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## Ajinomoto Bio-Pharma Services On the Forefront of Producing Advanced Medicines

### Improving the Health of Humankind

Ajinomoto Co., Inc's involvement with medicine shouldn't be all that surprising. Amino acids are at the heart of molecular medicine and science, and we began producing amino acid derivatives for therapeutic use more than 30 years ago. But making a strong contribution in today's revolutionary approaches to medicine requires an extraordinary level of expertise, technology, and dedication.

Ajinomoto Bio-Pharma Services (Aji Bio-Pharma), a contract development and manufacturing organization for the biopharmaceutical industry, represents all of these things. Aji Bio-Pharma creates and produces medicines across the entire spectrum of use, from pre-clinical development of the molecules themselves in the pre-clinical phase, to small-scale production in clinical trials, to full production for all people in need once the medicine has been tested and approved.

Aji Bio-Pharma has a range of capabilities and facilities around the world. Their facilities in Belgium, Japan, and India focus on conventional "small molecule" production, bringing some of the most needed conventional medicines to millions of people in need throughout the world. The specific focus in the California, USA facilities is on "large molecule" biologic medicines, and its Osaka, Japan facilities focus on gene expression technologies.

■ Sterile production area for the fill and finish of drug products



### AJICAP™: On the Cutting Edge of Cancer Treatment

One of the most exciting cutting-edge technologies being offered by Ajinomoto Co. and Aji Bio-Pharma is called AJICAP™.

To understand AJICAP™, you first must understand a bit about "biological medicines," and why they are becoming such a common treatment approach for people with cancer.

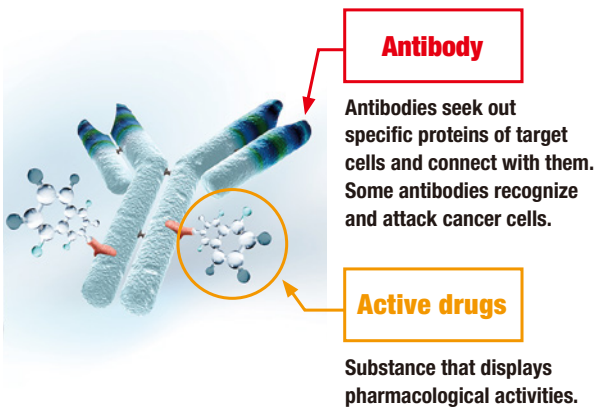


It's useful to think of a disease as an invasion by something that your body didn't make. For example, if you have a cut that is invaded by bacteria, you can get an infection, or if a virus invades your sinuses, you can get a head cold. For these types of conditions, the objective of treatment is to remove or neutralize the foreign invader. In the case of bacteria, for example, this means using antibiotics.

Cancer, however, is very tricky, because it is not foreign. Cancer occurs when the body produces abnormal cells that divide uncontrollably. The fact that cancer cells are created by the human body, and do not originate from the outside, makes it very difficult to target them effectively using conventional medicine. This is one reason that traditional chemotherapy has so many strong side effects—these medicines mostly attack all of the cells in a patient's body, not just the cancer cells, because it can't differentiate between them.

To improve the way that cancer is treated, researchers began to focus on the way that human body protects itself from disease. The hero of our bodies' self-defense system is the antibody, which is a Y-shaped protein that can identify and neutralize pathogens like bacteria and viruses. There are many different kinds of antibodies, and they're continually working to defend the human body from disease. And some of these antibodies target, and try to stop, cancer cells. Unfortunately, they often simply aren't strong enough.

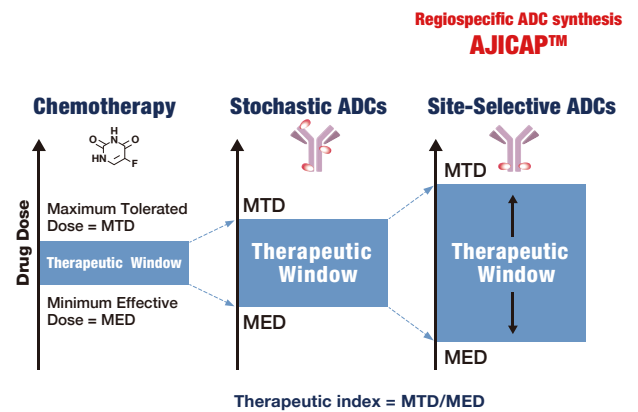
■ Precise drug payload in antibody using AJICAP



Biological medicine involves attaching molecules of medicine to the antibodies that target cancer cells. This helps the medicine find and act on the right cells, with a lower impact on healthy non-cancerous cells. And better targeting allows better potency and fewer side-effects compared to traditional chemotherapy, which is why biologic drugs (biologics) have improved outcomes so substantially for a range of cancer types.

An antibody armed with a drug molecule is called an ADC, which stands for antibody-drug conjugate, and AJICAP™ technology is a major advance in how ADCs are made. When conventional ADCs are made, the drug molecules are attached unevenly throughout the antibodies, and it's not possible to control exactly where they "stick." On the other hand, AJICAP™ allows the drug manufacturer to precisely control the amount of drug carried by each antibody, and also to control exactly where the drug is attached within the antibody. This makes ADCs more medicinal and safer.

■ The advantage of ADC site-selectivity with AJICAP



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This dramatic improvement in precision is expected to allow drug makers to create newer and more effective biologics for cancer treatment. Aji Bio-Pharma is the only company in the world that uses this technology for customers working to develop ADC medicines, and they are able to do so on a large enough scale for mass production of drugs that will save countless human lives in the future.

### **Fermentation Bacteria: From Umami Seasoning to Advanced Therapeutics**

Fermentation, which is the chemical breakdown of a substance using microorganisms such as bacteria, is fundamental to the production of the amino acids that we use for a huge variety of products. One of the bacteria that we have used for this purpose for decades is called *corynebacterium glutamicum*.

CORYNEX® is a system that uses *corynebacterium glutamicum* to produce proteins, which is critical for the manufacture of biologics. It's truly amazing to consider that the discovery of "umami" and its components by Japanese people more than 100 years ago has led to the development of a vital part of advanced medical care.

### **About Ajinomoto Co., Inc.**

The Ajinomoto Group is a global leader in amino acids thanks to its advanced bioscience and fine chemical technologies. Its products cover a range of fields such as seasonings, processed foods, beverages, amino acids, pharmaceuticals, and chemicals.

Since discovering "umami" (the fifth basic taste, created by glutamic acid, a type of amino acid) in 1908, we have been scientifically pursuing the possibilities of amino acids, and supporting the healthy lives of people all around the world. Based on our corporate message "Eat Well, Live Well," we aim for further growth and continuous contribution to greater wellness for people by creating value with communities and society.

The Ajinomoto Group has offices in 35 countries and regions, and sells products in more than 130 countries and regions. Its sales were 1.127 trillion yen (10.2 billion U.S. dollars) in fiscal year 2018. To learn more, visit <https://www.ajinomoto.com/>.

## **Commitment on a Scale that Makes a Difference**

Aji Bio-Pharma currently produces between 750 million and 1 billion doses of medicines across 43 indications. Their work has directly reached people in need in more than 150 countries, helping them to stay healthier longer.

Together with our ongoing research and expertise, which now ranges all the way from amino acids to the use of biologics to beat cancer, Ajinomoto Co. will continue to play a vital role in health and therapeutics for decades to come.