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New method seeks to diminish risk, maximize investment in cancer 'megafunds'

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Recognizing the high research and development costs for drugs to combat cancer, a team of researchers has devised a method to maximize investment into these undertakings by spotting which efforts are the most scientifically viable.

The work centers on "cancer megafunds," or Special Purpose Vehicles (SPVs), in which a collection of investors back a range of research projects, all designed to develop pharmaceuticals to battle cancer. By pooling resources and sponsoring multiple ventures, financial supporters aim to share the high costs of drug development, which include research and clinical trials that can run more than a decade.

However, SPVs mask risks to investors. Among these, as with many "portfolios," are "toxic assets" or "lemons" that threaten the fund by directing resources toward scientifically unsound initiatives.

The challenge, then, is to spot these lemons before too much money has been spent on them—or too little directed toward more worthwhile studies. In other words, what's the optimal financial strategy to increase the likelihood that an investment is paying off scientifically?

This was the aim of the method, reported in the journal *Oncotarget* and developed by New York University's Bud Mishra, along with his colleagues and students: Xianjin Yang of Saudi Arabia's King Abdullah University of Science and Technology, Edouard Debonneuil of the University of Lyon, and Alex Zhavoronkov, CEO of InSilico Medicine.

The team analyzed their proposed financial model by mathematical analysis, followed by a series of simulations designed to replicate early-stage investment, which is the most risky portion of this process and when funding is scarce. It used one semester (approximately 15 weeks) as a unit of time and six years as the duration of the drug-development enterprise.

The team's calculations revealed that many SPVs simply contain too many projects, many of which are bound to be "lemons"—i.e., have zero chance of resulting in an effective drug to fight cancer. Therefore, maximizing the value of these megafunds means not only eliminating a large percentage of projects from a portfolio early on in the process, but also assessing which are likely to be viable and which are not.

Their simulations pointed to some principles for a sound investment strategy. Among these is determining an optimal percentage of upfront costs to direct toward validating the scientific promise of a particular drug—for example, 25 percent. In addition, their approach also includes making all investors aware of which projects have promise and which are "lemons"—so as to prevent any one investor from taking advantage of information not available to others.

So, in short, the approach centers on: validation of drug development programs and transparency about the main results of validation. Their simulations indicate that without such a principled approach, the result would be financially disastrous megafunds—but presented as attractive.

"Ultimately, such an unfortunate outcome could lead the financial markets to completely lose their appetite for megafunds," observes Mishra. "The principles studied here could be helpful: they will strongly improve the yields and risks associated with securitization, but also limit the possibility of hiding defects of the 'lemon' projects."

"The principles introduced in this paper go beyond cancer megafunds and may be applied more broadly, helping finance biomedical research to address a wide range of diseases, including rare diseases, as well as extend into aging and longevity and providing pension funds with new instruments to hedge longevity risk," notes Zhavoronkov.

More information: Xianjin Yang et al, Cancer megafunds with *in silico* and *in vitro* validation: accelerating cancer drug discovery via financial engineering without financial crisis, *Oncotarget* (2014). DOI: 10.18632/oncotarget.9808

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