

# Anticancer Drug Development, a Matter of Money or a Matter of Idea?

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## Abstract

Drug manufacture (highly competitive area) is pillar industry for many developed countries and largest medical expenditures worldwide. Nonetheless, new anticancer drug discovery, development and manufacture have been entering into bottleneck stages. The persistent reducing of successful rates of phase II and phase III anticancer drug evaluations in clinics are grim situations for most anticancer drug developers. Owing to all these undesired factors, anticancer drug developments are highly risky enterprising now. This editorial addresses important factors affecting anticancer drug developments in future.

**Keywords:** Anticancer drug development; Neoplasm metastasis; Cost-effective; Medicinal chemistry; Animal models; Drug toxicity; Cancer stem cells; Individualized cancer therapy

## Introduction

### Backgrounds

Cancer is a malignant disease that is often difficult to be completely controlled or cured [1]. Despite great advances in recent decades, current cancer therapy has still many limitations, e.g. high costs for conventional therapy and shortage of effective anticancer drugs.

Nevertheless anticancer drug discovery, development and manufacture have been entering into bottleneck stages [2-4]. Now increasing amount of money must be paid for drug screening, mechanistic studies and developments, it therefore results in skyrocket treatment fee and the whole process of each anticancer licensing (1-1.8 billion USD) in US and other developed countries [5-7]. Despite these costs, cancer therapies improved slightly and are still imperfect in clinical practice, especially for cancer metastasis treatments [8-11]. Several factors can contribute for these drawbacks of present anticancer drug development systems.

### Current dilemma

1. Growing number of modern biological techniques and systems has been developed. In order to use and evaluate drug therapeutic efficacies and toxicities by these modern biological techniques and systems, much more money has to be paid off.
2. Since many biological or pathological properties of cancers, such as neoplasm metastasis and cancer stem cells have not been well understood, new anticancer drugs have to be produced from random experimental screening and clinical toxicity evaluations. This is also very expensive and low-efficiency.
3. Current policy of anticancer drug licensing is that new compounds must be more effective than licensed anticancer drugs. This is a paradox issue because cancer is a different disease that needs to be targeted or treated by different anticancer drugs. Thus rigid drug evaluation and regulatory rule forbid healthy progresses of anticancer drug developments and manufacture.

### Key of anticancer drug development, a matter of money or a matter of ideas?

Both money and ideas are indispensable elements for anticancer drug developments and licensing. But money can be raised easier than

fruits of ideas for most countries. Generally, this is why long-term pharmaceutical success in developed countries and heated competitions for producing almost no profit copying characters of anticancer drugs in developing countries even in some emerging economic powers. The number of real pharmaceutical talents in a country as we can see is no less important than how much some avant-garde instrument equipped laboratories, the size of pharmaceutical companies and government funding. But the final goal of employing talented scientists and distributors are also the purpose of creating new money and finally help the human beings. This is the real bottle-neck of anticancer drug in developing countries and mostly neglected issues in these countries.

Building fruitful pharmaceutical ideas cannot be pushed even in developed countries. Drug regulatory supports and governmental funding are necessary. We cannot let some pharmaceutical companies to take the responsibility of country images and healthy economic progressions. Still, the cooperation between academy, pharmaceutical companies and governmental funding is necessary. If possible, international communication or joint efforts especially between eastern and western might also be supportive. Different culture and custom of medical practice procedures and ways of thinking may bear many fresh fruits for benefiting both sides of countries and help more people in world. Above-mentioned three paradox issues might be solved by these efforts.

### Personal insights

This is an interrelated two factors that decide the healthy developments of anticancer drug discovery and manufactures. If it is really asked to give a list among these two factors, it must be ideas and talents because they are driving force to push the anticancer drug developments and science advancements.

### Possible solution for aforementioned dilemma

For solving the aforementioned dilemma, new ideas outside

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conventional drug development systems such as personalized cancer therapy or pharmaceutical formulating (nano-drugs) etc might also be helpful [12-16]. But these efforts are not straightforward. Many shortcomings are still hidden in the course of scientific investigations.

In future, as we speculate, anticancer drug discovery and developments may gradually transform from largely, random tumor-model screen enterprising into well-designed, targeted-based and molecular-intervention anticancer drug systems. By this way, drug developmental fiscal condition can be eased.

## Conclusion

Two future avenues might be gone through; (i) promote the efficacy of drug screening processes; (ii) optimally control drug development expenses. These are important topics and subjects for drug developments and manufactures internationally. In future, more creative experimental tumor growth or metastasis models and regulatory measures must be implemented for modernizing lab facilities and finding their relevance with clinical tumor proliferations and metastasis treatment outcomes. We look forward a new era of upcoming anticancer drug discovery and developments.

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