1859	0.0088	0.3894	10.2564	-	-	9.7880	-	-	21.9780	-	-
Cysteine synthase	41.7526	0.0026	0.1012	59.0206	0.0051	0.1984	39.9485	0.0026	0.1012	08.5052	-	-	8.7629	-	-	17.2680	-	-
Allophycocyanin alpha subunit	41.9753	0.0061	0.3315	56.7901	0.0123	0.6685	39.5062	0.0061	0.3315	11.7284	-	-	10.4938	-	-	22.2222	-	-
Chaperonine 60	41.6667	0.0035	0.1186	53.3333	0.2339	-	38.0208	0.0069	0.2339	10.2431	-	-	11.9792	-	-	19.1638	-	-
Ferritin	43.0189	0.0075	0.1812	60.3774	-	-	40.3774	0.0150	0.4983	11.3208	-	-	6.4151	-	-	24.1509	0.0038	0.1262

Table 4.6. Bioactive peptides predicted to be released from *pyropia orbicularis* protein based on *in silico* enzymolysis

Enzyme	ACE inhibitor	DPP-IV inhibitor	Alpha-glucosidase inhibitor
Papain	229 AF(14),AG(43),QG(8), NG(2),PG(4),AR(22), AV(5),AEL,QP,EF, DR(5),PL(6),IG(10), HL(5),KG(2),AL(3), SG(10),EG(7),KL(2), ASL(4),DF,ST(7),ER(4),AP(4),KR(4),MG(5), QG,AI(2),VR,DG(7),A H,AY(2),IF(2),VG(10), EI(2),SF,VF,NF,YG(2) ,IVR,EV,VE,VW,AVL (2),IL(3),YL(3),MF,PP ,YN,VP	361 QP,AL(40),AD(7),AE(7), AF(15),AG(39),AS(7),AV(5), DR(5),ET(4),ML(5),NG(3), PG(7),QG(10),QL(16),HL(5), PL(6),WR,WT,YT,AT(27), EG(8),HR,IH,KG(2),KT(7), MR(3),PF(4),QF(6),QT(7), SI(2),YR(2),APG(5),VR(3), AG(4),AH,HT,KR(4),MG(3), NL(5),NV,VL(6),NR(3),NT(3), AY(2),EI(2),KV(2),VG(8),VT(6), KP,DP,SF,SL(2),AP,DN,QS,VF, MG(2),VS(2),YI,EP,NP,WF,EH, EV,IL(3),KK,KS,KY,NF,QD(2), VE,VG(3),YD,YG,YL(2),YF, YG,VR,II,SV,YN,QE,QI,QV, VW	12 AD(7),PE(2),VE, PP,VW
Stem bromelain	251 IA(20),YA(7),DA(15), QG(4),EG(15),NG(6), PG(15),YV(4),EF(5), DR(11),YL(5),PL(9), IG(14),HL(6),KG(7), KL(6),KA(13),DF,ER(11),IR(2),KR(5),IF(3), MG(5),EA(14),DG(13) ,EVC(13),NF(2),WA(2),YL,PT,YG(5),MF(3), HG,IL(5),PR,NKL	389 IA(20),YT(2),DR(8),EG(15), ET(8),KV(7),ML(5),MV(4), NA(15),NG(5),NT(5),PG(15), QA(11),QG(4),QL(11),YA(7), YF(3),YV(5),MA(15),KA(12), PA(11),HL(6),PL(9),WR,WT(3), YT,ES(15),HR,KG(7),KT(10), MR(3),QL(9),NL(9),NR(5), NV(10),PF(5),PV(7),QF(3), QS(6),QT(5),YL(5),YR(3), YS(2),HA(5),EV(13),HT(2),IR, KR(5),KS(10),MG(5),WA(2), WL,HS(2),NF(2),QV(5),PT, YG(5),WV,IL(5),WF,MF(2), PS(8),MQ	16 EA(16)
Thermolysin	148 AR(6),LR(13),IW,VK (2),	207 AD(14),AE(13),AS(19),VS(10), YQ(2),IP,YT(4),AG(13),AT(10),	27 AD(14),VE(11), VW(2)

	IP,VP(3),FR(2),IG(10), AG(13),FG(3),LG(11), IE(4),LQ(5),LN(2),VM (3),IR(2),AP(10),VR(3),VE(11),AH(2),YH(2), LP(6),VW(2),AW,VK P,FQ,VG(7),FP(2),YG(2),YGG(2),YK(2),IE(2),LN,FKD,VGP,YE,L QQ,AKK,YN,LPG,LK P,LEE,LEK	FN(2),FR(2),IH(3),IN(2),IQ(3), IW,LH(2),LM(5),LN(3),LT(6), VK(2),VM(3),VT(7),YD(6), YR(3),AP(10),LR,VR(3),AH(3), IR(2),VE(11),YH(2),VN(3), LP(5),AW,FQ,VH,VW(2),IM, VG(7),YS,VP(2),FP(2),VD(4), YE,YG(2)YK(2),VQ,YN, APG(2)	

Amino acids have represented using letter codes:

alanine – ala-A ,arginine - arg – R,asparagine - asn - N ,aspartic acid - asp – D,cysteine - cys - C ,glutamine - gln - Q ,glutamic acid - glu – E,glycine - gly - G ,histidine - his - H ,isoleucine - ile – I,leucine - leu - L ,lysine - lys - K ,methionine - met - M ,phenylalanine - phe - F ,proline - pro - P ,serine - ser – S,threonine - thr - T ,tryptophan - trp – W,tyrosine - tyr - Y ,valine - val - V

Table 4.7. Predicted potential novel peptide released from *pyropia orbicularis* protein

Peptide	Sequence	predicted bioactive score	Enzyme	molecular wt. gm/mol	solubility in water	net charge at PH 7	Resistance to digestion	toxicity	allergence probability	Predicted IC_{50} ACE Inhibitor
PCF	Pro-cys-phe	0.992	Papaine, Stem Bromelain,	365.45	poor	-0.1	yes	non toxin	non-allergen	5.07
WHF	trp-hys-phe	0.99	Papaine, Stem Bromelain,	488.54	poor	0.1	yes	non toxin	allergen	4.18
FMR	phe-met-arg	0.98	Papaine, Thermolysin	452.57	good	1	no	non toxin	allergen	5.08
MNF	met-ans-phe	0.959	Papaine,	410.49	poor	0	yes	non toxin	non-allergen	4.13
IPW	ile-pro-trp	0.959	Stem Bromelain, Thermolysin	414.5	poor	0	yes	non toxin	allergen	5.36
AWL	ala-trp-leu	0.934	Papaine, Stem Bromelain,	388.46	poor	0	yes	non toxin	allergen	4.18
MKF	met-lys-phe	0.919	Papaine, Stem Bromelain,	424.56	good	1	no	non toxin	non-allergen	4.59

WQG	trp-gln-gly	0.904	Papaine, Thermolysin	389.41	poor	0	yes	non toxin	allergen	4.04
WNL	trp-ans-leu	0.898	Papaine, Stem Bromelain,	431.49	poor	0	yes	non toxin	non-allergen	4.33
SYF	ser-tyr-phe	0.896	Papaine, Stem Bromelain,	415.44	poor	0	yes	non toxin	non-allergen	5.19
QYF	gln-tyr-phe	0.891	Papaine,	456.49	poor	0	yes	non toxin	allergen	4.92
MVF	met-val-phe	0.889	Papaine,	395.52	poor	0	yes	non toxin	allergen	4.64
PPR	pro-pro-arg	0.879	Papaine, Stem Bromelain,	368.43	good	1	yes	non toxin	allergen	4.92
FKP	phe-lys-pro	0.871	Stem Bromelain, Thermolysin	390.48	good	1	yes	non toxin	allergen	4.07
AIW	ala-ile-trp	0.849	Papaine,	388.46	poor	0	yes	non toxin	allergen	5.17
FDR	phe-asp-arg	0.846	Papaine, Stem Bromelain,	436.46	good	0	no	non toxin	allergen	5.17
FSR	phe-ser-arg	0.831	Papaine, Stem Bromelain,	408.45	good	1	no	non toxin	allergen	5.35

YWD	tyr-trp-asp	0.828	Papaine, Stem Bromelain, Thermolysin	482.48	good	-1	yes	non toxin	allergen	5.07
LCG	leu-cys-gly	0.81	Papaine, Stem Bromelain, Thermolysin	291.37	poor	-0.1	yes	non toxin	allergen	5.17
SIF	ser-ile-phe	0.805	Papaine, Stem Bromelain,	365.42	poor	0	yes	non toxin	allergen	5.08
ANF	ala-asn-phe	0.803	Papaine, Stem Bromelain,	350.37	poor	0	yes	non toxin	allergen	3.8
MPI	met-pro-ile	0.799	Papaine, Stem Bromelain, Thermolysin	359.49	poor	0	no	non toxin	allergen	5.12
NIF	asn-ile-phe	0.781	Papaine, Thermolysin	392.45	poor	0	yes	non toxin	non-allergen	3.83
IWA	ile-trp-ala	0.775	Papaine, Stem Bromelain,	388.46	poor	0	yes	non toxin	allergen	5.17
QNW	gln-asn-trp	0.769	Papaine, Stem Bromelain,	446.46	poor	0	yes	non toxin	non-allergen	4.21
VRW	val-arg-trp	0.763	Stem Bromelain, Thermolysin	459.54	good	1	yes	non toxin	non-allergen	5.33

EPF	glu-pro-phe	0.756	Stem Bromelain, Thermolysin	391.42	good	-1	yes	non toxin	non-allergen	4.97
ACL	ala-cys-leu	0.746	Papaine, Stem Bromelain, Thermolysin	305.4	poor	-0.1	yes	non toxin	allergen	5.24
CIG	cys-ile-gly	0.739	Papaine, Stem Bromelain,	291.37	poor	-0.1	no	non toxin	non-allergen	4.69
AML	ala-met-leu	0.739	Papaine, Stem Bromelain, Thermolysin	333.45	poor	0	yes	non toxin	non-allergen	5.21
PPN	pro-pro-asn	0.728	Papaine, Stem Bromelain,	326.35	poor	0	no	non toxin	non-allergen	3.63
DMG	asp-met-gly	0.711	Papaine, Stem Bromelain,	321.35	good	-1	yes	non toxin	non-allergen	4.73
IML	ile-met-leu	0.709	Papaine, Stem Bromelain,	375.53	poor	0	yes	non toxin	non-allergen	5.23
MMS	met-met-ser	0.709	Papaine, Stem Bromelain, Thermolysin	367.49	poor	0	yes	non toxin	non-allergen	5.55
SPG	ser-pro-gly	0.697	Papaine, Stem Bromelain,	259.26	good	0	no	non toxin	allergen	4.7

APL	ala-pro-leu	0.697	Papaine, Stem Bromelain, Thermolysin	299.37	poor	0	yes	non toxin	non-allergen	4.86
ICR	ile-cys-arg	0.683	Papaine, Stem Bromelain, Thermolysin	390.5	good	0.9	yes	non toxin	allergen	5.53
YGR	tyr-gly-arg	0.676	Stem Bromelain, Thermolysin	394.43	good	1	yes	non toxin	allergen	4.11
EWG	glu-trp-gly	0.674	Papaine, Stem Bromelain, Thermolysin	390.39	good	-1	yes	non toxin	allergen	4.11
MTM	met-thr-met	0.665	Papaine, Stem Bromelain,	381.52	poor	0	yes	non toxin	non-allergen	5.17
QPG	gln-pro-gly	0.66	Papaine, Stem Bromelain, Thermolysin	300.31	poor	0	no	non toxin	allergen	4.6
PMS	pro-met-ser	0.659	Papaine, Stem Bromelain, Thermolysin	333.41	poor	0	yes	non toxin	non-allergen	5.08
APR	ala-pro-arg	0.649	Papaine, Thermolysin	342.39	good	1	yes	non toxin	non-allergen	5.04

CDL	cys-asp-leu	0.647	Papaine, Stem Bromelain,	349.41	good	-1.1	yes	non toxin	allergen	5.54
DCR	asp-cys-arg	0.647	Papaine, Stem Bromelain,	392.43	good	-0.1	yes	non toxin	non-allergen	5.45
APY	ala-pro-tyr	0.641	Stem Bromelain, Thermolysin	349.38	poor	0	yes	non toxin	non-allergen	4.32
DPL	asp-pro-leu	0.641	Papaine, Stem Bromelain, Thermolysin	343.88	good	-1	yes	non toxin	allergen	5.28
DWS	asp-trp-ser	0.637	Papaine, Stem Bromelain, Thermolysin	406.39	good	-1	yes	non toxin	non-allergen	5.35
HPL	his-pro-leu	0.636	Papaine, Stem Bromelain, Thermolysin	365.43	poor	0.1	yes	non toxin	allergen	4.43
MDL	met-asp-leu	0.635	Papaine, Stem Bromelain,	377.46	good	-1	yes	non toxin	allergen	5.46
IPR	ile-pro-arg	0.629	Papaine, Stem Bromelain,	384.47	good	1	yes	non toxin	allergen	5.34

ITW	ile-thr-trp	0.611	Papaine, Stem Bromelain, Thermolysin	418.49	poor	0	yes	non toxin	non-allergen	5.22
FRE	phe-arg-glu	0.602	Papaine, Stem Bromelain, Thermolysin	450.49	good	0	no	non toxin	allergen	4.83
VPC	val-pro-cys	0.6	Papaine, Stem Bromelain,	317.41	poor	-0.1	no	non toxin	allergen	5.35
WDT	trp-asp-thr	0.593	Papaine, Stem Bromelain, Thermolysin	420.42	good	-1	yes	non toxin	non-allergen	4.96
VWH	val-trp-his	0.591	Papaine, Stem Bromelain,	440.5	poor	0.1	yes	non toxin	non-allergen	4.39
YEF	tyr-glu-phe	0.553	Papaine, Stem Bromelain, Thermolysin	457.48	good	-1	yes	non toxin	allergen	4.55
KKF	lys-lys-phe	0.532	Papaine, Stem Bromelain,	421.53	good	2	no	non toxin	non-allergen	4.17
PYA	pro-tyr-ala	0.526	Papaine, Stem Bromelain,	349.38	poor	0	yes	non toxin	allergen	4.32
IRG	ile-arg-gly	0.521	Papaine, Stem Bromelain	344.41	good	1	yes	non toxin	allergen	4.47

ADM	ala-asp-met	0.52	Papaine, Stem Bromelain	335.38	good	-1	yes	non toxin	non-allergen	5.23
QMH	gln-met-his	0.503	Papaine, Stem Bromelain	414.48	poor	0.1	yes	non toxin	non-allergen	4.02
VWN	val-trp-asn	0.523	Papaine, Stem Bromelain	417.46	poor	0	yes	non toxin	allergen	4.53

Table 4.8: List of polypeptides having score less than 0.5 in peptide ranker

Polypeptides	NVF,AYL,MIA,PEM,AEF,KPR,QMA,AYR,LMS,ACD,MNI,DYL,MVL,FTQ,HYLAMQ,DPA,QSM,NPA,AIG,ACS,NEF,LNG,AMK,IKM,IPD,LSG,IMK,SCT,VGG,LGD,DCS,IPS,YGS,IGN,YSR,YKG,KMA,DIL,ADG,LGS,SHL,ANG,WES,QIL,IDG,ASG,CIV,YKL,ISG,DPA,KEF,HDG,ANL,DNG,LRD,KPA,QPS,AGQ,IDL,SDL,LGT,QIR,ADR,LRK,LSR,YIA,QDL,ANR,PDS,DDR,APV,DSG,DNL,MST,VRR,ASR,EPR,IIH,IKG,NDG,AGT,PDT,LD,VEF,YEP,VHP,DPV,QSG,LTG,DNR,NDL,PNT,AEM,QSL,PQT,KHL,LSH,VPN,VDP,IHA,KNG,PDV,PNV,VIG,AVG,FEE,ATG,EYG,AYT,KDL,QKR,DHA,LKH,YEG,DYT,LDN,YDQ,DKY,LEG,PEA,AIS,LSS,IGE,NKR,LDS,AIK,KKL,VKP,DVL,EIG,NYT,QVL,YNT,VNG,VPT,DYV,IEG,IDD,AEG,AIT,AND,IKA,LKD,ADQ,LKK,IDS,NYV,VGK,EPT,IQS,LST,AQS,AER,AKD,IER,NEG,LQT,INT,LNT,SNT,IKS,QER,EPV,ESL.

