

Megakaryon Corporation

Innovating transfusion medicine with platelets produced by megakaryocytes derived from human iPS (induced pluripotent stem) cells¹

www.megakaryon.com

Megakaryon Corporation
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Founded in: 2011
CEO: Genjiro Miwa
No. of employees: 24
Type of Ownership: Private

February 2018: Current transfusion medicine entirely relies on donated blood. Megakaryon will change the transfusion practices by supplying safe and cost-saving platelets produced in vitro. Mass production in Japan is expected to begin in 2020.

Venture Valuation (VV) interviewed Genjiro Miwa, CEO and Founder.

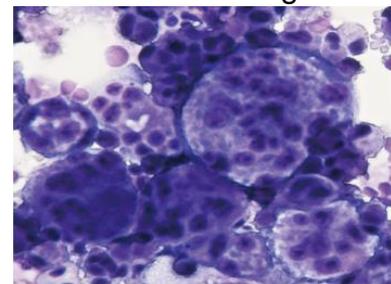


VV: **Megakaryon is internationally the first and only company that owns proprietary technology to manufacture large quantities of iPS cell-originated platelets.**

Miwa: Our technology was invented by the teams of Prof. Hiromitsu Nakauchi at the University of Tokyo, and Prof. Koji Eto at Kyoto University. We have the exclusive rights to use the related patents and additional inventions.

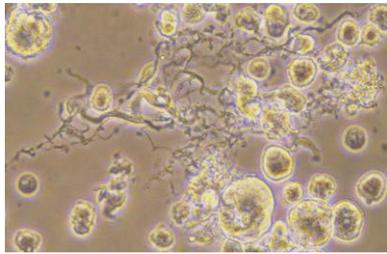
They discovered how to proliferate megakaryocytes from human iPS cells and immortalize them. Megakaryocytes are the unipotent progenitor of all platelets which are indispensable for blood clotting.

Immortalized megakaryocytes can be cryopreserved and self-expanded and are available whenever required to produce platelets in large amounts, for instance, in the event of surgical procedures. The photo on the right shows mature megakaryocytes generated from human iPS cells.



¹ Generated from somatic cells that have been reprogrammed back into an embryonic-like pluripotent state

The photo below demonstrates platelets being released from mature megakaryocytes. Being produced in a sterile environment under strict



manufacturing control, they are totally free from any pathogenic infection and bacterial or viral contamination: the inevitable testing costs and time of donated blood are not required.

While shelf life of platelets from donated blood is limited to a few days, iPS cell-originated platelets can be preserved for two weeks. Their availability not only reduces risk of shortage but also avoid the waste of valuable donated blood supplies which are not used soon enough.

With regard to potential tumorigenic risks of human iPS cells, platelets, having no nucleus, are unable to multiply. Furthermore, by using gamma-ray irradiation for sterilization in the manufacturing process, they are completely safe from tumorigenicity.

Another benefit is for patients who need transfusions of platelets with matched HLA (human leukocyte antigen) types. It is not easy to procure platelets from HLA-matched donors when necessary. Thanks to our technology, we collect in advance iPS cells from donors with various HLA types, prepare megakaryocytes, preserve them in a frozen state, and generate platelets in large quantities on demand.

VV: You have a strong sense of urgency about insufficient blood supplies in Japan which has the most rapidly declining and aging population in the world.

Miwa: Japan's population is falling due to low fertility rates, and is aging as life expectancy continues to increase². The older the population becomes, the fewer the blood donors are. By 2027 the shortage of donated blood supplies are predicted to be over 15%.

A low supply of platelets by blood donations is not only Japan's problem. It is a serious concern all over the world, particularly in industrialized countries. We estimate the current market for platelets in Japan is around 70 billion JPY (approx. 650 million USD) per year. It may be three times as much in the U.S. In Europe, for Germany, France, and the U.K. together, it is estimated to 100 billion JPY (approx. 930 million USD).

² Above the age of 65 accounts for 28% of the population, almost double the proportion of 15 to 29 year-olds. By 2065 they are projected to rise to nearly 40%. (The Economist February 17th 2018)

Our ultimate goal is to make our products available in countries where safe blood supplies are inadequate. For example, over 2,000 people have been yearly infected to HIV in India due to contaminated blood donations.

