



August 18, 2022

Exercise of Option by MEDIPAL HOLDINGS CORPORATION
~Selects FPP005, an Anti-IL-23 Antibody-inducing Peptide, as a Promising Target
Development Product~

FunPep Co., Ltd. ("FunPep") is pleased to announce that MEDIPAL HOLDINGS CORPORATION ("MEDIPAL") has selected FPP005, an anti-IL-23 antibody-inducing peptide, as a new target development product eligible for profit sharing and other benefits.

MEDIPAL has previously selected FPP003, an anti-IL-17A antibody-inducing peptide, as a target development product eligible for profit sharing and other benefits, under an option agreement with Sumitomo Pharma Co., Ltd. This time, MEDIPAL has newly selected FPP005, an anti-IL-23 antibody-inducing peptide, as a promising target development product. FPP005's development is progressing smoothly and out-licensing activities with pharmaceutical companies are underway with a view to start clinical trials in 2023.

MEDIPAL and FunPep entered into an alliance agreement in February 2016 for research and development support for an antibody-inducing peptide project. Under the alliance agreement, FunPep has received an upfront payment and a three-year R&D funding from MEDIPAL to research antibody-inducing peptides against a variety of target proteins to build its R&D pipeline.

In turn, upon selecting a certain number of target development products among antibody-inducing peptides generated from this research, MEDIPAL retains the right to receive a certain percentage of upfront payments and development milestone payments received by FunPep from pharmaceutical companies that have licensed the selected target development products from FunPep. Furthermore, FunPep will make every effort to ensure MEDIPAL obtains preferential negotiating rights for wholesale sales in Japan and one other specified country during licensing negotiations with pharmaceutical companies.

Antibody-inducing peptides are peptide therapeutic vaccines that are expected to have therapeutic effects by inducing antibody production in the patient's body.

Unlike antibody drugs manufactured in biomanufacturing facilities, antibody-inducing peptides can be produced by chemical synthesis, thus reducing manufacturing costs. Furthermore, once these peptides are administered, immune cells in the patient's body continuously produce antibodies for a period of time, thus allowing for a longer drug administration interval. With these features, FunPep hopes to develop antibody-inducing peptides as an alternative to expensive antibody drugs that can reduce medical costs, thereby contributing to solving the health economic issues that are becoming more serious in developed countries as well as reducing the burden on patients.

FunPep's strength is that we possess the drug discovery platform technology for antibody-inducing peptides. In collaboration with Osaka University Graduate School of Medicine, we are conducting drug discovery research on antibody-inducing peptides for various diseases.

The target protein of FPP005, IL-23, plays an important role in the pathogenesis of various inflammatory diseases, and leading anti-IL-23 antibody drugs are being developed for a wide range of

diseases including psoriasis vulgaris, psoriatic arthritis, Crohn's disease and ulcerative colitis. As such, the global market has already grown to several hundred billion yen.

FPP005 is progressing well in preclinical trials with a view to start clinical trials in 2023.

The global antibody drug market reached 17,824.6 billion yen in 2020, up 12.5% from the previous year, and continues to increase.ⁱ In the field of immunology and inflammation, which is the largest sector of the antibody drug market (6,795.6 billion yen in 2020), FunPep is developing two developmental compounds, FPP003 and FPP005.

FPP003 and FPP005 are being developed for the same initial indication of psoriasis vulgaris. FPP003, which targets IL-17A, is expected to expand its target indication to include spondyloarthritis (e.g. ankylosing spondylitis or non-radiographic axial spondyloarthritis, etc.) while FPP005, which targets IL-23, is expected to expand its target indication to include inflammatory bowel diseases (Crohn's disease or ulcerative colitis, etc.). We believe that the development of these two compounds will enable us to cover the large market of immunology and inflammation more widely, and so we are prioritizing the development of FPP003 and FPP005.

References

ⁱ TPC Marketing Research, Inc. "The Global Antibody Drug Market in 2021".

About MEDIPAL HOLDINGS CORPORATION

Corporate Name : MEDIPAL HOLDINGS CORPORATION

Representative : Shuichi Watanabe, Representative Director, President and CEO

Established : May 6, 1923

Line of Business : As a holding company, MEDIPAL HOLDINGS controls, administers and supports the operating activities of companies in which it holds shares in the Prescription Pharmaceutical Wholesale Business; the Cosmetics, Daily Necessities and OTC Pharmaceutical Wholesale Business; and the Animal Health Products and Food Processing Raw Materials Wholesale Business, and conducts business development for the MEDIPAL Group.

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URL : <https://www.medipal.co.jp>

< Reference Material >

◆ R&D Pipeline

< Products in Development >

Product	Indication	Region	Clinical trial sites	Discovery	Preclinical	Clinical Trials			Alliance
						P1	P2	P3	
SR-0379	Skin Ulcers	Global	Japan	Phase III Ongoing					Shionogi (Global license)
FPP003 (Target : IL-17A)	Psoriasis	Global	Australia	Phase I/IIa Ongoing					Sumitomo Pharma (Option for N.America)
	Ankylosing spondylitis		Japan	Phase I Ongoing *			* Investigator initiated trial		
FPP004 (Target : IgE)	Pollinosis (Seasonal allergy rhinitis)	Global	—	Preclinical					TBD
FPP005 (Target : IL-23)	Psoriasis	Global	—	Preclinical					TBD
FPP006	COVID-19	Global	—	Preclinical					TBD

< Research Themes >

Type	Indication	Academia	Partners
Antibody inducing peptide	Neuropsychiatric disease	Osaka University (Research collaboration on antibody-inducing peptide)	Sumitomo Pharma (Research agreement on Neuropsychiatric disease)
	Pain		
	High blood pressure		
	Allergy-related diseases	Kumamoto University (Research collaboration on dyslipidemia)	Shionogi (Research collaboration on pain)
	Thrombosis		
	Dyslipidemia		Medipal Holdings (R&D support agreement)
	Others		

Antibody-inducing Peptides

On the strength of AJP001, a functional peptide that is the result of research conducted at the Osaka University Graduate School of Medicine, FunPep is advancing research and development of "antibody-inducing peptides," therapeutic vaccines for chronic diseases such as inflammatory and allergic diseases.

In order to induce antibody production in vivo, it is necessary for B cells to recognize target proteins (antigens) and for B cells to be activated by stimulation from helper T cells. However, antibodies are not produced against self-antigens (e.g., self-proteins), which are the target proteins of chronic diseases, because helper T cells are not activated. For this reason, antibody-inducing peptides are designed to induce antibody production against target self-proteins by binding the "epitope" portion (B cell epitope) recognized by B cells to the "carrier" portion containing the T cell epitope recognized by helper T cells.

The strengths of our antibody-inducing peptides are: (1) the use of our proprietary functional peptide "AJP001" as the "carrier"^(Note) and (2) the technological know-how to design and select the "epitope" according to the characteristics of the target protein (physicochemical properties, steric structure, and biological functions). FunPep calls these two strengths together the "STEP UP (Search Technology of EPitope for Unique Peptide vaccine)" drug discovery platform.

(Note) Generally, biological substances are used as "carriers," but since these carriers contain not only T-cell epitopes but also B-cell epitopes, antibodies against the carriers are also produced. Therefore, repeated administration of the carrier may result in stronger immune induction against the carrier and weaker immune induction against the target protein. On the other hand, when AJP001 is used as a carrier, antibodies against AJP001 are not produced, so antibody production can be induced specifically for the target protein.

※ "Antibody-inducing peptides" is a registered trademark of FunPep.

◆ STEP UP Drug Discovery Platform