Amino acids have represented using letter codes:

alanine – ala-A ,arginine - arg – R,asparagine - asn - N ,aspartic acid - asp – D,cysteine - cys - C ,glutamine - gln - Q ,glutamic acid - glu – E,glycine - gly - G ,histidine - his - H ,isoleucine - ile – I,leucine - leu - L ,lysine - lys - K ,methionine - met - M ,phenylalanine - phe - F ,proline - pro - P ,serine - ser – S,threonine - thr - T ,tryptophan - trp – W,tyrosine - tyr - Y ,valine - val - V

CHAPTER 5: DISCUSSIONS

This research aimed to determine whether or not *Pyropia orbicularis* protein contained any biologically active peptides.

5.1 protein identified by MALDI-TOFF mass spectrometry

Table 4.1 shows the identified protein, their accession number, molecular mass (kdA) & amino acid residue. *Pyropia orbicularis* is a good source of essential amino acid. Table 4.2 indicates that we have good opportunity to collect & utilize the expected essential amino acid which we want.

5.2 *In silico* analysis

The other table are the part of *in silico* analysis. In this study we found the greater number of potential biological peptides for ACE inhibitor & DPP IV inhibitor. Some active peptides for alpha-glucosidase inhibitor is also found.

BIOPEP-UWM database gives the number of bioactive peptides expected to be released from the proteins. Based on the existing information in BIOPEP-UWM database (as of 23rd August 2022, 4325 peptides formed in 56 bioactivities have been existed), fragments with 16 biological activities were found in 12 different *pyropia orbicularis* proteins.

For total frequency of bioactive peptides occurrence (ΣA), RNP domain containing protein had the highest value (ΣA of 1.5543) followed by Aconitate hydratase (ΣA 1.5275) (table 4.4). The total frequency of occurrence, ΣA 1.5543 of RNP domain containing protein consists of ACE inhibitor of 0.564 and DPP IV inhibitor of 0.6161. This indicates that the main portion of the frequency of occurrences comes from ACE and DPP IV inhibitor. The occurrence varies from 0.6683 to 0.5963 (DPP IV inhibitor) and 0.5640 to 0.3860 (ACE inhibitor) for the different proteins. The total occurrences differ 1.5543 to 1.2848 and similar observation detected regarding the major portions of each protein. Thus, ACE and DPP IV inhibitors were the major part of the occurrence of bioactive fragments and the study focused on these activities. However, no comparison

can be made as no study has been reported on in-silico of *pyropia orbicularis* protein to produce bioactive peptides.

Among the predicted bioactivity present in the proteins were ACE inhibition, antioxidative, DPP-IV inhibition, DPP-III inhibition and stimulating fragments (table 4.3). BIOPEP-UWN database also gave the potential activities (B). It was found that ACE inhibitor and DPP IV inhibitor were the maximum released biological active fragments. DPP IV inhibitor had the highest active fragments (95-387) compared to ACE inhibitor fragments (81-192) though potential bioactivity (B) value was higher for the ACE inhibitor. It was also found that different species of *pyropia* family have proteins with various bioactive peptides mainly ACE inhibitor, antioxidative, DPP IV inhibitor etc. Proteins from the identical family expected to be possessed similar bioactive peptides(Sharmin et al., 2022)

In the BIOPEP-UWM database, there are 33 types of enzyme, but in this study, six proteases (Chymotrypsin, Papain, pepsin, thermolysin, trypsin and stem bromelain) are chosen for the *in-silico* proteolysis as they are commercially available. Compared with our result is was found that three proteases papain, ficin,stem bromelain were utilized and stem bromelain showed the highest value (Sharmin et al., 2022).

For the ACE Inhibitor, Chymotrypsin enzyme has Degree of Hydrolysis (DH_t) value higher in stem bromelain and papain enzyme. Pepsin and trypsin shows lower value . Like that, in DPP-IV inhibitor and Alpha-glucose contain lower Degree of Hydrolysis value in the corporation with Pepsin and Trypsin enzyme. In this study, stem bromelain shows the highest Degree of hydrolysis (DH_t).

5.3 Novel peptides

In this study, 63 novel peptides we found those have predicted bioactivity score more than 0.5 by peptide ranker. Their real activity is not find out yet. All peptides are not performed as toxin .Thirty four peptides are soluble in water. Twenty eight peptides are not showing allergenecity. Twelve peptides are not resistance to digestion.

PCF,MNF,MKF,WNL,SYF,NIF,QNW,VRW,EPF,CIG,AML,PPN,DMG,IML,MMS,APL,MTM,PMS,APR,PCR,APY,DWS,ITW,WDT,VWH,KKF,ADM,QMH.

Total: 28

In silico analysis suggest that, these novel peptides have high acceptability in pharmaceutical & functional food products. So, further *in vitro* & *in vivo* analysis is required to understand the actual condition of these novel peptides.

Amino acids have represented using letter codes:

alanine – ala-A ,arginine - arg – R,asparagine - asn - N ,aspartic acid - asp – D,cysteine - cys - C ,glutamine - gln - Q ,glutamic acid - glu – E,glycine - gly - G ,histidine - his - H ,isoleucine - ile – I,leucine - leu - L ,lysine - lys - K ,methionine - met - M ,phenylalanine - phe - F ,proline - pro - P ,serine - ser – S,threonine - thr - T ,tryptophan - trp – W,tyrosine - tyr - Y ,valine - val - V

CHAPTER 6: CONCLUSION

Possible building blocks for the development of bioactive peptides can be found in the proteins of *pyropia orbicularis*. There has been no published research on the possibility of using proteins from *pyropia orbicularis*. as building blocks for bioactive peptides(Sharmin et al., 2022) Twelve proteins from the *pyropia orbicularis*. were chosen in this in silico study as possible building blocks for bioactive peptides. Dipeptidyl peptidase-IV (DPP IV) inhibitory and angiotensin-I converting enzyme (ACE) inhibitory activities were identified as the most promising bioactivities. In-silico proteolysis was performed with papain, thermolysin, and stem bromelain. To a greater extent, bromelain isolated from the stem was able to release fragments of a given activity. Sixty-three tripeptides were also screened for their potential as novel bioactive peptides. Moreover, the bioinformatics programs PeptideRanker, PepCalc, Peptide Cutter, ToxinPred, AllerTop, and AHTpin were used to study the peptides' individual properties. All peptides were predicted to be non-toxic by the bioinformatics tools, and 28 were also predicted to be non-allergenic and very promising. These results suggest that *pyropia orbicularis*. can be used as a source of bioactive peptides, and they can serve as a foundation for future in-vitro and in-vivo study of bioactive peptides from *pyropia orbicularis*.

CHAPTER 7

RECOMMENDATIONS & FUTURE PERSPECTIVES

More research into the *pyropia orbicularis* protein extract is needed so that pharmaceuticals and functional food products, or the value added products, can be made from the plant. Here are some ideas for future research:

1. . Study on potential biological peptides from *pyropia orbicularis*, especially foe ACE & DPP IV inhibitor should be carried out.
2. Research into the seaweed protein extract's alpha-glucosidase inhibitor, stimulating, anti-diabetic, and anti-microbial properties is warranted.
3. Physiochemical properties of sea weed powder should be examined .
4. Human consumption capability of sea weed food needs to have especial consideration on future research .
5. Needs to have attention on developing more pharmaceutical & functional food products.

REFERENCES

Agirbasli Z and Cavas L (2017). In silico evaluation of bioactive peptides from the green algae Caulerpa. Journal of Applied Phycology, 29, pp. 1635–46.

Aziz E, Batool R, Khan MU, Rauf A, Akhtar W, Heydari M, Rehman S, Shahzad T, Malik A, Mosavat SH, Plygun S and Shariat MA (2020). An overview on red algae bioactive compounds and their pharmaceutical applications. *Journal of Complementary and Integrative Medicine*, 17(4), pp. 201-203.

Balasubramaniam V, June Chelyn L, Vimala S, Mohd Fairulnizal MN, Brownlee IA, Amin I (2020). Carotenoid composition and antioxidant potential of Eucheuma denticulatum, Sargassum polycystum and Caulerpa lentillifera. *Heliyon*, 6(8).

Cao J, Wang J, Wang S and Xu X (2016). Porphyra species: A mini-review of its pharmacological and nutritional properties. Journal of medicinal foods, 19(2), pp. 111-119

Capuano A, Sportiello L, Maiorino MI, Rossi F, Giugliano D. and Esposito K (2013). Dipeptidyl peptidase-4 inhibitors in type 2 diabetes therapy--focus on alogliptin. Drug Design and development therapy, (7), pp. 989-1001.

Carpentier, S. C., Witters, E., Laukens, K., Deckers, P., Swennen, R., and Panis, B. (2005). Preparation of protein extracts from recalcitrant plant tissues: an evaluation of different methods for two-dimensional gel electrophoresis analysis. *Proteomics*, 5(10), 2497-2507.

Carvalho C, Varela SAM, Marques TA, Knight A. and Vicente L (2020). Are in vitro and in silico approaches used appropriately for animal-based major depressive disorder research? Plos One, 15(6).

Chabanon, G.; Chevalot, I.; Framboisier, X.; Chenu, S. and Marc, I., (2007). Hydrolysis of rapeseed protein isolates: Kinetics, characterization and functional properties of hydrolysates. *Process of Biochemistry*, (42), pp. 1419-1428.

Chang, Y.W.; Hunag, B.B. and Lin, H.C (2015). Analysis of proteins and potential bioactive peptides from tilapia (oreochromis spp.) processing co-products using proteomic techniques coupled with biopep database. *Journal of Functional Foods*, 19, pp. 629–640.

Cheung I, Nakayama S, Hsu M, Samaranayaka A and Lichan E (2009). Angiotensin-I Converting Enzyme Inhibitory Activity of Hydrolysates from Oat (Avena sativa) Proteins by In Silico and In Vitro Analyses. *Journal of Agricultural and Food Chemistry*, 57 (19), pp. 9234-9242.

Chiasson JL, Josse RG. and Gomis R. (2003). Acarbose treatment and the risk of cardiovascular disease and hypertension in patients with impaired glucose tolerance. The STOP-NIDDM trial, 290, pp. 486–94.

Chiasson JL, Josse RG. and Gomis R. (2004). Acarbose for the prevention of Type 2 diabetes, hypertension and cardiovascular disease in subjects with impaired glucose tolerance: facts and interpretations concerning the critical analysis of the STOP-NIDDM Trial data. *Diabetologia*, 47, pp. 969–75.

Dantas G, Kuhlman B, Callender D, Wong M and Baker D (2003), A Large Scale Test of Computational Protein Design: Folding and Stability of Nine Completely Redesigned Globular Proteins. Journal of Molecular Biology, 332 (2), pp. 449–60.

del Mar Contreras, M., Lama-Muñoz, A., Gutiérrez-Pérez, J. M., Espínola, F., Moya, M., and Castro, E. (2019). Protein extraction from agri-food residues for integration in biorefinery: Potential techniques and current status. *Bioresource Technology*, 280, 459-477.

Je, J. Y., Cho, Y. S., Gong, M., and Udenigwe, C. C. (2015). Dipeptide Phe-Cys derived from in silico thermolysin-hydrolysed RuBisCO large subunit suppresses oxidative stress in cultured human hepatocytes. *Food Chemistry*, 171, 287-291.

Dziuba M., Minkiewicz P. and Dąbek M., (2013). Peptides, specific proteolysis products, as molecular markers of allergenic proteins – in silico studies. *Acta Scientiarum Polonorum Technologia Alimentaria*, 12(1), pp. 101-112.

Fleurence J. (2009). Seaweed proteins: biochemical, nutritional aspects and potential uses. *Trends Food Science and Technology*, 10(1), pp. 25-28.

Fleurence J (1999). The enzymatic degradation of algal cell walls: A useful approach for improving protein accessibility. Journal of Applied Phycology, 11, pp. 313–314.

Forner, F., Foster, L. J., Campanaro, S., Valle, G., & Mann, M. (2006). Quantitative proteomic comparison of rat mitochondria from muscle, heart, and liver. *Molecular & Cellular Proteomics*, 5(4), 608-619.

Gupta S, Kapoor P, Chaudhary K, Gautam A. and Kumar R (2013). In Silico Approach for Predicting Toxicity of Peptides and Protein. *PLOS ONE,* 8(9).

Hagen Rødde RS, Vårum KM, Larsen BA. and Myklestad S. M. (2004). Seasonal and geographical variation in the chemical composition of the red alga Palmaria palmata. Botanica Marina, 47 (2), pp. 125-33.

Kannel WB, Higgins M (1990). Smoking and hypertension as predictors of cardiovascular risk in population studies. *Journal of Hypertension,* 8, pp. 3–8.

Klevytska, A. M., Price, L. B., Schupp, J. M., Worsham, P. L., Wong, J., & Keim, P. (2001). Identification and characterization of variable-number tandem repeats in the Yersinia pestis genome. *Journal of clinical microbiology*, 39(9), 3179-3185.

Kuddus, M., Singh, P., Thomas, G., & Al-Hazimi, A. (2013). Recent developments in production and biotechnological applications of C-phycocyanin. *BioMed Research International*.

Lacroix, I.M.E.; Li-Chan and E.C.Y (2012). Evaluation of the potential of dietary proteins as precursors of dipeptidyl peptidase (DPP)-IV inhibitors by an in silico approach. Journal of Functional Foods, 4, pp. 403–422.

Lafarga T, Connor P O and Hayes M (2014). Peptides Identification of novel dipeptidyl peptidase-IV and angiotensin-I-converting enzyme inhibitory peptides from meat proteins using in silico analysis. *Peptides*, 59, pp**.** 53-62.

Lafarga T, Connor P O and Hayes M (2014). In silico methods to identify meat-derived prolyl endopeptidase inhibitors. Food Chemistry ,175, pp. 337-343.

Lafarga T, Aluko R E, Rai D K, Connor P O and Hayes M (2016). Identification of bioactive peptides from a papain hydrolysate of bovine serum albumin and assessment of an antihypertensive effect in spontaneously hypertensive rats. Food Research International, 81, pp. 91-99

Lafarga T., Acien-Fernandez, F.G., and Garcia-Vaquero, M. 2020. Bioactive peptides and carbohydrates from seaweed for food applications: Natural occurrence, isolation, purification, and identification. *Algal Research*.

