Anaeropharma Science, Inc.

Developing systemic therapy for metastatic cancer by means of *Bifidobacterium* as unprecedented drug delivery platform

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Anaeropharma Science, Inc.
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JAPAN

Founded in	2004
No. of employees	16
State of Ownership	private
Primary stock exchange	N/A

June 2009: Anaeropharma Science focuses on developing systemic therapy for metastatic cancer by targeting hypoxia inherent in solid tumors. The Company was incorporated in August 2004 as a spin-off of Shinshu University, Nagano, Japan. Its head office is located in Tokyo and the R&D division in the Matsumoto campus of Shinshu University.
Venture Valuation (VV) interviewed Mr. Tetsuya Mishima, President and CEO, and Mr. Koji Hagimoto, Director Clinical Research.

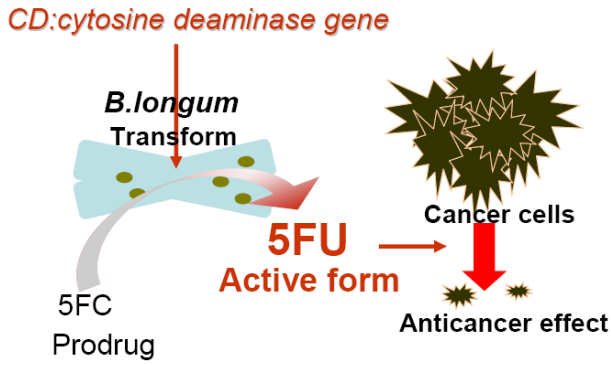
VV: **Would you please describe your business and its strengths?**

Mishima: Our company was founded by scientists who are committed to improving the treatment of metastatic/recurrent cancer patients by using *Bifidobacterium longum* as drug delivery system. *Bifidobacterium* is nonpathogenic as well as anaerobic. By intravenous injection it selectively localizes to and proliferates in the hypoxic regions inherent in solid tumors. This means that *Bifidobacterium* is an ideal vector to deliver anticancer agent to targeted solid tumors.

Our first product APS001, the BEST-CD (Bifidobacterial Selective Targeting-Cytosine Deaminase) therapy, is anticipated to start Phase I trial next year in the U.S. BEST-CD applies enzyme/prodrug therapy, which is one of the most common approaches for cancer gene therapy and is confirmed to be effective for systemic administration. The CD (Cytosine Deaminase) is able to transform the nontoxic prodrug 5-fluorocytosine (5-FC) into the anticancer agent 5-fluorouracil (5-FU). The CD gene is inserted into the plasmid; transformed *Bifidobacterium* produces CD in the hypoxic tumor. Mutant CD increases the enzyme activity of the conversion from 5-FC to 5-FU. (see chart below)

Schematic representation of *Bifidobacterial* Selective Targeting - Cytosine Deaminase (BEST-CD) therapy.

Breast Cancer. 2006;13(1):27-31.



There are other bacterial therapy approaches with Salmonella and Clostridium. However, they are pathogenic.

VV: **What are your objectives in the future?**

Mishima: Our priority is to demonstrate favorable results by 2011 from Phase I trial of APS001. We have been discussing with FDA for two years and preparing for Phase I study in the U.S.

Another objective is to further develop platform technology features of our *Bifidobacterium* based drug delivery system.

VV: **In what geographical areas would you like to develop your business?**

Mishima: We are looking for major pharmaceutical and biotech companies who plan to enrich their oncology portfolio or to get into the oncology field. As our company is small with limited resources, it would be great if we could have partners willing to participate in Phase I trial with us.

The patent for the basic concept has been approved in Japan and filed in the U.S. and Canada. We have been filing the consequent patents worldwide to strengthen our patent portfolio.

VV: **How do you differentiate from your competitors and position your company?**

Mishima: As far as we know, we are the only company in the world developing the cancer therapy with *Bifidobacterium* targeting tumor hypoxia. We believe that it is the safest and the most efficacious bacterial technology for this purpose.

It is worth mentioning that Vion Pharmaceuticals, a U.S.company, performed Phase I clinical trials with attenuated Salmonella strain. However, the study is suspended due to low selectivity of colonization in tumor compared with other normal organs such as liver. Our preliminary data showed that Bifidobacterium was less virulent compared to Salmonella.(see data below)

Survival after a single intravenous injection of Bacterial products;
APS001(*B.longum*) vs VNP20009 (attenuated *Salmonella strain*)

Products	Mouse Strain	Route	Dose (cfu/mouse)	Dose (cfu/kg)	n	Mortality (%)
APS001 (B.longum)	Balb/c (nu/nu) ♀	Single bolus, iv	4.2×10^8	2.1×10^{10}	6	0/6 (0)
			1.3×10^9	6.5×10^{10}	5	0/5 (0)
			2.1×10^9	1.1×10^{11}	6	0/6 (0)
VNP20009#) (Salmonella)	C57BL/6 ♀	Single bolus, iv	1×10^6	5×10^7	10	0/10 (0)
			3×10^6	1.5×10^8	10	5/10 (50)
			1×10^7	5×10^8	10	10/10 (100)

#) Lee.KC et al., Int J Toxicol. 2001;20(4):207-17

B.Longum(APS001) was low virulent more than 1,000 fold in mouse.

VV Comments after the Interview:

Anaeropharma has introduced an unprecedented bacterial therapy approach to cure metastatic/recurrent cancer patients of solid tumors. Since there is no specific treatment for them, the clinical success of product APS100 would give a tremendous impact on the oncology field.

The global cancer drug market was estimated around US$64 billion in 2008 and is expected to grow to over US$80 billion in a few years. Anaeropharma has the opportunity to create its own market segment if the clinical studies go smoothly.

Contact

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Venture Valuation specializes in independent assessment and valuation of technology-driven companies in growth industries, such as the Life Sciences (Biotech, Pharma, Medtech), ICT, high-tech, Nanotech, Cleantech and Renewable energy. In addition to valuation products, Venture Valuation offers high-quality, focused information services like the Global Life Sciences Database, Biotechgate.com and this *"Let's Interview Series"* with leading Life Sciences companies. We select and interview thriving companies and organizations all over the world.