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Editorial

Challenges for Poly Pharmacology

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EDITORIAL

Drug research and discovery is a time consuming and costly procedure. The efforts of drug development have been greatly accelerated as a result of the exponential growth of molecular data and rapid technological advancements. Poly pharmacology is a new term for the idea of drug design, which has evolved from "one drug, one target" to "one drug, numerous targets." Poly pharmacology is gaining traction as the future drug discovery paradigm. A single medicine operating on several targets of a single illness route, or single drug acting on multiple targets pertaining to multiple disease pathways, are examples of poly pharmacological phenomena. Furthermore, poly pharmacology for complicated disorders is likely to use numerous medications that act on different targets that are part of networks that regulate different physiological responses.

Poly pharmacology argues that by influencing many sites, more effective medications can be generated. Complicated disorders, such as cancer and central nervous system ailments, are thought to necessitate complex therapeutic approaches. In this regard, a medicine that "hits" several sensitive nodes within a network of interacting targets has the potential to increase efficacy while also limiting the downsides associated with using a single-target therapy or a combination of treatments. Poly pharmacological drug profiles can have additive or synergistic effects while lowering side effects, which helps to explain why essential medications like aspirin have such a high therapeutic success rate.

Poly pharmacology can also be used to combat the problem of drug resistance. One of the most popular approaches for dealing with bacterial drug resistance is to employ wide spectrum antibiotics, which has a long history. As shown by clonal selection for drug-resistant BCR–ABL alleles during afatinib therapy, a general downside of target-specific immunotherapy in cancer is that a single genetic change providing target resistance to an individual tumours cell can eventually lead to recurrence. As a result, the potential of kinases to evolve in response to the selective pressure caused by drug therapy presents a compelling argument for simultaneously attacking many critical targets in tumours cells.

Poly pharmacology is now defined as the design or use of pharmaceutical agents to either interact with multiple functionally related targets that act together at the same time, or to inhibit targets that are functionally different from the drug's primary target to produce additional relevant effects thus repurposing the drug for new effects. Despite their apparent success, poly pharmacological techniques face a number of obstacles. The fundamental restriction is that we only have a partial understanding of many disease pathways/mechanisms at the molecular level. Without all of the data, constructing the whole poly pharmacological networks is extremely challenging.

To examine the complicated data, more precise mining techniques and mapping procedures are also required. Understanding the convoluted associations, on the other hand, is a difficult process after the intricate networks have been built. Poly pharmacology can be used to find new drug off-target effects. This is especially crucial when it comes to predicting potential side effects of new medications in development. On the other hand, it can be utilized for drug repurposing, which identifies new indications for existing drugs/agents. This will vastly improve the current drug discovery engine, which is now stalled. Although it is still incredibly challenging at this level, poly pharmacology techniques will flourish, and the rational creation of more effective but less hazardous multi targeting drugs may emerge.

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