Li, C. M., Haratipour, P., Lingeman, R. G., Perry, J. J. P., Gu, L., Hickey, R. J., & Malkas, L. H. (2021). Novel peptide therapeutic approaches for cancer treatment. Cells, 10(11), 2908.

Li GH, Le GW, Shi YH and Shrestha S (2013). Angiotensin I – converting enzyme inhibitory peptides derived from food proteins and their physiological and pharmacological effects. Nutrition Resources, 24, pp. 469–486.

Minkiewicz P, Dziuba J, Iwaniak A, Dziuba M and Darewicz M (2008). BIOPEP Database and Other Programs for Processing Bioactive Peptide Sequences. Journal of AOAC Intenational, 91, pp. 965–80.

Minkiewicz, P., Iwaniak, A., and Darewicz, M. (2022). BIOPEP-UWM Virtual—A Novel Database of Food-Derived Peptides with In Silico-Predicted Biological Activity. Applied Sciences, 12(14), 7204.

Newton, L. (1931). A Handbook of the British Seaweeds. British Museum.

Nongonierma AB, FitzGerald RJ. (2019). Features of dipeptidyl peptidase IV (DPP-IV) inhibitory peptides from dietary proteins. Journal of Food Biochemistry, 43(1).

Pinto AI. and Silveira NJ. (2020). In Silico Identification of Potential Inhibitors of the Wnt Signaling Pathway in Human Breast Cancer. Journal of Computational Biology, 27(7), pp. 999-1010.

Pliego C, H.; Wijesekara, I.; Lang, M.; Bourgougnon, N. and Bedoux, G (2020). Current knowledge and challenges in extraction, characterization and bioactivity of seaweed protein and seaweed-derived proteins. *In Advances in Botanical Research*, 95, pp. 289–326.

Pruitt K, Tatusova T and Maglott D (2005). NCBI Reference Sequence (RefSeq): a curated non-redundant sequence database of genomes, transcripts and proteins, *Nucleic Acids Research*, 33.

Qiao L, Li B, Chen Y, Li L, Chen X, Wang L, Lu F, Luo G, Li G and Zhang Y (2016): Discovery of Anti-Hypertensive Oligopeptides from Adlay Based on In Silico Proteolysis and Virtual Screening. *International journal of Molecular Science*, 17, pp. 12-13.

Roy A, Kucukural A and Zhang Y. (2010). I-TASSER: a unified platform for automated protein structure and function prediction. *Nature Protocols*, 5, 725-738.

Sharmin K N, M A Amiza, F Ahmad, S A Razali and F Hashim (2022). In silico analysis of Gracilaria changii proteins for potential bioactive peptides. IOP Conference Series: Earth and Environmental Science, 967, pp. 6-10.

Singh N, Upadhyay S, Jaiswar A and Mishra N (2016): In silico Analysis of Protein. *Journal of Bioinformatics, genomics and proteomics,* 1(2), pp.1007

Taher R A, Bashir A, Yousuf M N, Ahmed A, Dali Y, Khan S and Sehgal S A (2020). In Silico identification of angiotensin-converting enzyme inhibitory peptides, *Plos One*, 15, pp. 1-18.

Tailor PK., Davender R. Suman D. and Jasbir S. (2013). In Silico Evaluation of Potential DPP-III Inhibitor Precursors from Dietary Proteins. *International Journal of Food Properties*, 18(3), pp. 499-507.

Tradioli M M, Flórez-Fernández N. and Domínguez H (2018). Impact of counterions on the thermo-rheological features of hybrid carrageenan systems isolated from red seaweed Gigartina skottsbergii. *Food Hydrocolloids*, 84, pp. 321-29.

Udenigwe, Chibuike C, Gong M and Wu S (2013). In silico analysis of the large and small subunits of cereal RuBisCO as precursors of cryptic bioactive peptides, *Process Biochemistry*, 48 (11), 1794-1799.

Wang L., Qu Y., Fu X, Zhao M. and Wang S. (2014). Isolation, Purification and Properties of an R-Phycocyanin from the Phycobilisomes of a Marine Red Macroalga Polysiphonia urceolata. Plos ONE, 9(2).

Wang, Y, Tibbetts S. and McGinn P. (2021). Microalgae as Sources of High-Quality Protein for Human Food and Protein Supplements. *Foods,* 10(12), pp. 3002.

Wang, Z., Zhao, F. and Li, D. (2003). Determination of solubilization of phenol at coacervate phase of cloud point extraction. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 216(1-3), 207-214.

Wachters RE, Priebe MG. and Heimweg JA, (2007). Low-dose acarbose does not delay digestion of starch but reduces its bioavailability. Diabetic Medicine, 24, pp. 600–606.

W. J. Woelkerling (1990). An introduction of red algae. In K. M. Cole; R. G. Sheath (eds.). Biology of the Red Algae. Cambridge University Press, Cambridge. pp. 1–6.

Zhang SY. and Sun HC (2007): Research progress on seaweed bed ecosystem and its engineering. *The Journal of Applied Ecology*, 18(7), pp. 1647-1653.

APPENDICES

Profiles of proteins potential biological activity for phycocyanin beta subunit(YP 537058.1):

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	2	PG
3257	beta-lactokinin	ACE inhibitor	1	RL
3380	ACE inhibitor	ACE inhibitor	1	RY
3551	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	1	LF
3563	ACE inhibitor	ACE inhibitor	1	AY
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	2	IA
7583	ACE inhibitor	ACE inhibitor	1	AF
7585	ACE inhibitor	ACE inhibitor	1	LA
7586	ACE inhibitor	ACE inhibitor	1	KR
7588	ACE inhibitor	ACE inhibitor	2	RA
7589	ACE inhibitor	ACE inhibitor	1	YA
7590	ACE inhibitor	ACE inhibitor	2	AA
7596	ACE inhibitor	ACE inhibitor	1	GI
7599	ACE inhibitor	ACE inhibitor	1	GL
7600	ACE inhibitor	ACE inhibitor	1	AG
7606	ACE inhibitor	ACE inhibitor	3	DA
7607	ACE inhibitor	ACE inhibitor	2	GS
7612	ACE inhibitor	ACE inhibitor	1	GT
7615	ACE inhibitor	ACE inhibitor	1	GE
7616	ACE inhibitor	ACE inhibitor	1	GG
7617	ACE inhibitor	ACE inhibitor	1	QG
8193	ACE inhibitor	ACE inhibitor	1	AI
7619	ACE inhibitor	ACE inhibitor	2	LG
7620	ACE inhibitor	ACE inhibitor	2	GD
7621	ACE inhibitor	ACE inhibitor	1	TG
7622	ACE inhibitor	ACE inhibitor	1	EG
7623	ACE inhibitor	ACE inhibitor	1	EA
7624	ACE inhibitor	ACE inhibitor	1	NG
7625	ACE inhibitor	ACE inhibitor	2	PG
7635	ACE inhibitor from k-CN (fr. 51-53)	ACE inhibitor	1	VAV
7649	ACE inhibitor from red algae	ACE inhibitor	1	LRY
7680	ACE inhibitor from pea vicilin	ACE inhibitor	1	QK
7684	ACE inhibitor from garlic	ACE inhibitor	2	SY
7698	ACE inhibitor from wakame	ACE inhibitor	2	NK
7741	ACE inhibitor	ACE inhibitor	1	RR
7742	ACE inhibitor	ACE inhibitor	2	AR
7824	ACE inhibitor from micro algae	ACE inhibitor	1	IAE

7826	ACE inhibitor	ACE inhibitor	1	EI
7832	ACE inhibitor	ACE inhibitor	1	LN
7834	ACE inhibitor	ACE inhibitor	2	TQ
7837	ACE inhibitor	ACE inhibitor	1	PQ
7839	ACE inhibitor	ACE inhibitor	1	ME
7841	ACE inhibitor	ACE inhibitor	1	KE
8184	ACE Inhibitor	ACE inhibitor	1	IQP
8951	ACE inhibitor	ACE inhibitor	2	AV
9073	ACE inhibitor	ACE inhibitor	1	TP
9075	ACE inhibitor	ACE inhibitor	1	DM
9077	ACE inhibitor	ACE inhibitor	1	YV
9088	ACE inhibitor	ACE inhibitor	1	AEL
9173	ACE inhibitor	ACE inhibitor	1	RG
9213	ACE inhibitor	ACE inhibitor	3	LR
9566	ACE inhibitor	ACE inhibitor	2	QP
9942	ACE inhibitor	ACE inhibitor	1	EF
10091	ACE inhibitor	ACE inhibitor	2	DR
3285	Antithrombotic peptide	antithrombotic	2	PG
8320	Glucose uptake stimulating peptide	stimulating	2	VL
8322	Glucose uptake stimulating peptide	stimulating	2	IV
8324	Glucose uptake stimulating peptide	stimulating	2	LI
2754	peptide regulating the stomach mucosal membrane activity	regulating	2	PG
7866	peptide from Okara protein	antioxidative	1	AY
7888	antioxidative peptide	antioxidative	1	EL
8219	antioxidative peptide	antioxidative	1	TY
9879	Antioxidative peptide	antioxidative	1	SVL
10051	Antioxidative peptide	antioxidative	1	RY
10141	Hypotensive peptide	hypotensive	2	AA
4005		activating ubiquitin-mediated proteolysis	2	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	1	LA
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LA

3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FA
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VV
8503	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TP
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RA
8532	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QP
8555	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	FL
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AL
8561	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GL
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AA
8693	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IQP
8696	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YT
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AE
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AG
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AS
8764	dipeptidyl peptidase IV inhibitor (DPP IV	dipeptidyl	2	AV

	inhibitor)	peptidase IV inhibitor		
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AY
8769	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	DR
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EG
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EI
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ET
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GE
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GG
8785	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GI
8804	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IN
8805	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IQ
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KE
8812	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KI
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KR
8817	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KV
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LI
8823	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LN
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	1	LT

		inhibitor		
8826	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ME
8830	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MI
8831	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MK
8832	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ML
8837	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MV
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NA
8840	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ND
8843	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NG
8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NT
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PG
8861	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PQ
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QA
8871	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QG
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QL
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RG
8886	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RL
8887	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RM

8889	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RR
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	SV
8897	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SY
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TG
8907	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TN
8908	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TQ
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TS
8914	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TY
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VL
8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VN
8925	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VQ
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VS
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VT
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YA
8935	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YF
8943	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YQ
8946	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YV
9650	Alpha-glucosidase inhibitor	alpha-glucosidase	1	EA

		inhibitor		
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	AD
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	LR
9480	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YF
9485	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RR
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GE
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	DA
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	LA
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	FA
9502	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	FL
9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	SM
8250	CaMPDE inhibitor	CaMPDE inhibitor	1	EF
2842	Renin inhibitor	renin inhibitor	3	LR
8251	Renin inhibitor	renin inhibitor	1	EF
9433	Renin inhibitor	renin inhibitor	1	YA
9580	Hypolipidemic peptide	hypolipidemic	1	EF

Profiles of proteins potential biological activity for Ribulose -1.5 bisphosphate carboxylase(ACZ57927.1):

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	1	PG
3461	Prolyl endopeptidase inhibitor	antiamnestic	3	GP
3257	beta-lactokinin	ACE inhibitor	1	RL
3342	ACE inhibitor	ACE inhibitor	1	GPA
3378	ACE inhibitor	ACE inhibitor	1	GRP
3380	ACE inhibitor	ACE inhibitor	1	RY
3381	ACE inhibitor	ACE inhibitor	2	LY
3384	ACE inhibitor	ACE inhibitor	1	VF

3386	ACE inhibitor	ACE inhibitor	1	KW
3388	ACE inhibitor	ACE inhibitor	1	MY
3389	ACE inhibitor from alphas1-CN	ACE inhibitor	1	LW
3486	ACE inhibitor from sake lees	ACE inhibitor	1	VW
3488	ACE inhibitor from sake lees	ACE inhibitor	1	YW
3489	ACE inhibitor from sake lees	ACE inhibitor	1	RF
3492	ACE inhibitor from sake	ACE inhibitor	1	VY
3494	ACE inhibitor from sake	ACE inhibitor	1	HY
3532	ACE inhibitor	ACE inhibitor	2	GY
3550	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	3	YL
3551	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	3	LF
3553	ACE inhibitor	ACE inhibitor	1	YG
3556	ACE inhibitor	ACE inhibitor	1	FY
3563	ACE inhibitor	ACE inhibitor	4	AY
7506	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	GPL
7512	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	3	GP
7513	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	2	PL
7544	ACE inhibitor	ACE inhibitor	1	IW
7558	ACE inhibitor from buckwheat	ACE inhibitor	2	VK
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	4	IA
7580	ACE inhibitor	ACE inhibitor	1	RW
7581	ACE inhibitor	ACE inhibitor	1	IP
7582	ACE inhibitor	ACE inhibitor	1	RP
7585	ACE inhibitor	ACE inhibitor	1	LA
7587	ACE inhibitor	ACE inhibitor	2	VP
7588	ACE inhibitor	ACE inhibitor	3	RA
7589	ACE inhibitor	ACE inhibitor	1	YA
7590	ACE inhibitor	ACE inhibitor	3	AA
7591	ACE inhibitor	ACE inhibitor	2	GF
7592	ACE inhibitor	ACE inhibitor	2	FR
7594	ACE inhibitor	ACE inhibitor	2	VG
7595	ACE inhibitor	ACE inhibitor	3	IG
7596	ACE inhibitor	ACE inhibitor	2	GI
7597	ACE inhibitor	ACE inhibitor	1	GM
7598	ACE inhibitor	ACE inhibitor	2	GA
7599	ACE inhibitor	ACE inhibitor	5	GL
7600	ACE inhibitor	ACE inhibitor	7	AG
7601	ACE inhibitor	ACE inhibitor	2	GH
7602	ACE inhibitor	ACE inhibitor	1	HL
7603	ACE inhibitor	ACE inhibitor	3	GR
7604	ACE inhibitor	ACE inhibitor	3	KG

7605	ACE inhibitor	ACE inhibitor	3	FG
7606	ACE inhibitor	ACE inhibitor	2	DA
7607	ACE inhibitor	ACE inhibitor	2	GS
7608	ACE inhibitor	ACE inhibitor	4	GV
7609	ACE inhibitor	ACE inhibitor	1	MG
7610	ACE inhibitor	ACE inhibitor	1	GQ
7611	ACE inhibitor	ACE inhibitor	2	GK
7612	ACE inhibitor	ACE inhibitor	2	GT
7614	ACE inhibitor	ACE inhibitor	1	HG
7615	ACE inhibitor	ACE inhibitor	2	GE
7616	ACE inhibitor	ACE inhibitor	4	GG
7617	ACE inhibitor	ACE inhibitor	2	QG
8193	ACE inhibitor	ACE inhibitor	3	AI
7618	ACE inhibitor	ACE inhibitor	3	SG
7619	ACE inhibitor	ACE inhibitor	3	LG
7620	ACE inhibitor	ACE inhibitor	2	GD
7621	ACE inhibitor	ACE inhibitor	1	TG
7622	ACE inhibitor	ACE inhibitor	6	EG
7623	ACE inhibitor	ACE inhibitor	1	EA
7625	ACE inhibitor	ACE inhibitor	1	PG
7680	ACE inhibitor from pea vicilin	ACE inhibitor	1	QK
7681	ACE inhibitor from soy	ACE inhibitor	1	DG
7682	ACE inhibitor from garlic	ACE inhibitor	3	NY
7683	ACE inhibitor from garlic	ACE inhibitor	1	NF
7685	ACE inhibitor from garlic	ACE inhibitor	1	SF
7692	ACE inhibitor	ACE inhibitor	1	KF
7693	ACE inhibitor from wakame	ACE inhibitor	2	KL
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7742	ACE inhibitor	ACE inhibitor	2	AR
7743	ACE inhibitor	ACE inhibitor	4	KA
7803	ACE inhibitor from as2-casein	ACE inhibitor	1	IPY
7810	ACE inhibitor from anchovy and bonito	ACE inhibitor	1	KP
7826	ACE inhibitor	ACE inhibitor	1	EI
7827	ACE inhibitor	ACE inhibitor	1	IE
7828	ACE inhibitor	ACE inhibitor	1	EV
7829	ACE inhibitor	ACE inhibitor	2	VE
7831	ACE inhibitor	ACE inhibitor	2	LQ
7832	ACE inhibitor	ACE inhibitor	1	LN
7837	ACE inhibitor	ACE inhibitor	3	PQ
7839	ACE inhibitor	ACE inhibitor	2	ME
7841	ACE inhibitor	ACE inhibitor	2	KE
7842	ACE inhibitor	ACE inhibitor	1	HP

