



Korea Drug Development Fund

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KDDF: a rich source of innovative drugs for global pharma companies

The government-funded Korea Drug Development Fund is helping support the investment, nurture and development of some of the most promising drugs in Korea. Many of the advanced programs are now looking for partnerships.

The Korea Drug Development Fund (KDDF) is a major force in Korean research and development (R&D). Through the use of its \$1 billion, 9-year budget, the government-funded organization has selected more than 100 of the most promising drugs in development in Korea and provided them with funds and business development support. In doing so, KDDF is helping drugs advance out of laboratories and into the pipelines of global pharma companies.

KDDF, a consortium of three government ministries, supports drug development projects through its three R&D tracks and one consulting program. These initiatives are tailored to the needs of different types of organization, positioning KDDF to partner with global companies, help academic groups take candidates into the clinic and guide drugs quickly and cheaply to go or no-go decisions.

The approach has led to notable successes. Since it began operating in 2011, KDDF has played a role in 34 licensing deals worth \$4.7 billion. Around 40% of the deals involve global companies. Now, KDDF is helping its current crop of programs find partners.

Focus on cancer

One-third of the programs in KDDF's pipeline target cancers (Fig. 1). These programs include an anticancer RNA oligonucleotide that originated from the Korea Advanced Institute of Science and Technology (KAIST) and oncolytic adenoviruses discovered at the Hanyang Gene Therapy Lab at Hanyang University.

KAIST's prospect is a RIG-I-targeting RNA oligonucleotide designed to kill tumor cells. When introduced into various types of human and mouse cancer cell line in vitro, the RNA oligonucleotide selectively induced immunogenic tumor cell death. Following this, KAIST examined the in vivo antitumor activity of the RNA oligonucleotide in mice engrafted with syngeneic murine pancreatic or breast cancer cells.

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Following intratumoral injections of the drug, tumor volumes shrank and stayed suppressed throughout the 21-day study. Encouraged by the in vitro and in vivo data, KAIST advanced to lead generation.

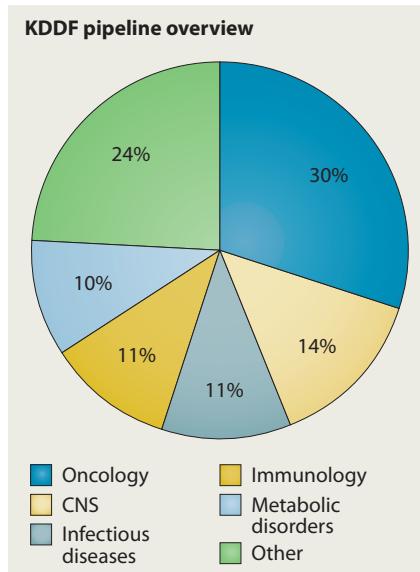


Fig. 1 | The KDDF pipeline. The chart shows the percentage of products being developed in each therapeutic area. For more information, please visit KDDF's website (eng.kddf.org).

KAIST is now looking to outlicense the asset or enter into a codevelopment agreement to support further development.

Hanyang University's Gene Therapy Lab is in a similar position. The laboratory developed oncolytic adenoviruses that contain gene combinations to promote an antitumor immune response, cancer cell death and inhibit blood vessel growth. By pairing the viruses to tumor-targeted nanomaterials, the laboratory aims to enable systemic delivery without causing off-target toxicity or inflammatory responses.

The laboratory designed the adenoviruses to attack via multiple pathways. Viral replication lyses cancer cells, releasing tumor antigens. The expression of IL-12 helps immune cells to infiltrate and attack tumors, while short hairpin RNA targeted against vascular endothelial growth factor (shVEGF) induces strong antiangiogenesis. The coexpression of IL-12 and shVEGF thereby restores antitumor responses in immunosuppressive microenvironments.

Hanyang University's Gene Therapy Lab has published in vivo data showing these effects restore antitumor immunity. With the laboratory also generating positive preclinical data on other adenoviruses, it now has a pipeline of four candidates that will be

ready to enter human testing by 2020. The group is seeking a codevelopment or licensing partner to advance the prospects into the clinic.

Creating a universal flu vaccine

While cancer is the largest therapeutic area in KDDF's pipeline, the fund is active in many other fields, including infectious diseases and conditions affecting the central nervous, immune and metabolic systems.

With 13 programs, the infectious disease portfolio is the third biggest piece of KDDF's pipeline. One of many promising infectious disease programs backed by KDDF is a universal influenza vaccine in development at Korea University.

The vaccine candidate, which is in preclinical development, emerged from the university's work on a platform for the engineering and production of viral surface proteins in stable monomeric forms. The use of stable monomers, instead of the trimeric antigens typically found in vaccines, has resulted in a candidate that is highly immunogenic and induces the production of antibodies against the conserved domain of hemagglutinin. Importantly, the candidate can be readily fused to scaffold molecules in stable monomeric forms to further enhance its immunogenicity.

The vaccine candidates induced protection against seasonal strains of the influenza vaccine in mice. Lead generation is now underway. With the program advancing through preclinical development, the university is seeking a partner willing to license or codevelop the asset.

The vaccine, KAIST's RNA oligonucleotide and Hanyang University's adenoviruses represent just a fraction of the programs supported by KDDF. The fund's portfolio features more than 100 programs spanning from lead generation to early-phase development, making it a rich source of assets for companies that want to add innovative, first-in-class candidates to their pipelines.

Contact Yong Kim, Business Development Manager
Korea Drug Development Fund
Seoul, Korea
Tel: +82 2 6379 3069
Email: yong@kddf.org