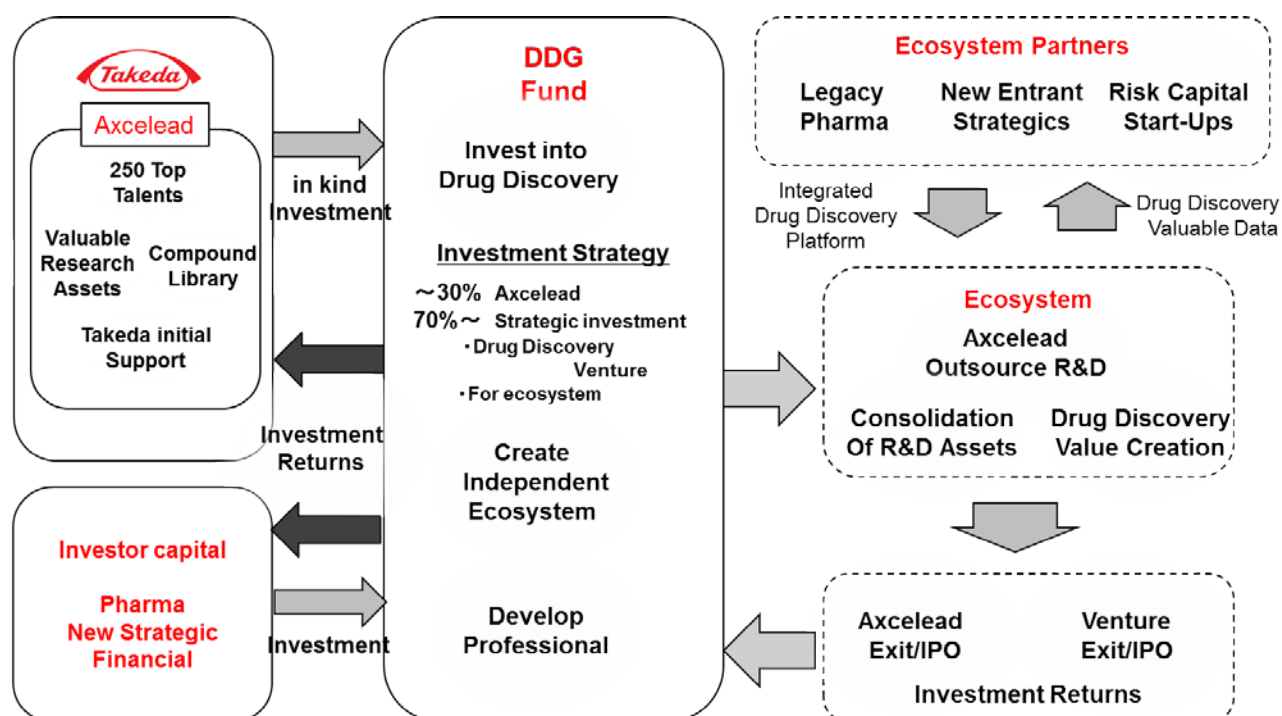


Initiatives of DDG Fund and Axcelead in the Drug Discovery Ecosystem "Shonan Health Innivation Park"

1. Schematic of the DDG Fund



2. Role of DDG Fund -Contribution to Resolving Challenges for Japanese Pharmaceutical Industry-

Industry sentiment generally views Japanese pharmaceutical companies, similar to Global Pharma, to have issues related to improvement of R&D productivity and recovery from decreasing sales due to the patent cliff. In addition, as the number of high-priced drugs including therapeutic antibodies increases, it is anticipated that pressure on drug prices will intensify further. Therefore, Japanese pharmaceutical companies are increasingly introducing products from overseas and acquiring products through acquisitions/mergers to achieve sustainable growth. However, it remains difficult to compete with Global Pharma owing to significant differences in their financial and information-gathering capabilities. Although Japanese pharma houses a vast reservoir of seed drug technologies, the system through which these are commercialized (i.e., the drug discovery ecosystem) is not working appropriately.