8185	ACE inhibitor	ACE inhibitor	1	TF
8436	ACE inhibitor from jellyfish (Rhopilema esculentum)	ACE inhibitor	1	VKP
8951	ACE inhibitor	ACE inhibitor	1	AV
8968	ACE inhibitor	ACE inhibitor	1	ASL
9036	ACE inhibitor	ACE inhibitor	1	YVA
9053	ACE inhibitor	ACE inhibitor	1	FYN
9070	ACE inhibitor	ACE inhibitor	1	MRW
9071	ACE inhibitor	ACE inhibitor	2	IAY
9072	ACE inhibitor	ACE inhibitor	2	DY
9073	ACE inhibitor	ACE inhibitor	1	TP
9074	ACE inhibitor	ACE inhibitor	1	DF
9075	ACE inhibitor	ACE inhibitor	3	DM
9076	ACE inhibitor	ACE inhibitor	1	FQ
9077	ACE inhibitor	ACE inhibitor	2	YV
9078	ACE inhibitor	ACE inhibitor	3	YE
9079	ACE inhibitor	ACE inhibitor	3	IL
9089	ACE inhibitor	ACE inhibitor	2	WA
9090	ACE inhibitor	ACE inhibitor	1	WM
9146	ACE inhibitor	ACE inhibitor	1	QGP
9184	ACE inhibitor	ACE inhibitor	3	ST
9185	ACE inhibitor	ACE inhibitor	1	YN
9195	ACE inhibitor	ACE inhibitor	1	FGG
9206	ACE inhibitor	ACE inhibitor	1	LFR
9213	ACE inhibitor	ACE inhibitor	3	LR
9228	ACE Inhibitor	ACE inhibitor	1	LDY
9566	ACE inhibitor	ACE inhibitor	2	QP
9731	ACE inhibitor	ACE inhibitor	1	VVL
9882	ACE inhibitor	ACE inhibitor	1	VM
9942	ACE inhibitor	ACE inhibitor	1	EF
9944	ACE inhibitor	ACE inhibitor	5	ER
9945	ACE inhibitor	ACE inhibitor	1	SLR
10027	ACE inhibitor	ACE inhibitor	1	FF
10092	ACE inhibitor	ACE inhibitor	1	LP
3283	Antithrombotic peptide	antithrombotic	3	GP
3285	Antithrombotic peptide	antithrombotic	1	PG
2882	Immunostimulating peptide	immunomodulating	1	YG
9386	Immunostimulating peptide	immunomodulating	1	GLF
8320	Glucose uptake stimulating peptide	stimulating	1	VL
8321	Glucose uptake stimulating peptide	stimulating	1	LV
8322	Glucose uptake stimulating peptide	stimulating	1	IV
8323	Glucose uptake stimulating peptide	stimulating	3	IL
8324	Glucose uptake stimulating peptide	stimulating	1	LI

8325	Glucose uptake stimulating peptide	stimulating	2	II
8326	Glucose uptake stimulating peptide	stimulating	3	LL
8329	Stimulating vasoactive substance release	stimulating	1	EE
8330	Stimulating vasoactive substance release	stimulating	2	SE
2890	neuropeptide	neuropeptide	1	GQ
8310	Anxiolytic peptide	neuropeptide	3	YL
9534	Kyotorphin	neuropeptide	2	YR
9953	anxiolytic-like peptide	neuropeptide	1	YLG
10111	Wheylin-1	neuropeptide	1	MH
2740	Peptide regulating phosphoinositol metabolism	regulating	1	GLF
2749	peptide regulating ion flow	regulating	2	DY
2753	peptide regulating the stomach mucosal membrane activity	regulating	3	GP
2754	peptide regulating the stomach mucosal membrane activity	regulating	1	PG
9955	Regulator of phosphoglycerate kinase activity	regulating	1	SL
3301		antioxidative	1	HLH
3305		antioxidative	2	LH
3317		antioxidative	1	HL
7866	peptide from Okara protein	antioxidative	4	AY
7872	peptide from soybean protein isolates: beta-conglycinin and glycinin	antioxidative	2	LY
7984	synthetic peptide	antioxidative	1	HIH
7995	synthetic peptide	antioxidative	1	LHL
7999	synthetic peptide	antioxidative	1	LHR
8012	synthetic peptide	antioxidative	1	LWK
8078	synthetic peptide	antioxidative	1	RWR
8090	peptide derived from sardine muscle	antioxidative	1	MY
8134	peptide derived from dried bonito	antioxidative	2	KD
8214	Antioxidative peptide	antioxidative	1	RW
8217	Antioxidative peptide	antioxidative	3	LK
8218	Antioxidative peptide	antioxidative	1	KP
8219	antioxidative peptide	antioxidative	1	TY
8224	antioxidative peptide	antioxidative	1	VY
8434	Antioxidant peptide from jellyfish (Rhopilema esculentum)	antioxidative	1	VKP
8453	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	1	LDY
8459	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	1	TW
8461	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	1	VW

8462	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	1	LW
8482	Antioxidant peptide from as2-CN (179-182)	antioxidative	1	YLKT
10051	Antioxidative peptide	antioxidative	1	RY
10056	Antioxidative peptide	antioxidative	1	YLG
10194	Antioxidative peptide	antioxidative	1	AYI
9856	Anti-inflammatory peptide	anti inflammatory	1	PY
9868	Anti-inflammatory peptide	anti inflammatory	1	YW
9869	Anti-inflammatory peptide	anti inflammatory	1	HY
10141	Hypotensive peptide	hypotensive	3	AA
4005		activating ubiquitin-mediated proteolysis	3	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	1	LA
4007	Peptide activating ubiquitin-mediated proteolysis	activating ubiquitin-mediated proteolysis	2	WA
3169	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GP
3171	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MP
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LA
3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FA
3179	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PA
3180	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LP
3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VP
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VV
3184	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	HA
8501	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IP
8503	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TP
8518	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RP
8519	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl peptidase	1	KP

	IV inhibitor)	IV inhibitor		
8520	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HP
8522	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GPA
8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GA
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	RA
8528	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	WA
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	TA
8532	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QP
8555	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	FL
8557	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HL
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AL
8560	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SL
8561	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	GL
8595	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WRE
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AA
8638	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PL
8650	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MAGVDHI
8675	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WR
8676	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WK
8682	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WM
8685	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	WT
8688	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LW
8696	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YT
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AE

8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	AG
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AS
8763	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AT
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AY
8767	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	DP
8768	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DQ
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	EG
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EI
8773	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	ES
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	ET
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EV
8778	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	FN
8779	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	FQ
8780	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FR
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GE
8782	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GF
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	GG
8784	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GH
8785	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GI
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	GV
8788	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GY
8789	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HD
8793	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HI
8794	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HR
8799	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HY

8800	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IH
8801	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	II
8802	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	IL
8804	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IN
8805	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IQ
8807	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IW
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KE
8809	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KF
8810	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	KG
8811	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KH
8815	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KS
8816	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KT
8817	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KV
8818	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KW
8820	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LH
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LI
8822	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LM
8823	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LN
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LT
8825	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LV
8826	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	ME
8828	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MG
8829	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor) – Wheylin-1	dipeptidyl peptidase IV inhibitor	1	MH
8830	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	MI
8834	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MN
8836	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	MR

8837	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MV
8838	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MY
8841	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NE
8842	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NF
8844	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NH
8845	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NL
8849	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NR
8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NT
8851	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NV
8852	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NW
8853	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NY
8854	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PF
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PG
8857	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PI
8858	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PK
8860	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PN
8861	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PQ
8864	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PV
8866	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PY
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QA
8870	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QF
8871	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QG
8873	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QI
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QL
8875	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QN
8877	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QS

8878	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QT
8881	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QY
8884	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RI
8885	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RK
8886	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RL
8887	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	RM
8888	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RN
8890	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RW
8891	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SF
8893	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SI
8894	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SK
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SV
8898	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TD
8900	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TF
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TG
8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TI
8905	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TL
8906	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TM
8909	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TR
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TS
8912	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TV
8913	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TW
8914	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TY
8915	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VD
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VE
8917	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VF

8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VG
8920	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	VI
8921	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VK
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VL
8923	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VM
8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VN
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VT
8928	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VW
8929	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VY
8930	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WD
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YA
8933	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YD
8934	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	YE
8935	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YF
8936	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YG
8938	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YI
8940	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	YL
8942	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YN
8944	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YR
8945	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YS
8946	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YV
8947	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YW
9339	Dipeptidyl peptidase IV inhibitor	dipeptidyl peptidase IV inhibitor	1	LPQ
10028	Inhibitor od Dipeptidyl Peptidase IV	dipeptidyl peptidase IV inhibitor	1	FF
9387	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	VW
9650	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	EA

9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	2	VE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	2	AD
9477	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RW
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	LR
9479	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	MR
9480	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YF
9482	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	YL
9484	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	YR
9486	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	TF
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	GE
9488	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	GF
9490	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RF
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	DA
9493	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	HL
9496	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	HP
9497	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	IH
9498	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	LW
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	LA
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	FA
9501	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	FR
9502	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	FL
9503	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	FM
9505	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	PF
9506	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	WM
9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	SM

9508	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YG
9509	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	VY
9510	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YI
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	KA
8249	CaMPDE inhibitor	CaMPDE inhibitor	1	KF
8250	CaMPDE inhibitor	CaMPDE inhibitor	1	EF
9947	CaMPDE inhibitor	CaMPDE inhibitor	1	AGA
2832	Renin inhibitor	renin inhibitor	1	LW
2842	Renin inhibitor	renin inhibitor	3	LR
8248	Renin inhibitor	renin inhibitor	1	KF
8251	Renin inhibitor	renin inhibitor	1	EF
9430	Renin inhibitor	renin inhibitor	1	NR
9431	Renin inhibitor	renin inhibitor	1	QF
9432	Renin inhibitor	renin inhibitor	1	SF
9433	Renin inhibitor	renin inhibitor	1	YA
9470	Renin inhibitor	renin inhibitor	2	LY
9471	Renin inhibitor	renin inhibitor	1	TF
9580	Hypolipidemic peptide	hypolipidemic	1	EF

Profiles of proteins potential biological activity for phycoerythrin beta subunit(YP 007947897.1):

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	2	PG
3257	beta-lactokinin	ACE inhibitor	1	RL
3380	ACE inhibitor	ACE inhibitor	1	RY
3518	ACE inhibitor	ACE inhibitor	1	VAA
3563	ACE inhibitor	ACE inhibitor	1	AY
7507	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	PGL
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	3	IA
7583	ACE inhibitor	ACE inhibitor	2	AF
7584	ACE inhibitor	ACE inhibitor	1	AP
7585	ACE inhibitor	ACE inhibitor	2	LA
7586	ACE inhibitor	ACE inhibitor	1	KR
7587	ACE inhibitor	ACE inhibitor	1	VP
7588	ACE inhibitor	ACE inhibitor	1	RA
7589	ACE inhibitor	ACE inhibitor	1	YA
7590	ACE inhibitor	ACE inhibitor	6	AA
7594	ACE inhibitor	ACE inhibitor	1	VG

7597	ACE inhibitor	ACE inhibitor	1	GM
7599	ACE inhibitor	ACE inhibitor	2	GL
7600	ACE inhibitor	ACE inhibitor	1	AG
7606	ACE inhibitor	ACE inhibitor	3	DA
7607	ACE inhibitor	ACE inhibitor	1	GS
7608	ACE inhibitor	ACE inhibitor	1	GV
7615	ACE inhibitor	ACE inhibitor	1	GE
7616	ACE inhibitor	ACE inhibitor	2	GG
8193	ACE inhibitor	ACE inhibitor	2	AI
7618	ACE inhibitor	ACE inhibitor	1	SG
7619	ACE inhibitor	ACE inhibitor	1	LG
7620	ACE inhibitor	ACE inhibitor	2	GD
7624	ACE inhibitor	ACE inhibitor	1	NG
7625	ACE inhibitor	ACE inhibitor	2	PG
7628	ACE inhibitor from kappa-CN (fr. 67-68)	ACE inhibitor	1	VR
7649	ACE inhibitor from red algae	ACE inhibitor	1	LRY
7681	ACE inhibitor from soy	ACE inhibitor	3	DG
7684	ACE inhibitor from garlic	ACE inhibitor	2	SY
7692	ACE inhibitor	ACE inhibitor	1	KF
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7741	ACE inhibitor	ACE inhibitor	1	RR
7743	ACE inhibitor	ACE inhibitor	2	KA
7819	ACE inhibitor from wheat gliadin	ACE inhibitor	1	IAP
7822	ACE inhibitor from micro algae	ACE inhibitor	1	IAPG
7826	ACE inhibitor	ACE inhibitor	1	EI
7828	ACE inhibitor	ACE inhibitor	1	EV
7831	ACE inhibitor	ACE inhibitor	1	LQ
7832	ACE inhibitor	ACE inhibitor	1	LN
7833	ACE inhibitor	ACE inhibitor	1	PT
7841	ACE inhibitor	ACE inhibitor	1	KE
8126	ACE inhibitor	ACE inhibitor	1	VAF
8951	ACE inhibitor	ACE inhibitor	3	AV
9077	ACE inhibitor	ACE inhibitor	2	YV
9079	ACE inhibitor	ACE inhibitor	1	IL
9213	ACE inhibitor	ACE inhibitor	2	LR
9326	ACE inhibitor	ACE inhibitor	1	LGV
10091	ACE inhibitor	ACE inhibitor	2	DR
3285	Antithrombotic peptide	antithrombotic	2	PG
8320	Glucose uptake stimulating peptide	stimulating	1	VL
8322	Glucose uptake stimulating peptide	stimulating	2	IV
8323	Glucose uptake stimulating peptide	stimulating	1	IL

