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Opinion

An Overview of Drug Research and Discovery Process

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The drug discovery process is the entire pharmaceutical industry, encompassing the primary stages of research from discovery and validation of target, through the identification of a drug candidate or lead compound. Initially, identification of small therapeutic candidates comes about a variety of streams. Research also lead to the development of new insights into disease processes that highlight new pathways for which drugs can be developed. Alternatively, companies conduct large scale trial and error based programs in order to identify the molecular compounds which are interest. This is the process performed during lead discovery, with a view to take new compounds through the preclinical and clinical trials. The risk analysis is calculated at this point which can increase the chances of success and investments leads are made.

In the drug discovery process there are few processes involved. They are:

1. Target identification and validation: In target identification and validation kicks off the whole process of drug discovery. Natural occurring cellular or modular structures that appear to play an important role in pathogenicity or disease progression are normally targets for therapeutics.

Identification of the drug target, a systematic validation approach should be adhered for mode of action which leads candidate to be assessed for efficacy. The approach itself depends on therapeutic area, but has a set of general principles which includes disease association, preclinical evidence in key cells, preclinical evidence in intact systems (i.e. transgenic animals), and literature survey and competitor information.

2. Hit identification and validation: The next step is to identify the small molecule which leads to have the desired effect against the identified targets. There are several approaches which hits are identified, including knowledge-based approaches, high-throughput screening, and virtual screening.

3. Moving from a hit to a lead: The aim is to point the refinement of each hit series in order to produce selective compounds. Multiple series worked on tandem, as it is hit series will fail, often due to the particular characteristics of the series.

4. Lead optimization: At this stage, the aim is to maintain the desired properties of lead compounds while improving on possible deficiencies of their structures, with a view to produce a preclinical drug candidate. This stage can be used to find the drug metabolizes in the area of the body.

5. Late lead optimization: This is the late stage optimization, in which further pharmacological safety of a lead compound is assessed, is a vital step. Before the progression to preclinical and clinical trials, if this stage is overlooked, the problems in efficacy, pharmacokinetics, and safety are more likely to occur later on in drug development.