1) Challenges and solutions for Japanese pharmaceutical industry which the DDG Fund assumes

a. Further Improvement of Drug Discovery Capabilities

It is reported that few Japanese companies are capable of providing one-stop solutions to various issues in drug discovery research and that there is strong demand for an integrated drug discovery technology platform. Establishment of this kind of platform can significantly contribute to drug discovery in academia and ventures.

b. Effective Utilization of Research Assets

Every year, pharmaceutical companies prioritize promising drug discovery projects and, thus, discontinue those with low priorities. Therefore, these companies have a vast reservoir of dormant "seed drug compounds." Review of potential of these compounds can lead to effective drug discovery.

c. *Efficient Management of Fundamental Drug Discovery Technology*

Currently, Japanese pharmaceutical companies own and maintain their R&D assets on their own. Given these circumstances, we recognize that a compound library, as the key to initiating drug discovery, is a good example in which the effective streamlining of management can be demonstrated. It is important to focus on the core function for efficient investment of the R&D assets.

d. *Efficient Utilization of Surplus Funds*

Japanese pharmaceutical companies collectively hold approximately 25 billion USD in cash, which can be used for seeking good business partners to ensure sustainable growth for these companies. On the other hand, it is becoming very difficult to evaluate partners, so to speak “appraising ability”, due to diversified modalities of drugs.

The DDG Fund aims to resolve these challenges and will meet the above-mentioned needs by establishing the ecosystem, with which an Integrated Drug Discovery (IDD) service owned by Axcelead can be utilized, cooperating with wide-ranging stakeholders including pharmaceutical companies, bio-technology ventures, and academia. Namely, DDG will lead the commercialization of research assets with potential to realize an efficient expansion of the execution of investment by Japanese pharmaceutical companies.

2) *Technical Capabilities of Axcelead as a Drug Discovery Platform*

In July 2017, Takeda launched Axcelead as the first business model in the Japanese pharmaceutical industry that bridges bridge and applied clinical research, from exploratory research to optimizing candidate compounds. This is because Axcelead can provide drug discovery services for not only Takeda but also other pharmaceutical companies, bio-technology ventures, universities, and public research institutions to establish the drug discovery ecosystem in Japan.

Axcelead is the first investment destination of the DDG Fund and will play a central role in the fund’s drug discovery ecosystem. Axcelead has 3 important assets to be the core of the drug discovery ecosystem:

1. Personnel: A total of 250 seasoned researchers with a full-spectrum of capabilities in drug discovery research
2. Research assets: Fundamental drug discovery technology and know-how useful within and outside the company, as well as candidate compounds with commercialization potential
3. Compound library: Largest out-source library to be seeds for drug discovery in Asia

Axcelead will leverage the personnel and assets to offer the following wide range of services involved in the drug discovery as a one-stop service provider.

a. *Integrated Drug Discovery (IDD) Service*

By taking advantage of the extensive drug discovery research conducted over many years at Takeda, Axcelead will provide an integrated drug discovery (IDD) service. This service will include identifying drug discovery targets, optimizing candidate compounds, and Investigational New Drug application (IND) procedures.

b. *Cost Saving Services*

Axcelead will realize clients’ cost optimization and access to the largest compound library in Asia by

assuming the maintenance of compound libraries of other pharmaceutical companies in addition to the library succeeded from Takeda.

c. Revitalizing Dormant Research Assets

Axcelead will analyze dormant seed compounds and technology held within Japanese pharmaceutical companies, pursue business development opportunities for such seeds, and develop and turn them into intellectual property rights that meet client needs.

d. Synergies between Drug Discovery Ecosystem and Investment Opportunities

With its substantial pool of personnel and assets, with a wide variety of capabilities based on many years of drug discovery research, Axcelead will play a central role in the drug discovery ecosystem. The DDG Fund will help to activate the industry through an extensive network of personnel and technology, thereby generating many investment opportunities. The personnel and technology available to the DDG Fund and to Axcelead will reinforce each other and leverage multi-level synergies in the drug discovery ecosystem.

3. An Important Role at the Shonan Health Innovation Park

In April 2018, Takeda launched the Shonan Health Innovation Park in an initiative to create an open, innovative ecosystem built on the pharmaceutical know-how where pharmaceutical companies, government, and academia come together to incubate and accelerate the translation of cutting-edge science into impactful health solutions for patients in Japan and globally.

Activities of the Shonan iPark focus on the following four objectives:

- Bridge innovative ideas and technology with business
- Become a place to co-create with various stakeholders across industry, academia, government and entrepreneurs
- Become a next-generation global research ecosystem
- Contribute to the industry's employment rate and development of the local area

In addition to providing venture capital investment, one of the visions of the Shonan Health Innovation Park, the DDG Fund functions as a catalyst to facilitate an alliance between the pharmaceutical industry, the government, medical institutions, and academia. The DDG Fund is expected to contribute to Shonan Health Innovation Park's goal of attracting a total of 3,000 researchers by 2020 and to the Japan Revitalization Strategy of the Japanese government.

Also, Axcelead will evolve the business in the Shonan Health Innovation Park and lead the drug discovery ecosystem by becoming the hub of stakeholders as the best drug discovery solution provider not only for companies invested by the DDG Fund and those gathered in the Shonan Health Innovation Park but also for all partners.

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