8324	Glucose uptake stimulating peptide	stimulating	1	LI
8325	Glucose uptake stimulating peptide	stimulating	1	II
8326	Glucose uptake stimulating peptide	stimulating	1	LL
8330	Stimulating vasoactive substance release	stimulating	1	SE
2754	peptide regulating the stomach mucosal membrane activity	regulating	2	PG
8318	Dvl protein binding	anticancer	1	VVV
7866	peptide from Okara protein	antioxidative	1	AY
8217	Antioxidative peptide	antioxidative	2	LK
8219	antioxidative peptide	antioxidative	1	TY
9879	Antioxidative peptide	antioxidative	1	SVL
10051	Antioxidative peptide	antioxidative	1	RY
3751		bacterial permease ligand	1	KK
10141	Hypotensive peptide	hypotensive	6	AA
4005		activating ubiquitin-mediated proteolysis	1	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	2	LA
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LA
3177	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AP
3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VP
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VV
8500	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	APG
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RA
8530	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NP
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TA
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AL
8561	dipeptidyl peptidase IV inhibitor	dipeptidyl peptidase IV	2	GL

	(DPP IV inhibitor)	inhibitor		
8594	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VR
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AA
8645	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LIAP
8649	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VGGSDLQALK
8696	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YT
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AD
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AG
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AS
8763	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AT
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AY
8767	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DP
8769	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	DR
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EI
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ET
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EV
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GE
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GG
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GV
8801	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	II
8802	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IL
8803	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IM
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KE
8809	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KF

8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KK
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KR
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LI
8823	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LN
8830	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MI
8831	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MK
8832	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ML
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NA
8843	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NG
8849	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NR
8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NT
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PG
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PS
8863	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PT
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QA
8885	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RK
8886	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RL
8887	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RM
8889	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RR
8893	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SI
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SV
8897	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SY
8907	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TN
8914	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TY
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VG
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VL

8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VN
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VS
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YA
8938	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YI
8946	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YV
9334	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VAAA
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	2	AD
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LR
9485	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RR
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GE
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	DA
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LA
9510	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YI
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	KA
8249	CaMPDE inhibitor	CaMPDE inhibitor	1	KF
2842	Renin inhibitor	renin inhibitor	2	LR
8248	Renin inhibitor	renin inhibitor	1	KF
9430	Renin inhibitor	renin inhibitor	1	NR
9433	Renin inhibitor	renin inhibitor	1	YA

Profiles of proteins potential biological activity for fGTpase family 11(XP005708023.1):

ID	Name of peptide	Activity	Number	Sequence
3380	ACE inhibitor	ACE inhibitor	1	RY
3383	ACE inhibitor	ACE inhibitor	1	IY
3386	ACE inhibitor	ACE inhibitor	1	KW
3489	ACE inhibitor from sake lees	ACE inhibitor	1	RF
3492	ACE inhibitor from sake	ACE inhibitor	1	VY
3550	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	1	YL
3551	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	1	LF
3563	ACE inhibitor	ACE inhibitor	1	AY
7544	ACE inhibitor	ACE inhibitor	1	IW

7583	ACE inhibitor	ACE inhibitor	1	AF
7588	ACE inhibitor	ACE inhibitor	2	RA
7594	ACE inhibitor	ACE inhibitor	3	VG
7595	ACE inhibitor	ACE inhibitor	3	IG
7598	ACE inhibitor	ACE inhibitor	2	GA
7600	ACE inhibitor	ACE inhibitor	1	AG
7602	ACE inhibitor	ACE inhibitor	1	HL
7604	ACE inhibitor	ACE inhibitor	1	KG
7606	ACE inhibitor	ACE inhibitor	1	DA
7608	ACE inhibitor	ACE inhibitor	3	GV
7610	ACE inhibitor	ACE inhibitor	1	GQ
7611	ACE inhibitor	ACE inhibitor	3	GK
7612	ACE inhibitor	ACE inhibitor	1	GT
7615	ACE inhibitor	ACE inhibitor	1	GE
8193	ACE inhibitor	ACE inhibitor	1	AI
7618	ACE inhibitor	ACE inhibitor	1	SG
7619	ACE inhibitor	ACE inhibitor	1	LG
7620	ACE inhibitor	ACE inhibitor	1	GD
7622	ACE inhibitor	ACE inhibitor	2	EG
7628	ACE inhibitor from kappa-CN (fr. 67-68)	ACE inhibitor	1	VR
7671	ACE inhibitor from b-CN (56-59), mouse	ACE inhibitor	1	QAFT
7685	ACE inhibitor from garlic	ACE inhibitor	3	SF
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7742	ACE inhibitor	ACE inhibitor	1	AR
7743	ACE inhibitor	ACE inhibitor	2	KA
7752	ACE inhibitor from shark meat hydrolysate	ACE inhibitor	1	EY
7810	ACE inhibitor from anchovy and bonito	ACE inhibitor	1	KP
7826	ACE inhibitor	ACE inhibitor	1	EI
7827	ACE inhibitor	ACE inhibitor	1	IE
7829	ACE inhibitor	ACE inhibitor	3	VE
7830	ACE inhibitor	ACE inhibitor	3	TE
7834	ACE inhibitor	ACE inhibitor	1	TQ
7840	ACE inhibitor	ACE inhibitor	3	EK
7841	ACE inhibitor	ACE inhibitor	3	KE
7844	ACE inhibitor	ACE inhibitor	2	HK
8402	ACE inhibitor	ACE inhibitor	1	LVY
8951	ACE inhibitor	ACE inhibitor	2	AV
9072	ACE inhibitor	ACE inhibitor	1	DY
9107	ACE inhibitor	ACE inhibitor	1	WL
9173	ACE inhibitor	ACE inhibitor	1	RG

9184	ACE inhibitor	ACE inhibitor	2	ST
9213	ACE inhibitor	ACE inhibitor	2	LR
9729	ACE inhibitor	ACE inhibitor	1	VVR
9942	ACE inhibitor	ACE inhibitor	3	EF
9944	ACE inhibitor	ACE inhibitor	1	ER
9946	ACE inhibitor	ACE inhibitor	1	YY
8320	Glucose uptake stimulating peptide	stimulating	1	VL
8321	Glucose uptake stimulating peptide	stimulating	2	LV
8322	Glucose uptake stimulating peptide	stimulating	3	IV
8324	Glucose uptake stimulating peptide	stimulating	1	LI
8326	Glucose uptake stimulating peptide	stimulating	3	LL
8329	Stimulating vasoactive substance release	stimulating	1	EE
2890	neuropeptide	neuropeptide	1	GQ
8310	Anxiolytic peptide	neuropeptide	1	YL
9534	Kyotorphin	neuropeptide	3	YR
2749	peptide regulating ion flow	regulating	1	DY
9955	Regulator of phosphoglycerate kinase activity	regulating	1	SL
8318	Dvl protein binding	anticancer	1	VVV
3317		antioxidative	1	HL
7866	peptide from Okara protein	antioxidative	1	AY
7873	peptide from soybean protein isolates: beta-conglycinin and glycinin	antioxidative	1	IY
7888	antioxidative peptide	antioxidative	1	EL
7925	synthetic peptide	antioxidative	1	YDY
7938	synthetic peptide	antioxidative	1	YYR
7953	synthetic peptide	antioxidative	1	AYY
8217	Antioxidative peptide	antioxidative	2	LK
8218	Antioxidative peptide	antioxidative	1	KP
8224	antioxidative peptide	antioxidative	1	VY
10051	Antioxidative peptide	antioxidative	1	RY
3751		bacterial permease ligand	4	KK
3752		bacterial permease ligand	1	KKK
4005		activating ubiquitin-mediated proteolysis	2	RA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KA
3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FA
3179	dipeptidyl peptidase IV inhibitor	dipeptidyl peptidase	2	PA

	(DPP IV inhibitor)	IV inhibitor		
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VV
3184	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HA
8519	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KP
8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RA
8530	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NP
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TA
8557	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HL
8558	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EK
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AL
8560	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SL
8594	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VR
8677	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WL
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AE
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AG
8763	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AT
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AY
8767	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DP
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	EG
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EI
8773	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	ES

8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ET
8777	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EY
8778	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	FN
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GE
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GV
8795	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HS
8803	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IM
8807	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IW
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	KE
8810	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KG
8811	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KH
8812	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KI
8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KK
8815	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KS
8816	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KT
8818	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KW
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LI
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LT
8825	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LV
8832	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ML
8841	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NE
8845	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NL
8851	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NV
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PS
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QA
8869	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QE

8873	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QI
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QL
8878	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QT
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RG
8884	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RI
8888	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RN
8891	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SF
8894	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SK
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SV
8899	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TE
8902	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TH
8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TI
8904	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TK
8907	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TN
8908	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TQ
8909	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TR
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TS
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VE
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VG
8919	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VH
8920	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VI
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VL
8925	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VQ
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VS
8929	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VY
8930	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WD

8933	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YD
8940	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YL
8944	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	YR
8948	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YY
9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	3	VE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	AD
9476	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YY
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LR
9482	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YL
9484	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	YR
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GE
9490	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RF
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	DA
9493	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	HL
9494	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	HK
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	FA
9509	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	VY
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	KA
8250	CaMPDE inhibitor	CaMPDE inhibitor	3	EF
2835	Renin inhibitor	renin inhibitor	2	FT
2842	Renin inhibitor	renin inhibitor	2	LR
8251	Renin inhibitor	renin inhibitor	3	EF
9432	Renin inhibitor	renin inhibitor	3	SF
9580	Hypolipidemic peptide	hypolipidemic	3	EF

Profiles of proteins potential biological activity for Aconitatehydratase(P49609.1)

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	6	PG
3461	Prolyl endopeptidase inhibitor	antiamnestic	5	GP
3257	beta-lactokinin	ACE inhibitor	5	RL

3258	beta-lactokinin	ACE inhibitor	2	IR
3370	ACE inhibitor from beta-CN (177-179)	ACE inhibitor	1	AVP
3380	ACE inhibitor	ACE inhibitor	1	RY
3381	ACE inhibitor	ACE inhibitor	1	LY
3384	ACE inhibitor	ACE inhibitor	1	VF
3385	ACE inhibitor	ACE inhibitor	1	MF
3391	ACE inhibitor	ACE inhibitor	1	LPP
3393	ACE inhibitor	ACE inhibitor	1	FAP
3406	ACE inhibitor	ACE inhibitor	1	TAP
3421	ACE inhibitor	ACE inhibitor	1	LVL
3489	ACE inhibitor from sake lees	ACE inhibitor	1	RF
3492	ACE inhibitor from sake	ACE inhibitor	2	VY
3502	ACE inhibitor (BSA fr. 221-222)	ACE inhibitor	3	FP
3506	ACE inhibitor	ACE inhibitor	1	GKP
3532	ACE inhibitor	ACE inhibitor	1	GY
3537	ACE inhibitor	ACE inhibitor	2	PR
3543	ACE inhibitor	ACE inhibitor	1	LRP
3547	ACE inhibitor	ACE inhibitor	1	IRA
3550	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	1	YL
3553	ACE inhibitor	ACE inhibitor	6	YG
3563	ACE inhibitor	ACE inhibitor	1	AY
3573		ACE inhibitor	1	AFP
3713	ACE inhibitor from alpha-zein	ACE inhibitor	1	LLP
7502	ACE inhibitor	ACE inhibitor	1	IVR
7509	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	2	GLP
7512	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	5	GP
7513	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	2	PL
7542	ACE inhibitor	ACE inhibitor	1	DLP
7543	ACE inhibitor	ACE inhibitor	2	AW
7558	ACE inhibitor from buckwheat	ACE inhibitor	3	VK
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	3	IA
7569	ACE inhibitor from chicken muscle	ACE inhibitor	3	LKA
7579	ACE inhibitor	ACE inhibitor	1	GW
7580	ACE inhibitor	ACE inhibitor	1	RW
7582	ACE inhibitor	ACE inhibitor	3	RP
7583	ACE inhibitor	ACE inhibitor	3	AF
7584	ACE inhibitor	ACE inhibitor	5	AP
7585	ACE inhibitor	ACE inhibitor	4	LA
7586	ACE inhibitor	ACE inhibitor	2	KR
7587	ACE inhibitor	ACE inhibitor	3	VP

7588	ACE inhibitor	ACE inhibitor	6	RA
7589	ACE inhibitor	ACE inhibitor	2	YA
7590	ACE inhibitor	ACE inhibitor	12	AA
7591	ACE inhibitor	ACE inhibitor	1	GF
7592	ACE inhibitor	ACE inhibitor	1	FR
7594	ACE inhibitor	ACE inhibitor	6	VG
7595	ACE inhibitor	ACE inhibitor	8	IG
7596	ACE inhibitor	ACE inhibitor	5	GI
7598	ACE inhibitor	ACE inhibitor	10	GA
7599	ACE inhibitor	ACE inhibitor	8	GL
7600	ACE inhibitor	ACE inhibitor	12	AG
7601	ACE inhibitor	ACE inhibitor	2	GH
7602	ACE inhibitor	ACE inhibitor	4	HL
7603	ACE inhibitor	ACE inhibitor	2	GR
7604	ACE inhibitor	ACE inhibitor	2	KG
7605	ACE inhibitor	ACE inhibitor	1	FG
7606	ACE inhibitor	ACE inhibitor	4	DA
7607	ACE inhibitor	ACE inhibitor	8	GS
7608	ACE inhibitor	ACE inhibitor	8	GV
7609	ACE inhibitor	ACE inhibitor	1	MG
7610	ACE inhibitor	ACE inhibitor	2	GQ
7611	ACE inhibitor	ACE inhibitor	5	GK
7612	ACE inhibitor	ACE inhibitor	5	GT
7614	ACE inhibitor	ACE inhibitor	2	HG
7615	ACE inhibitor	ACE inhibitor	6	GE
7616	ACE inhibitor	ACE inhibitor	7	GG
7617	ACE inhibitor	ACE inhibitor	1	QG
8193	ACE inhibitor	ACE inhibitor	4	AI
7618	ACE inhibitor	ACE inhibitor	3	SG
7619	ACE inhibitor	ACE inhibitor	4	LG
7620	ACE inhibitor	ACE inhibitor	4	GD
7621	ACE inhibitor	ACE inhibitor	4	TG
7622	ACE inhibitor	ACE inhibitor	3	EG
7623	ACE inhibitor	ACE inhibitor	1	EA
7624	ACE inhibitor	ACE inhibitor	5	NG
7625	ACE inhibitor	ACE inhibitor	6	PG
7628	ACE inhibitor from kappa-CN (fr. 67-68)	ACE inhibitor	3	VR
7638	ACE inhibitor from tuna muscles	ACE inhibitor	3	LTF
7647	ACE inhibitor	ACE inhibitor	2	YGG
7681	ACE inhibitor from soy	ACE inhibitor	4	DG
7682	ACE inhibitor from garlic	ACE inhibitor	2	NY
7683	ACE inhibitor from garlic	ACE inhibitor	1	NF