VV: **In order to proceed with clinical approval and a mass production process, you have recently raised 3.7 billion JPY (34 million USD) in Japan from venture capital and partnering companies.**

Miwa: We have established a consortium with 15 partnering companies in Japan. Each company is contributing its expertise toward creating a new transfusion medicine infrastructure. We are aiming to start mass production in 2020.

Also we are in the process of filing an IND (investigational new drug) application with the U.S. Food and Drug Administration, and developing similar infrastructure systems locally. Europe will follow.

As mentioned, we are endeavoring to provide our iPS cell-derived platelets to challenging areas in the world where the need is most soring, mainly low income countries. In doing so, we would be interested in support and collaboration from industries, local and central governments, and international organizations.

VV Comments after the interview:

Medical advances are reducing the quantity of blood required by procedures. In the U.S., it is reported that the blood banking industry revenue has dropped to 1.5 billion USD per year in 2014, down from 5 billion USD in 2008.³ The blood banking industry is undergoing mergers and acquisitions to consolidate the operations.

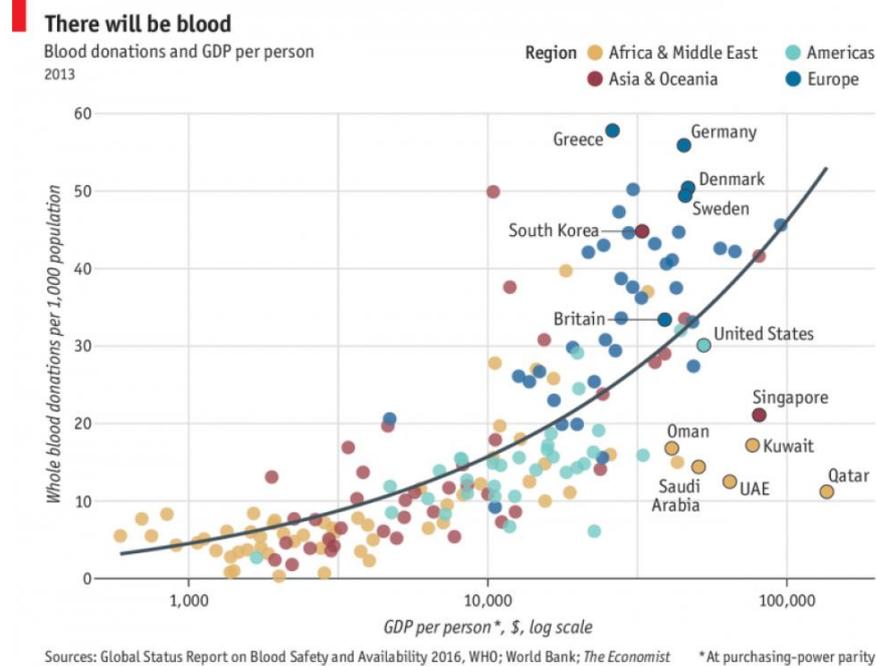
On the other hand, the article “Road blocks in making platelets for transfusion”, published at Journal of Thrombosis and Haemostasis in 2015⁴, pointed out that “In contrast to a sharp decline in red blood cell use between 2008 and 2011, platelet transfusions have risen by 7.3%. The market for platelets is expected to grow at 5.3% per annum over the next decade as a result of a growing and aging population... Globally, the market for blood products is six times larger, suggesting a global platelet market worth over 12 billion USD.”

Optimizing efficient and effective blood supply chain networks may be an immediate solution for securing sudden demand and enough supply. An alternative approach, in terms of platelet supplies, is the regenerative medicine Megakaryon is pursuing.

³ <https://theconversation.com/uncertainty-in-blood-supply-chains-creating-challenges-for-industry-70316>

⁴ <http://onlinelibrary.wiley.com/doi/10.1111/jth.12942/pdf>

According to the analysis “The global inequality of blood supplies” (see chart on next page)⁵, “Nearly 30% of blood donations occur in Europe, which has about a tenth of the world’s population. Sub-Saharan Africa, which has a larger share of the global populations, accounts for less than 5% of the blood supplies.”



Once Megakaryon successfully establishes the mass production process and make iPS cell-originated platelets products available worldwide, the company will definitely have a huge impact on the field of transfusion medicine.

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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, 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 companies with interesting technologies and services. We select and interview thriving companies and organizations all over the world.

⁵ <https://www.economist.com/blogs/graphicdetail/2017/06/daily-chart-9>