

# Drug Discovery and Development



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# Drug Discovery and Development **Prospects** and **Challenges**

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## Summary

Drug discovery and development is a vital process before a new drug can be introduced for clinical use. Undeniably, the process to produce a single drug that is safe for the human body and effectively treat specific disease without any side effects is lengthy and very costly. It starts from the curiosity over an emerging disease or the absence of effective medication and is translated into a scientific and clinical study through various research approaches, such as from jungle-to-bench, from culture-to-vial, and from waste-to-wealth.

Since ancient times, humans have produced drugs or medicine from raw plant materials and their extracts to treat various illnesses. Today, the paradigm has shifted from test and trial to a scientific evidence-based approach through experiments and clinical trials. High throughput methods are also crucial tools to speed up the process of drug discovery. Various drugs have been introduced via stringent guidelines and regulations. With the emergence of new diseases, the development of new side effects, and the latest Coronavirus Disease 2019 (COVID-19) outbreak, these experiences and scenarios have taught us how to address the global impact of disease through collaboration and synergistic strategies. As part of the intellectual community, our collective knowledge would be meaningful to contribute to the discovery and development of effective drugs.

The main obstacle in drug discovery and development nowadays is related to biological/pharmacological activities and delivery methods. Given this, nanotechnology has provided an impactful approach to drug and vaccine delivery. Certain drugs that possess unwanted side effects can be improved through nanotechnology to reduce their side effect, while their effective constituent can be delivered to the specific site in a very effective manner. Furthermore, the development of nanocarriers, such as nanovesicles, nanoemulsions, and polymers, has become a global interest due to its ability to increase, protect, and encapsulate drugs, ultimately increasing the efficacy of drug delivery.

Therefore, drug discovery and development require a continuous supply of innovative ideas, effective strategies, and strong synergy to improve the quality of modern medication and provide a reliable treatment against new diseases. The collaboration between academia and industry would not only strengthen the efforts to develop and discover new drugs but also avoids a gap in the development process, which may lead translational research to a valley of death.