7684	ACE inhibitor from garlic	ACE inhibitor	3	SY
7685	ACE inhibitor from garlic	ACE inhibitor	2	SF
7691	ACE inhibitor from wakame	ACE inhibitor	4	KY
7693	ACE inhibitor from wakame	ACE inhibitor	1	KL
7697	ACE inhibitor from wakame	ACE inhibitor	1	YK
7698	ACE inhibitor from wakame	ACE inhibitor	2	NK
7741	ACE inhibitor	ACE inhibitor	1	RR
7742	ACE inhibitor	ACE inhibitor	7	AR
7743	ACE inhibitor	ACE inhibitor	9	KA
7752	ACE inhibitor from shark meat hydrolysate	ACE inhibitor	3	EY
7810	ACE inhibitor from anchovy and bonito	ACE inhibitor	2	KP
7826	ACE inhibitor	ACE inhibitor	7	EI
7827	ACE inhibitor	ACE inhibitor	6	IE
7828	ACE inhibitor	ACE inhibitor	5	EV
7829	ACE inhibitor	ACE inhibitor	5	VE
7830	ACE inhibitor	ACE inhibitor	2	TE
7831	ACE inhibitor	ACE inhibitor	2	LQ
7832	ACE inhibitor	ACE inhibitor	3	LN
7833	ACE inhibitor	ACE inhibitor	2	PT
7835	ACE inhibitor	ACE inhibitor	1	AH
7836	ACE inhibitor	ACE inhibitor	2	PP
7837	ACE inhibitor	ACE inhibitor	3	PQ
7840	ACE inhibitor	ACE inhibitor	5	EK
7841	ACE inhibitor	ACE inhibitor	1	KE
8182	ACE Inhibitor	ACE inhibitor	1	ALEP
8185	ACE inhibitor	ACE inhibitor	5	TF
8516	ACE inhibitor from soya milk	ACE inhibitor	1	LEPP
8951	ACE inhibitor	ACE inhibitor	5	AV
9041	ACE inhibitor	ACE inhibitor	1	AGP
9049	ACE inhibitor	ACE inhibitor	1	FDK
9056	ACE inhibitor	ACE inhibitor	1	DGL
9060	ACE inhibitor	ACE inhibitor	2	AVL
9061	ACE inhibitor	ACE inhibitor	1	LGI
9069	ACE inhibitor	ACE inhibitor	1	VGP
9072	ACE inhibitor	ACE inhibitor	1	DY
9073	ACE inhibitor	ACE inhibitor	3	TP
9074	ACE inhibitor	ACE inhibitor	2	DF
9075	ACE inhibitor	ACE inhibitor	1	DM
9078	ACE inhibitor	ACE inhibitor	2	YE
9079	ACE inhibitor	ACE inhibitor	2	IL
9107	ACE inhibitor	ACE inhibitor	1	WL

9173	ACE inhibitor	ACE inhibitor	6	RG
9183	ACE inhibitor	ACE inhibitor	1	GTG
9184	ACE inhibitor	ACE inhibitor	4	ST
9185	ACE inhibitor	ACE inhibitor	1	YN
9192	ACE inhibitor	ACE inhibitor	2	AGS
9213	ACE inhibitor	ACE inhibitor	2	LR
9727	ACE inhibitor	ACE inhibitor	2	GVR
9742	ACE inhibitor	ACE inhibitor	1	EKR
9882	ACE inhibitor	ACE inhibitor	2	VM
9942	ACE inhibitor	ACE inhibitor	2	EF
9944	ACE inhibitor	ACE inhibitor	3	ER
10001	ACE inhibitor	ACE inhibitor	1	LPL
10004	ACE inhibitor	ACE inhibitor	1	LQL
10044	ACE inhibitor	ACE inhibitor	1	YLR
10091	ACE inhibitor	ACE inhibitor	2	DR
10092	ACE inhibitor	ACE inhibitor	4	LP
3283	Antithrombotic peptide	antithrombotic	5	GP
3285	Antithrombotic peptide	antithrombotic	6	PG
2882	Immunostimulating peptide	immunomodulating	6	YG
3741	Immunomodulating peptide	immunomodulating	2	YGG
8320	Glucose uptake stimulating peptide	stimulating	5	VL
8321	Glucose uptake stimulating peptide	stimulating	5	LV
8322	Glucose uptake stimulating peptide	stimulating	5	IV
8323	Glucose uptake stimulating peptide	stimulating	2	IL
8324	Glucose uptake stimulating peptide	stimulating	5	LI
8325	Glucose uptake stimulating peptide	stimulating	1	II
8326	Glucose uptake stimulating peptide	stimulating	3	LL
8329	Stimulating vasoactive substance release	stimulating	2	EE
8330	Stimulating vasoactive substance release	stimulating	3	SE
2890	neuropeptide	neuropeptide	2	GQ
3749		neuropeptide	1	KPS
8310	Anxiolytic peptide	neuropeptide	1	YL
9534	Kyotorphin	neuropeptide	1	YR
10111	Wheylin-1	neuropeptide	1	MH
2736	Peptide regulating phosphoinositole mechanism	regulating	1	GFW
2749	peptide regulating ion flow	regulating	1	DY
2753	peptide regulating the stomach mucosal membrane activity	regulating	5	GP
2754	peptide regulating the stomach mucosal membrane activity	regulating	6	PG
8318	Dvl protein binding	anticancer	2	VVV

3317		antioxidative	4	HL
7866	peptide from Okara protein	antioxidative	1	AY
7872	peptide from soybean protein isolates: beta-conglycinin and glycinin	antioxidative	1	LY
7886	peptide derived from egg white albumin	antioxidative	1	AH
7888	antioxidative peptide	antioxidative	2	EL
8041	synthetic peptide	antioxidative	1	PWE
8045	synthetic peptide	antioxidative	1	PWL
8061	synthetic peptide	antioxidative	1	RHL
8133	peptide derived from dried bonito	antioxidative	1	KVI
8134	peptide derived from dried bonito	antioxidative	2	KD
8190	peptide from buckwheat	antioxidative	2	PW
8214	Antioxidative peptide	antioxidative	1	RW
8215	Antioxidative peptide	antioxidative	2	IR
8217	Antioxidative peptide	antioxidative	8	LK
8218	Antioxidative peptide	antioxidative	2	KP
8219	antioxidative peptide	antioxidative	2	TY
8224	antioxidative peptide	antioxidative	2	VY
8459	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	1	TW
8460	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	2	AW
8983	Antioxidative peptide	antioxidative	2	GAA
10000	Antioxidative peptide	antioxidative	1	LPL
10003	Antioxidative peptide	antioxidative	1	LQL
10051	Antioxidative peptide	antioxidative	1	RY
3751		bacterial permease ligand	1	KK
9728	Hypotensive peptide	hypotensive	2	GVR
10141	Hypotensive peptide	hypotensive	12	AA
4005		activating ubiquitin-mediated proteolysis	6	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	4	LA
3169	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	GP
3170	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PP
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	9	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	LA

3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	FA
3177	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AP
3179	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PA
3180	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	LP
3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VP
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VV
3184	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	HA
8500	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	APG
8503	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TP
8504	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WP
8505	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SP
8506	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	FP
8518	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	RP
8519	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KP
8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	10	GA
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	RA
8529	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	EP
8530	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NP
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TA
8555	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FL
8556	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WV
8557	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	HL
8558	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	EK
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AL

8561	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	GL
8594	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VR
8616	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LPL
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	12	AA
8638	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PL
8676	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	WK
8677	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WL
8685	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WT
8691	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WE
8692	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WF
8695	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AW
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AE
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	12	AG
8761	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AH
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AS
8763	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AT
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AY
8766	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	DN
8767	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	DP
8768	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DQ
8769	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	DR
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EG
8771	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EH

8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	EI
8773	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ES
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	ET
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	EV
8777	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EY
8778	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	FN
8780	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	FR
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	GE
8782	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GF
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	GG
8784	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GH
8785	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	GI
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	GV
8787	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GW
8788	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GY
8790	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HE
8793	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HI
8796	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HT
8800	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	IH
8801	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	II
8802	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IL
8806	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	IR
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KE
8810	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KG
8811	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KH
8812	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KI

8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KK
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KR
8815	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KS
8816	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KT
8817	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	KV
8819	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KY
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	LI
8822	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LM
8823	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LN
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	LT
8825	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	LV
8827	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MF
8828	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MG
8829	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor) – Wheylin-1	dipeptidyl peptidase IV inhibitor	1	MH
8830	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MI
8832	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ML
8835	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MQ
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NA
8840	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	ND
8842	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NF
8843	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	NG
8845	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NL
8846	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NM
8847	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NN
8848	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NQ
8849	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NR

8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NT
8851	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NV
8853	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NY
8854	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	PF
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	PG
8858	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PK
8859	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PM
8860	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PN
8861	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PQ
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PS
8863	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PT
8864	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PV
8865	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PW
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	QA
8868	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QD
8869	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QE
8870	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QF
8871	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QG
8873	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	QI
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	QL
8877	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QS
8878	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QT
8879	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QV
8880	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QW
8881	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QY
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	RG

8883	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RH
8884	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RI
8886	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	RL
8888	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RN
8889	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RR
8890	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RW
8891	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SF
8892	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SH
8893	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SI
8894	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SK
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SV
8897	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SY
8898	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TD
8899	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TE
8900	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	TF
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TG
8902	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TH
8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	TI
8904	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TK
8905	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TL
8907	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TN
8909	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TR
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TS
8911	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TT
8912	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TV
8913	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TW

8914	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TY
8915	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VD
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VE
8917	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VF
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	VG
8920	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VI
8921	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VK
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VL
8923	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VM
8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VN
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VS
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VT
8929	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VY
8930	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WD
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YA
8933	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	YD
8934	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YE
8935	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YF
8936	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	YG
8939	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YK
8940	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YL
8942	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YN
8943	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YQ
8944	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YR
9383	HMG-CoA reductase inhibitor	HMG-CoA reductase inhibitor	2	GGV
9650	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	EA

9651	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	2	PP
9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	5	VE
9694	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	3	PE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	7	AD
9477	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RW
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LR
9480	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YF
9482	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YL
9483	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YK
9484	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YR
9485	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RR
9486	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	TF
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	6	GE
9488	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GF
9489	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	PR
9490	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RF
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	DA
9493	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	HL
9497	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	IH
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	LA
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	FA
9501	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	FR
9502	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	FL
9504	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	PE
9505	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	PF

9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	SM
9508	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	6	YG
9509	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	VY
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	9	KA
8247	CaMPDE inhibitor	CaMPDE inhibitor	2	IR
8250	CaMPDE inhibitor	CaMPDE inhibitor	2	EF
2835	Renin inhibitor	renin inhibitor	3	FT
2842	Renin inhibitor	renin inhibitor	2	LR
8246	renin inhibitor	renin inhibitor	2	IR
8251	Renin inhibitor	renin inhibitor	2	EF
9430	Renin inhibitor	renin inhibitor	3	NR
9431	Renin inhibitor	renin inhibitor	1	QF
9432	Renin inhibitor	renin inhibitor	2	SF
9433	Renin inhibitor	renin inhibitor	2	YA
9470	Renin inhibitor	renin inhibitor	1	LY
9471	Renin inhibitor	renin inhibitor	5	TF
10002	renin inhibitor	renin inhibitor	1	LPL
10005	renin inhibitor	renin inhibitor	1	LQL
9580	Hypolipidemic peptide	hypolipidemic	2	EF

Profiles of potential biological activity for Cysteine synthase(AAP97124.1)

ID	Name of peptide	Activity	Number	Sequence
3459	Prolyl endopeptidase (PEP) inhibitor	antiamnestic	1	PGP
3460	Prolyl endopeptidase inhibitor	antiamnestic	2	PG
3461	Prolyl endopeptidase inhibitor	antiamnestic	2	GP
3380	ACE inhibitor	ACE inhibitor	2	RY
3384	ACE inhibitor	ACE inhibitor	2	VF
3492	ACE inhibitor from sake	ACE inhibitor	1	VY
3494	ACE inhibitor from sake	ACE inhibitor	1	HY
3506	ACE inhibitor	ACE inhibitor	1	GKP
3518	ACE inhibitor	ACE inhibitor	1	VAA
3521	ACE inhibitor	ACE inhibitor	1	VAP
3532	ACE inhibitor	ACE inhibitor	1	GY
3537	ACE inhibitor	ACE inhibitor	1	PR
3539	ACE inhibitor from alpha-zein	ACE inhibitor	1	LAA
3550	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	2	YL
3551	ACE inhibitor (from bovine beta-Lg)	ACE inhibitor	1	LF
3563	ACE inhibitor	ACE inhibitor	1	AY
3714	ACE inhibitor	ACE inhibitor	1	LQQ

7498	ACE inhibitor from as2-CN	ACE inhibitor	1	TVY
7512	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	2	GP
7513	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	PL
7558	ACE inhibitor from buckwheat	ACE inhibitor	1	VK
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	6	IA
7581	ACE inhibitor	ACE inhibitor	1	IP
7582	ACE inhibitor	ACE inhibitor	1	RP
7583	ACE inhibitor	ACE inhibitor	3	AF
7584	ACE inhibitor	ACE inhibitor	5	AP
7585	ACE inhibitor	ACE inhibitor	2	LA
7586	ACE inhibitor	ACE inhibitor	1	KR
7587	ACE inhibitor	ACE inhibitor	1	VP
7588	ACE inhibitor	ACE inhibitor	2	RA
7589	ACE inhibitor	ACE inhibitor	1	YA
7590	ACE inhibitor	ACE inhibitor	12	AA
7591	ACE inhibitor	ACE inhibitor	1	GF
7593	ACE inhibitor	ACE inhibitor	1	IF
7594	ACE inhibitor	ACE inhibitor	3	VG
7595	ACE inhibitor	ACE inhibitor	3	IG
7596	ACE inhibitor	ACE inhibitor	3	GI
7597	ACE inhibitor	ACE inhibitor	3	GM
7598	ACE inhibitor	ACE inhibitor	6	GA
7599	ACE inhibitor	ACE inhibitor	2	GL
7600	ACE inhibitor	ACE inhibitor	6	AG
7603	ACE inhibitor	ACE inhibitor	3	GR
7604	ACE inhibitor	ACE inhibitor	1	KG
7605	ACE inhibitor	ACE inhibitor	2	FG
7606	ACE inhibitor	ACE inhibitor	3	DA
7608	ACE inhibitor	ACE inhibitor	1	GV
7611	ACE inhibitor	ACE inhibitor	5	GK
7612	ACE inhibitor	ACE inhibitor	2	GT
7615	ACE inhibitor	ACE inhibitor	1	GE
7616	ACE inhibitor	ACE inhibitor	3	GG
7617	ACE inhibitor	ACE inhibitor	2	QG
8193	ACE inhibitor	ACE inhibitor	3	AI
7618	ACE inhibitor	ACE inhibitor	4	SG
7621	ACE inhibitor	ACE inhibitor	7	TG
7622	ACE inhibitor	ACE inhibitor	1	EG
7623	ACE inhibitor	ACE inhibitor	3	EA
7625	ACE inhibitor	ACE inhibitor	2	PG
7635	ACE inhibitor from k-CN (fr. 51-53)	ACE inhibitor	1	VAV
7646	ACE inhibitor from pea vicilin	ACE inhibitor	1	GYK
7684	ACE inhibitor from garlic	ACE inhibitor	1	SY

