Importance of ADME and Toxicology Studies in Drug Discovery

If your company is planning to bring a new drug to market, ADME and toxicology studies must be a part of the early drug discovery process. Performing these *in vitro* (i.e., test tube) assays allows you to filter out inappropriate drug candidates as early as possible. This process ensures the safety and efficacy of your chosen drug compound long before you start investing in costly *in vivo* medicine testing.

In this blog post, we'll explain what ADME stands for, and how ADME and toxicology assays work. We'll also go into more detail about their importance to the pharmaceutical industry and explain the *in vitro* testing capabilities at LifeNet Health LifeSciences.

What is *In Vitro* ADME?

ADME is an acronym that stands for Absorption, Distribution, Metabolism, and Excretion. These are the four criteria that are analyzed and examined in pharmacokinetics. They are the main steps of drug metabolism in the body, influencing its actual performance and effects on the target organ and the entire organism.

When it comes to drug discovery, we frequently also use the acronym ADMET, with the T at the end standing for Toxicity.

Absorption: This refers to the characterization of how much of a drug compound can be absorbed by the organ it is meant to target, as well as how long the absorption process takes. This is important for understanding a test compound's bioavailability and identifying its ideal method of delivery.

One of the main tests that measure absorption is the Caco-2 Permeability Assay, which predicts intestinal permeability to characterize the oral absorption of a drug candidate.

Distribution: This refers to how a drug travels through the body following systemic absorption. This process largely depends on how a xenobiotic binds with plasma proteins (which is best measured with Plasma Protein Binding or Protein Binding & Blood Partitioning assays) and how it is removed from blood circulation by different organs (which can be predicted through comprehensive Microphysiological System Testing).

Metabolism: This is the transformation that a compound undergoes once it is processed in the body. Tests that study metabolism determine which metabolites a test compound converts into, as well as the speed at which metabolism occurs. This is important for understanding whether a test compound's metabolites are inert or bioactive (and potentially toxic), as well as for understanding drug-drug interaction.

Excretion: Finally, excretion is the process by which a drug compound's metabolites are removed from the body. It's important to understand how a drug is removed (a process usually performed by the kidneys) and whether any of its metabolites accumulate in the body leading to toxicity. Understanding excretion often requires in vitro Multi-Organ Microphysiological System Testing.

Toxicity refers to the extent to which a compound can cause damage to the organism. Toxicity screens are one of our main focuses, which often provide a comprehensive understanding of multiple ADME criteria.

The Importance of ADME Testing to Drug R&D

ADMET assays are useful in a whole range of industries, but they're particularly indispensable to medicine testing.

Today's ADME and toxicology assays are incredibly advanced and precise. They can predict all relevant aspects of how the human body will process and react to a compound, as well as drug-drug interactions.

According to the most recent data, 95% of new drug candidates fail at some point during clinical trials, either due to toxicity or lack of efficacy. Considering the median cost of a clinical trial is $19 million, this costs the pharmaceutical industry billions of dollars per year on failed drug candidates.

In vitro testing acts as an important filter step. ADMET assays save the pharmaceutical industry both time and money since dozens of different compounds can be tested within a short timeframe. By providing both safety and efficacy data, pharmaceutical companies can reduce their spending on clinical testing of compounds that will ultimately fail.

LifeNet Health LifeSciences – In Vitro Toxicology Specialists

If your company does not have the capacity to conduct *in vitro* ADMET testing in-house, reach out to our experts at LifeNet Health LifeSciences. Our services lab specializes in helping companies with the drug discovery process.

As *in vitro* specialists, we work tirelessly to develop and innovate in the realm of *in vitro* research, to expand its applications and grow its utility as a practical and humane alternative to *in vivo* research.

Along with results data, we also provide all documentation and reports necessary to support your new drug application. Our lab follows ISO guidelines and offers GLP-compliant studies when required.

For more information and a quote, contact us today. One of our scientists will be in touch to discuss your project.