7685	ACE inhibitor from garlic	ACE inhibitor	1	SF
7693	ACE inhibitor from wakame	ACE inhibitor	2	KL
7697	ACE inhibitor from wakame	ACE inhibitor	1	YK
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7741	ACE inhibitor	ACE inhibitor	2	RR
7742	ACE inhibitor	ACE inhibitor	2	AR
7743	ACE inhibitor	ACE inhibitor	4	KA
7746	ACE inhibitor from pearl oyster	ACE inhibitor	1	LVE
7810	ACE inhibitor from anchovy and bonito	ACE inhibitor	1	KP
7819	ACE inhibitor from wheat gliadin	ACE inhibitor	1	IAP
7826	ACE inhibitor	ACE inhibitor	1	EI
7827	ACE inhibitor	ACE inhibitor	1	IE
7828	ACE inhibitor	ACE inhibitor	3	EV
7829	ACE inhibitor	ACE inhibitor	3	VE
7831	ACE inhibitor	ACE inhibitor	1	LQ
7833	ACE inhibitor	ACE inhibitor	1	PT
7835	ACE inhibitor	ACE inhibitor	1	AH
7839	ACE inhibitor	ACE inhibitor	1	ME
7840	ACE inhibitor	ACE inhibitor	1	EK
7841	ACE inhibitor	ACE inhibitor	1	KE
7843	ACE inhibitor	ACE inhibitor	1	PH
7844	ACE inhibitor	ACE inhibitor	2	HK
8185	ACE inhibitor	ACE inhibitor	1	TF
8199	ACE inhibitor	ACE inhibitor	1	KAPVA
8508	ACE inhibitor from soybean	ACE inhibitor	1	IVF
8513	ACE inhibitor from soya milk	ACE inhibitor	1	FVP
8951	ACE inhibitor	ACE inhibitor	4	AV
9031	ACE inhibitor	ACE inhibitor	1	LEE
9048	ACE inhibitor	ACE inhibitor	1	LVQ
9073	ACE inhibitor	ACE inhibitor	4	TP
9078	ACE inhibitor	ACE inhibitor	1	YE
9079	ACE inhibitor	ACE inhibitor	3	IL
9085	ACE inhibitor	ACE inhibitor	1	MM
9151	ACE inhibitor	ACE inhibitor	1	TGP
9173	ACE inhibitor	ACE inhibitor	1	RG
9183	ACE inhibitor	ACE inhibitor	1	GTG
9184	ACE inhibitor	ACE inhibitor	3	ST
9196	ACE inhibitor	ACE inhibitor	1	AVV
9213	ACE inhibitor	ACE inhibitor	1	LR
9543	ACE inhibitor	ACE inhibitor	2	RYL
9731	ACE inhibitor	ACE inhibitor	1	VVL
9743	ACE inhibitor	ACE inhibitor	1	EQR
9944	ACE inhibitor	ACE inhibitor	2	ER

10091	ACE inhibitor	ACE inhibitor	1	DR
3283	Antithrombotic peptide	antithrombotic	2	GP
3284	antithrombotic peptide	antithrombotic	1	PGP
3285	Antithrombotic peptide	antithrombotic	2	PG
3626		immunomodulating	1	KRP
8320	Glucose uptake stimulating peptide	stimulating	4	VL
8321	Glucose uptake stimulating peptide	stimulating	2	LV
8322	Glucose uptake stimulating peptide	stimulating	1	IV
8323	Glucose uptake stimulating peptide	stimulating	3	IL
8324	Glucose uptake stimulating peptide	stimulating	2	LI
8326	Glucose uptake stimulating peptide	stimulating	1	LL
8329	Stimulating vasoactive substance release	stimulating	2	EE
8310	Anxiolytic peptide	neuropeptide	2	YL
2753	peptide regulating the stomach mucosal membrane activity	regulating	2	GP
2754	peptide regulating the stomach mucosal membrane activity	regulating	2	PG
2756	peptide regulating the stomach mucosal membrane activity	regulating	1	PGP
3305		antioxidative	1	LH
7866	peptide from Okara protein	antioxidative	1	AY
7886	peptide derived from egg white albumin	antioxidative	1	AH
7994	synthetic peptide	antioxidative	1	LHK
8028	synthetic peptide	antioxidative	1	PHK
8134	peptide derived from dried bonito	antioxidative	1	KD
8217	Antioxidative peptide	antioxidative	1	LK
8218	Antioxidative peptide	antioxidative	1	KP
8224	antioxidative peptide	antioxidative	1	VY
8983	Antioxidative peptide	antioxidative	1	GAA
9086	Antioxidative peptide	antioxidative	1	MM
9164	Antioxidative peptide	antioxidative	1	CGA
10051	Antioxidative peptide	antioxidative	2	RY
10052	Antioxidative peptide	antioxidative	2	RYL
3751		bacterial permease ligand	1	KK
9866	Anti-inflammatory peptide	anti inflammatory	1	ANP
9869	Anti-inflammatory peptide	anti inflammatory	1	HY
3046	inhibitor of insulin secretion	inhibitor	1	PGP
3464	Chemotactic peptide	chemotactic	1	PGP
10141	Hypotensive peptide	hypotensive	12	AA
4005		activating ubiquitin-mediated proteolysis	2	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated	2	LA

		proteolysis		
3169	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GP
3171	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MP
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LA
3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	FA
3177	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AP
3179	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	PA
3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VP
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VV
8501	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IP
8503	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TP
8505	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	SP
8518	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RP
8519	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KP

8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	GA
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RA
8529	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EP
8530	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NP
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TA
8558	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EK
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AL
8561	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GL
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	12	AA
8638	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PL
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AE
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AG
8761	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AH
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AS
8763	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	2	AT

	IV inhibitor)	peptidase IV inhibitor		
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AY
8769	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DR
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EG
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EI
8773	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	ES
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	ET
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EV
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GE
8782	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GF
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GG
8785	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GI
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GV
8788	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GY
8799	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HY
8802	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	IL
8803	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	1	IM

		inhibitor		
8805	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IQ
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KE
8810	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KG
8812	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	KI
8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KK
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KR
8816	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KT
8820	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LH
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LI
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LT
8825	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LV
8826	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ME
8830	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MI
8831	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MK
8833	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MM
8834	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MN
8835	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MQ

8837	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MV
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NA
8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NT
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PG
8856	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PH
8858	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PK
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	PS
8863	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PT
8864	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	PV
8870	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QF
8871	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QG
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QL
8876	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QQ
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RG
8884	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RI
8887	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RM
8889	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RR
8891	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	1	SF

	IV inhibitor)	peptidase IV inhibitor		
8893	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SI
8894	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SK
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SV
8897	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SY
8900	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TF
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	TG
8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TI
8906	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TM
8909	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TR
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TS
8911	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TT
8912	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TV
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VE
8917	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VF
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VG
8921	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VK
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	4	VL

		inhibitor		
8925	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VQ
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VS
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VT
8929	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VY
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YA
8933	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YD
8934	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YE
8938	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YI
8939	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YK
8940	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YL
9650	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	3	EA
9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	3	VE
9694	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	3	PE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	AD
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	LR
9482	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	YL
9483	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YK
9485	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	RR

9486	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	TF
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GE
9488	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GF
9489	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	PR
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	DA
9494	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	HK
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LA
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	FA
9504	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	PE
9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	SM
9509	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	VY
9510	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YI
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	KA
2842	Renin inhibitor	renin inhibitor	1	LR
9431	Renin inhibitor	renin inhibitor	1	QF
9432	Renin inhibitor	renin inhibitor	1	SF
9433	Renin inhibitor	renin inhibitor	1	YA
9471	Renin inhibitor	renin inhibitor	1	TF

Profiles of proteins potential biological activity for Chaperonine 60(XP 005715325.1)

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	2	PG
3461	Prolyl endopeptidase inhibitor	antiamnestic	3	GP
2642	ACE inhibitor	ACE inhibitor	1	ILP
3257	beta-lactokinin	ACE inhibitor	4	RL
3379	ACE inhibitor	ACE inhibitor	1	AKK
3383	ACE inhibitor	ACE inhibitor	1	IY
3385	ACE inhibitor	ACE inhibitor	1	MF
3489	ACE inhibitor from sake lees	ACE inhibitor	2	RF
3518	ACE inhibitor	ACE inhibitor	1	VAA
3528	ACE inhibitor	ACE inhibitor	1	LVR
3532	ACE inhibitor	ACE inhibitor	2	GY
3537	ACE inhibitor	ACE inhibitor	1	PR
7502	ACE inhibitor	ACE inhibitor	1	IVR
7508	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	LGP
7510	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	PLG
7512	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	3	GP
7513	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	3	PL
7558	ACE inhibitor from buckwheat	ACE inhibitor	2	VK
7562	ACE inhibitor from soy hydrolysate	ACE inhibitor	5	IA
7581	ACE inhibitor	ACE inhibitor	1	IP
7582	ACE inhibitor	ACE inhibitor	1	RP
7583	ACE inhibitor	ACE inhibitor	1	AF
7584	ACE inhibitor	ACE inhibitor	1	AP
7585	ACE inhibitor	ACE inhibitor	7	LA
7586	ACE inhibitor	ACE inhibitor	1	KR
7587	ACE inhibitor	ACE inhibitor	2	VP
7588	ACE inhibitor	ACE inhibitor	3	RA
7590	ACE inhibitor	ACE inhibitor	7	AA
7591	ACE inhibitor	ACE inhibitor	1	GF
7594	ACE inhibitor	ACE inhibitor	4	VG
7596	ACE inhibitor	ACE inhibitor	6	GI
7597	ACE inhibitor	ACE inhibitor	5	GM
7598	ACE inhibitor	ACE inhibitor	2	GA
7599	ACE inhibitor	ACE inhibitor	3	GL
7600	ACE inhibitor	ACE inhibitor	5	AG
7603	ACE inhibitor	ACE inhibitor	2	GR
7604	ACE inhibitor	ACE inhibitor	2	KG
7605	ACE inhibitor	ACE inhibitor	2	FG
7606	ACE inhibitor	ACE inhibitor	3	DA

7607	ACE inhibitor	ACE inhibitor	3	GS
7608	ACE inhibitor	ACE inhibitor	6	GV
7609	ACE inhibitor	ACE inhibitor	2	MG
7610	ACE inhibitor	ACE inhibitor	1	GQ
7611	ACE inhibitor	ACE inhibitor	2	GK
7612	ACE inhibitor	ACE inhibitor	3	GT
7615	ACE inhibitor	ACE inhibitor	2	GE
7616	ACE inhibitor	ACE inhibitor	11	GG
8193	ACE inhibitor	ACE inhibitor	2	AI
7618	ACE inhibitor	ACE inhibitor	3	SG
7619	ACE inhibitor	ACE inhibitor	5	LG
7620	ACE inhibitor	ACE inhibitor	4	GD
7621	ACE inhibitor	ACE inhibitor	4	TG
7622	ACE inhibitor	ACE inhibitor	7	EG
7623	ACE inhibitor	ACE inhibitor	4	EA
7624	ACE inhibitor	ACE inhibitor	1	NG
7625	ACE inhibitor	ACE inhibitor	2	PG
7628	ACE inhibitor from kappa-CN (fr. 67-68)	ACE inhibitor	2	VR
7635	ACE inhibitor from k-CN (fr. 51-53)	ACE inhibitor	1	VAV
7640	ACE inhibitor from porcine myosin (79-81)	ACE inhibitor	1	MNP
7654	ACE inhibitor from wakame	ACE inhibitor	1	NKL
7680	ACE inhibitor from pea vicilin	ACE inhibitor	2	QK
7681	ACE inhibitor from soy	ACE inhibitor	4	DG
7683	ACE inhibitor from garlic	ACE inhibitor	1	NF
7685	ACE inhibitor from garlic	ACE inhibitor	1	SF
7692	ACE inhibitor	ACE inhibitor	1	KF
7693	ACE inhibitor from wakame	ACE inhibitor	2	KL
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7741	ACE inhibitor	ACE inhibitor	2	RR
7742	ACE inhibitor	ACE inhibitor	5	AR
7743	ACE inhibitor	ACE inhibitor	5	KA
7751	ACE inhibitor from shark meat hydrolysate	ACE inhibitor	1	CF
7752	ACE inhibitor from shark meat hydrolysate	ACE inhibitor	2	EY
7820	ACE inhibitor from wheat gliadin	ACE inhibitor	1	GPP
7824	ACE inhibitor from micro algae	ACE inhibitor	2	IAE
7826	ACE inhibitor	ACE inhibitor	3	EI
7827	ACE inhibitor	ACE inhibitor	4	IE
7828	ACE inhibitor	ACE inhibitor	3	EV
7829	ACE inhibitor	ACE inhibitor	11	VE
7830	ACE inhibitor	ACE inhibitor	2	TE

7832	ACE inhibitor	ACE inhibitor	2	LN
7833	ACE inhibitor	ACE inhibitor	1	PT
7834	ACE inhibitor	ACE inhibitor	1	TQ
7836	ACE inhibitor	ACE inhibitor	1	PP
7837	ACE inhibitor	ACE inhibitor	1	PQ
7839	ACE inhibitor	ACE inhibitor	1	ME
7840	ACE inhibitor	ACE inhibitor	5	EK
7841	ACE inhibitor	ACE inhibitor	2	KE
8951	ACE inhibitor	ACE inhibitor	8	AV
9047	ACE inhibitor	ACE inhibitor	2	AQL
9061	ACE inhibitor	ACE inhibitor	1	LGI
9075	ACE inhibitor	ACE inhibitor	2	DM
9077	ACE inhibitor	ACE inhibitor	1	YV
9079	ACE inhibitor	ACE inhibitor	4	IL
9151	ACE inhibitor	ACE inhibitor	1	TGP
9173	ACE inhibitor	ACE inhibitor	4	RG
9184	ACE inhibitor	ACE inhibitor	3	ST
9185	ACE inhibitor	ACE inhibitor	1	YN
9213	ACE inhibitor	ACE inhibitor	5	LR
9284	ACE inhibitor	ACE inhibitor	1	LGY
9882	ACE inhibitor	ACE inhibitor	2	VM
9942	ACE inhibitor	ACE inhibitor	2	EF
9944	ACE inhibitor	ACE inhibitor	3	ER
10001	ACE inhibitor	ACE inhibitor	1	LPL
10091	ACE inhibitor	ACE inhibitor	5	DR
10092	ACE inhibitor	ACE inhibitor	2	LP
3283	Antithrombotic peptide	antithrombotic	3	GP
3285	Antithrombotic peptide	antithrombotic	2	PG
3094	gliadin 1 exorphin	opioid	1	PLG
3356	Stimulating vasoactive substance release	stimulating	1	LLL
8320	Glucose uptake stimulating peptide	stimulating	2	VL
8321	Glucose uptake stimulating peptide	stimulating	4	LV
8322	Glucose uptake stimulating peptide	stimulating	3	IV
8323	Glucose uptake stimulating peptide	stimulating	4	IL
8324	Glucose uptake stimulating peptide	stimulating	2	LI
8325	Glucose uptake stimulating peptide	stimulating	3	II
8326	Glucose uptake stimulating peptide	stimulating	4	LL
8329	Stimulating vasoactive substance release	stimulating	2	EE
8330	Stimulating vasoactive substance release	stimulating	5	SE
3098	fragment of bovine beta casein (91-93)	immunostimulating	1	GVM
3099	Immunostimulating peptide	immunostimulating	1	LGY
2890	neuropeptide	neuropeptide	1	GQ
2738	Peptide regulating phosphoinositol	regulating	1	LGY

	metabolism			
2753	peptide regulating the stomach mucosal membrane activity	regulating	3	GP
2754	peptide regulating the stomach mucosal membrane activity	regulating	2	PG
9955	Regulator of phosphoglycerate kinase activity	regulating	2	SL
8318	Dvl protein binding	anticancer	1	VVV
7873	peptide from soybean protein isolates: beta-conglycinin and glycinin	antioxidative	1	IY
7888	antioxidative peptide	antioxidative	1	EL
8134	peptide derived from dried bonito	antioxidative	6	KD
8217	Antioxidative peptide	antioxidative	2	LK
8987	Antioxidative peptide	antioxidative	1	GPP
10000	Antioxidative peptide	antioxidative	1	LPL
10060	Antioxidative peptide	antioxidative	1	LGY
3751		bacterial permease ligand	2	KK
9856	Anti-inflammatory peptide	anti inflammatory	1	PY
10141	Hypotensive peptide	hypotensive	7	AA
4005		activating ubiquitin-mediated proteolysis	3	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	7	LA
3169	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GP
3170	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PP
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	LA
3177	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AP
3180	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LP

3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VP
3182	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	LL
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VV
8500	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	APG
8501	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IP
8505	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SP
8518	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RP
8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GA
8525	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	IA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	RA
8530	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NP
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TA
8558	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	EK
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AL
8560	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	SL
8561	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GL
8594	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VR
8616	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	1	LPL

	IV inhibitor)	peptidase IV inhibitor		
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	AA
8638	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PL
8640	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AAAAG
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AD
8758	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AE
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AG
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AS
8763	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	AT
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	AV
8766	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DN
8767	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	DP
8768	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DQ
8769	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	DR
8770	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	EG
8772	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EI
8773	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	4	ES

		inhibitor		
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	EV
8777	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	EY
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GE
8782	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	GF
8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	11	GG
8785	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	GI
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	6	GV
8788	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GY
8790	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HE
8796	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HT
8800	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IH
8801	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	II
8802	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	IL
8808	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KE
8809	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KF
8810	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KG
8811	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KH

8812	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KI
8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KK
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KR
8815	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	KS
8816	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KT
8817	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	8	KV
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LI
8822	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	LM
8823	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LN
8824	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LT
8825	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	LV
8826	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ME
8827	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MF
8828	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MG
8831	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	MK
8832	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	ML
8834	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MN
8837	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	1	MV

	IV inhibitor)	peptidase IV inhibitor		
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	NA
8840	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ND
8842	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NF
8843	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NG
8844	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NH
8845	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	NL
8847	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NN
8848	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NQ
8851	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NV
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PG
8857	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PI
8858	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PK
8859	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PM
8861	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PQ
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PS
8863	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PT
8866	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	1	PY

		inhibitor		
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QA
8873	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QI
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	QL
8875	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QN
8878	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QT
8879	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QV
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	RG
8885	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	RK
8886	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	RL
8888	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	RN
8889	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	RR
8891	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SF
8893	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	SI
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	SV
8898	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TD
8899	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TE
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TG

8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TI
8904	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	TK
8905	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TL
8907	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TN
8908	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TQ
8909	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TR
8911	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	TT
8912	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	TV
8915	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	VD
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	11	VE
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	VG
8920	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VI
8921	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VK
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VL
8923	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VM
8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VN
8925	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VQ
8926	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	6	VS

	IV inhibitor)	peptidase IV inhibitor		
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VT
8933	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YD
8935	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YF
8938	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YI
8942	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YN
8945	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YS
8946	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YV
9383	HMG-CoA reductase inhibitor	HMG-CoA reductase inhibitor	2	GGV
9650	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	4	EA
9651	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	PP
9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	11	VE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	AD
9478	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	LR
9480	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YF
9485	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	RR
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	GE
9488	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	GF
9489	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	PR
9490	DPP-III inhibitor	dipeptidyl	2	RF

		peptidase III inhibitor		
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	3	DA
9497	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	IH
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	7	LA
9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	SM
9510	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	YI
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	KA
9516	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	AAAA
8249	CaMPDE inhibitor	CaMPDE inhibitor	1	KF
8250	CaMPDE inhibitor	CaMPDE inhibitor	2	EF
2835	Renin inhibitor	renin inhibitor	1	FT
2842	Renin inhibitor	renin inhibitor	5	LR
8248	Renin inhibitor	renin inhibitor	1	KF
8251	Renin inhibitor	renin inhibitor	2	EF
9432	Renin inhibitor	renin inhibitor	1	SF
10002	renin inhibitor	renin inhibitor	1	LPL
9580	Hypolipidemic peptide	hypolipidemic	2	EF

Profiles of proteins potential biological activity for Ferritin(AFR78246.1):

ID	Name of peptide	Activity	Number	Sequence
3460	Prolyl endopeptidase inhibitor	antiamnestic	3	PG
3370	ACE inhibitor from beta-CN (177-179)	ACE inhibitor	1	AVP
3375	ACE inhibitor	ACE inhibitor	1	AAP
3378	ACE inhibitor	ACE inhibitor	1	GRP
3380	ACE inhibitor	ACE inhibitor	1	RY
3384	ACE inhibitor	ACE inhibitor	1	VF
3385	ACE inhibitor	ACE inhibitor	1	MF
3393	ACE inhibitor	ACE inhibitor	1	FAP

3486	ACE inhibitor from sake lees	ACE inhibitor	2	VW
3492	ACE inhibitor from sake	ACE inhibitor	1	VY
3518	ACE inhibitor	ACE inhibitor	2	VAA
3521	ACE inhibitor	ACE inhibitor	1	VAP
3563	ACE inhibitor	ACE inhibitor	2	AY
7491	ACE inhibitor	ACE inhibitor	1	GVW
7511	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	1	LPG
7513	ACE inhibitor from Alaskan pollack skin	ACE inhibitor	2	PL
7549	ACE inhibitor	ACE inhibitor	1	LKP
7558	ACE inhibitor from buckwheat	ACE inhibitor	1	VK
7582	ACE inhibitor	ACE inhibitor	1	RP
7583	ACE inhibitor	ACE inhibitor	1	AF
7584	ACE inhibitor	ACE inhibitor	4	AP
7585	ACE inhibitor	ACE inhibitor	2	LA
7586	ACE inhibitor	ACE inhibitor	2	KR
7587	ACE inhibitor	ACE inhibitor	1	VP
7588	ACE inhibitor	ACE inhibitor	1	RA
7589	ACE inhibitor	ACE inhibitor	2	YA
7590	ACE inhibitor	ACE inhibitor	7	AA
7591	ACE inhibitor	ACE inhibitor	2	GF
7594	ACE inhibitor	ACE inhibitor	3	VG
7597	ACE inhibitor	ACE inhibitor	1	GM
7598	ACE inhibitor	ACE inhibitor	4	GA
7600	ACE inhibitor	ACE inhibitor	2	AG
7602	ACE inhibitor	ACE inhibitor	1	HL
7603	ACE inhibitor	ACE inhibitor	1	GR
7606	ACE inhibitor	ACE inhibitor	5	DA
7607	ACE inhibitor	ACE inhibitor	1	GS
7608	ACE inhibitor	ACE inhibitor	2	GV
7610	ACE inhibitor	ACE inhibitor	1	GQ
7612	ACE inhibitor	ACE inhibitor	2	GT
7614	ACE inhibitor	ACE inhibitor	1	HG
7615	ACE inhibitor	ACE inhibitor	2	GE
7616	ACE inhibitor	ACE inhibitor	3	GG
7618	ACE inhibitor	ACE inhibitor	3	SG
7619	ACE inhibitor	ACE inhibitor	1	LG
7621	ACE inhibitor	ACE inhibitor	1	TG
7625	ACE inhibitor	ACE inhibitor	3	PG
7681	ACE inhibitor from soy	ACE inhibitor	1	DG
7684	ACE inhibitor from garlic	ACE inhibitor	1	SY
7685	ACE inhibitor from garlic	ACE inhibitor	1	SF

7691	ACE inhibitor from wakame	ACE inhibitor	1	KY
7692	ACE inhibitor	ACE inhibitor	1	KF
7693	ACE inhibitor from wakame	ACE inhibitor	1	KL
7698	ACE inhibitor from wakame	ACE inhibitor	1	NK
7742	ACE inhibitor	ACE inhibitor	1	AR
7743	ACE inhibitor	ACE inhibitor	1	KA
7752	ACE inhibitor from shark meat hydrolysate	ACE inhibitor	1	EY
7810	ACE inhibitor from anchovy and bonito	ACE inhibitor	1	KP
7828	ACE inhibitor	ACE inhibitor	2	EV
7829	ACE inhibitor	ACE inhibitor	1	VE
7831	ACE inhibitor	ACE inhibitor	1	LQ
7840	ACE inhibitor	ACE inhibitor	1	EK
7843	ACE inhibitor	ACE inhibitor	1	PH
8185	ACE inhibitor	ACE inhibitor	2	TF
8404	ACE inhibitor	ACE inhibitor	1	VLKP
8951	ACE inhibitor	ACE inhibitor	5	AV
8968	ACE inhibitor	ACE inhibitor	1	ASL
9029	ACE inhibitor	ACE inhibitor	1	ALP
9031	ACE inhibitor	ACE inhibitor	2	LEE
9047	ACE inhibitor	ACE inhibitor	1	AQL
9064	ACE inhibitor	ACE inhibitor	1	LEK
9072	ACE inhibitor	ACE inhibitor	1	DY
9073	ACE inhibitor	ACE inhibitor	2	TP
9074	ACE inhibitor	ACE inhibitor	1	DF
9075	ACE inhibitor	ACE inhibitor	1	DM
9077	ACE inhibitor	ACE inhibitor	1	YV
9087	ACE inhibitor	ACE inhibitor	1	YH
9089	ACE inhibitor	ACE inhibitor	1	WA
9173	ACE inhibitor	ACE inhibitor	1	RG
9184	ACE inhibitor	ACE inhibitor	3	ST
9731	ACE inhibitor	ACE inhibitor	1	VVL
9942	ACE inhibitor	ACE inhibitor	1	EF
9944	ACE inhibitor	ACE inhibitor	1	ER
10004	ACE inhibitor	ACE inhibitor	1	LQL
10092	ACE inhibitor	ACE inhibitor	1	LP
3285	Antithrombotic peptide	antithrombotic	3	PG
8320	Glucose uptake stimulating peptide	stimulating	2	VL
8324	Glucose uptake stimulating peptide	stimulating	1	LI
8329	Stimulating vasoactive substance release	stimulating	3	EE
2890	neuropeptide	neuropeptide	1	GQ
2749	peptide regulating ion flow	regulating	1	DY

2754	peptide regulating the stomach mucosal membrane activity	regulating	3	PG
9955	Regulator of phosphoglycerate kinase activity	regulating	3	SL
3305		antioxidative	1	LH
3317		antioxidative	1	HL
7866	peptide from Okara protein	antioxidative	2	AY
7957	synthetic peptide	antioxidative	1	YAY
7995	synthetic peptide	antioxidative	1	LHL
8026	synthetic peptide	antioxidative	1	PHG
8114	peptide derived from sardinelle by-products proteins (Sardinella aurita)	antioxidative	2	GGE
8216	Antioxidative peptide	antioxidative	1	LKP
8217	Antioxidative peptide	antioxidative	2	LK
8218	Antioxidative peptide	antioxidative	1	KP
8224	antioxidative peptide	antioxidative	1	VY
8461	Antioxidant peptide from marine bivalve (Mactra veneriformis)	antioxidative	2	VW
9356	Antioxidative peptide	antioxidative	1	ACQ
10003	Antioxidative peptide	antioxidative	1	LQL
10051	Antioxidative peptide	antioxidative	1	RY
3751		bacterial permease ligand	1	KK
10141	Hypotensive peptide	hypotensive	7	AA
4005		activating ubiquitin-mediated proteolysis	1	RA
4006	Ubiqitin-mediated proteolysis activating peptide	activating ubiquitin-mediated proteolysis	2	LA
4007	Peptide activating ubiquitin-mediated proteolysis	activating ubiquitin-mediated proteolysis	1	WA
3172	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	VA
3173	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MA
3174	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KA
3175	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	LA
3176	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	FA
3177	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	4	AP

	IV inhibitor)	peptidase IV inhibitor		
3180	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LP
3181	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VP
3183	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VV
3184	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	HA
8500	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	APG
8503	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TP
8505	Dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SP
8518	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RP
8519	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KP
8524	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	4	GA
8526	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RA
8528	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WA
8531	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TA
8557	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HL
8558	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EK
8559	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AL
8560	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	3	SL

		inhibitor		
8637	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	7	AA
8638	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	PL
8696	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YT
8757	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AD
8759	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	AF
8760	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AG
8762	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	AS
8764	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	5	AV
8765	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	AY
8766	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DN
8768	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	DQ
8774	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ET
8775	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	EV
8777	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	EY
8778	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	FN
8781	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GE
8782	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GF

8783	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	GG
8786	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	GV
8791	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	HF
8805	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	IQ
8809	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KF
8813	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KK
8814	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	KR
8819	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	KY
8820	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LH
8821	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	LI
8827	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MF
8834	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MN
8836	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	MR
8837	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	MV
8839	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NA
8840	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	ND
8847	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	NN
8848	dipeptidyl peptidase IV inhibitor (DPP	dipeptidyl	1	NQ

	IV inhibitor)	peptidase IV inhibitor		
8849	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NR
8850	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NT
8851	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	NV
8855	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PG
8856	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PH
8862	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	PS
8864	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	PV
8867	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	QA
8868	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QD
8869	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QE
8870	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QF
8873	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QI
8874	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	QL
8877	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	QS
8879	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	QV
8882	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	RG
8887	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV	1	RM

		inhibitor		
8891	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SF
8895	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SV
8897	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	SY
8898	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TD
8900	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TF
8901	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TG
8902	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TH
8903	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TI
8906	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TM
8910	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	TS
8912	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	TV
8915	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VD
8916	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VE
8917	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VF
8918	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	3	VG
8921	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VK
8922	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VL

8924	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VN
8925	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VQ
8926	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VS
8927	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VT
8928	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	VW
8929	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VY
8931	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	WH
8932	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YA
8935	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	2	YF
8937	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YH
8941	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YM
8946	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	YV
9334	dipeptidyl peptidase IV inhibitor (DPP IV inhibitor)	dipeptidyl peptidase IV inhibitor	1	VAAA
9387	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	2	VW
9693	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	1	VE
9695	Alpha-glucosidase inhibitor	alpha-glucosidase inhibitor	5	AD
9479	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	MR
9480	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	YF
9481	DPP-III inhibitor	dipeptidyl	1	YH

		peptidase III inhibitor		
9486	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	TF
9487	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	GE
9488	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	GF
9491	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	RV
9492	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	5	DA
9493	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	HL
9495	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	HF
9499	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	2	LA
9500	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	4	FA
9503	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	FM
9507	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	SM
9509	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	VY
9511	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	KA
9516	DPP-III inhibitor	dipeptidyl peptidase III inhibitor	1	AAAA
8249	CaMPDE inhibitor	CaMPDE inhibitor	1	KF
8250	CaMPDE inhibitor	CaMPDE inhibitor	1	EF

BRIEF BIOGRAPHY

MD IMRANUL ISLAM was born on 12 june 1995 in chattogram. His father, MD Nazrul Islam, was a senior school teacher. His mother was Nelufa Yeasmin. He spent his childhood mainly in chattogram. He is the only child of his parents.He passed the SSC exam from Victory Adarsha High School in 2011 and the HSC exam from BAF Shaheen Collage, Chattogram in 2013.

He earned his bachelor's in Food Science & Technology from the Chattogram Veterinary & Animal Sciences University(CVASU) in 2018 and then admitted to MS course in same University.