

## DRUG DEVELOPMENT AND CLINICAL TRIALS PROCESS: HOW NEW THERAPIES ARE CREATED AND BROUGHT TO PATIENTS, A SPECIAL FOCUS ON RARE DISEASES



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### Addressing the Myth that Rare Disease Therapies are Easier to Develop than Therapies for More Prevalent Diseases

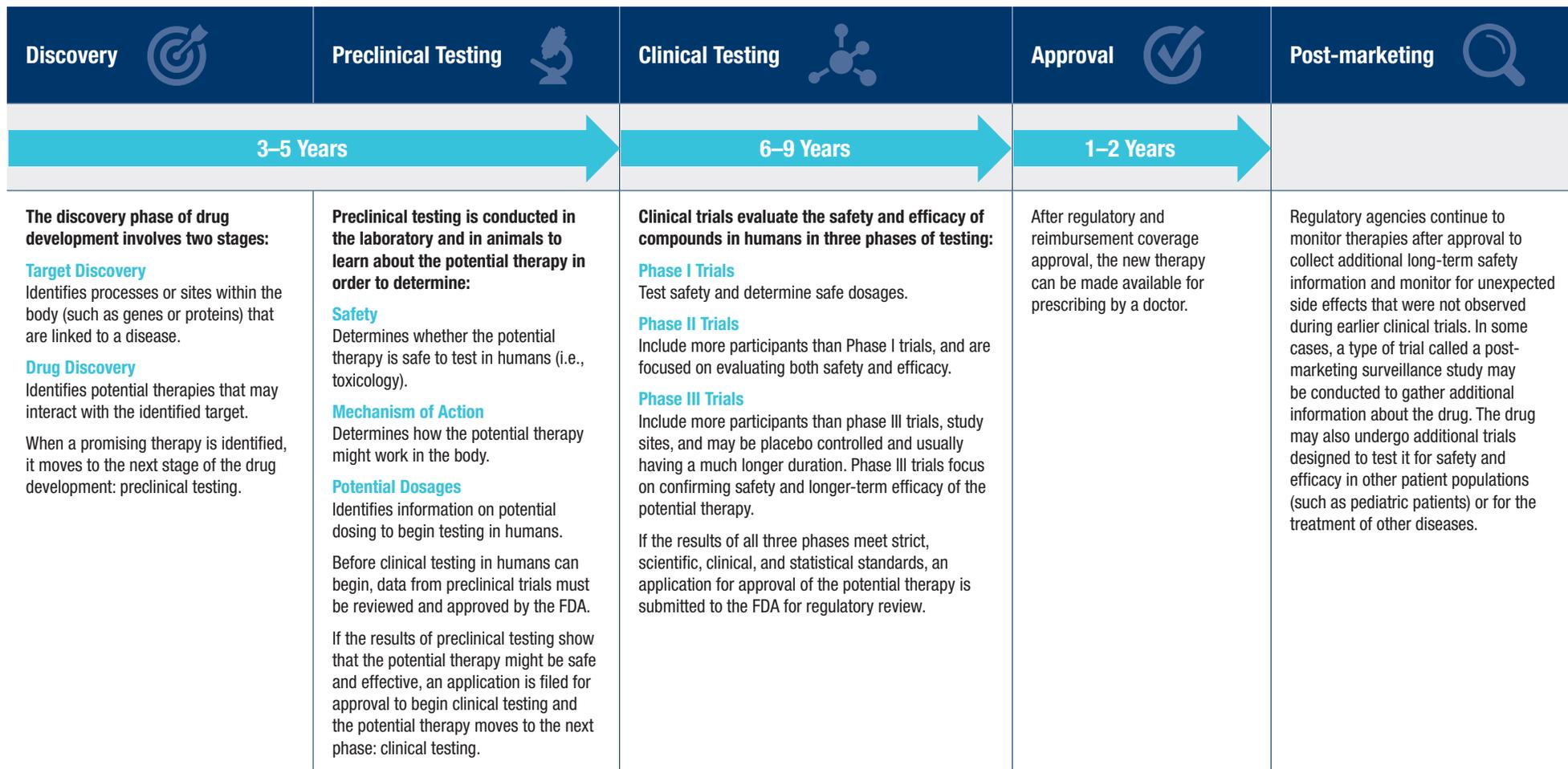
**Myth:** Because rare disease patient populations are so small, clinical trials are much easier to complete.

**Fact:** Drug development for any therapeutic area is difficult and expensive.<sup>1</sup> In fact, for all therapies, a molecule that enters phase I for clinical testing only has a 9.6% chance of later being approved. That means that fewer than 1 in 10 therapies that begin clinical testing are eventually delivered to patients. For rare diseases, where advances in science have led to developments that can help identifying the cause of rare diseases, success rates are slightly higher. For rare disease therapies that enter phase I, approximately 25% are later approved.<sup>2</sup> While the rate of success for rare diseases is higher, there are specific and unique challenges involved in developing therapies for rare diseases. Additionally, rare disease therapies are subject to the same rigorous scientific and regulatory requirements that all therapies must face in order to ensure that treatments are safe and effective.

This graphic outlines the path that all therapies must follow for approval by the Food and Drug Administration (FDA), the regulatory agency in the United States in charge of overseeing the safety and efficacy of therapies, before they are made accessible to patients. The graphic also highlights specific and unique challenges for drug development for rare diseases.

<sup>1</sup> Tufts paper: <http://www.marketwired.com/press-release/tufts-center-study-drug-development-assessment-cost-develop-win-marketing-approval-new-2104802.htm>

<sup>2</sup> BIO Report: Clinical Development Success Rates 2006–2015.



### Special considerations for rare disease:

<p><b>Natural history data and knowledge about the disease</b></p> <ul style="list-style-type: none"> <li>The natural history (how a disease develops and progresses over time) of most rare diseases is not very well understood when compared more prevalent diseases. This is because only a small number of people are affected by each rare disease, and because these diseases may manifest very differently in different patients.</li> <li>The relative lack of information about the natural history of a rare disease makes completing the discovery and preclinical phases of drug development very difficult.</li> <li>In addition to a lack of information regarding the natural history of a disease, there are often times no well-defined mechanisms for measuring how well a potential therapy works. For example, rare diseases do not often have endpoints, outcome measures, or biomarkers which make completing clinical trials and initially diagnosing patients very difficult.</li> </ul>	<p><b>Clinical testing</b></p> <ul style="list-style-type: none"> <li>Rare diseases, by definition, have small patient populations, meaning fewer patients are available to participate in trials.</li> <li>Additionally, patients available for clinical trials may live far away from each other and from the study locations, which may pose logistical difficulties and prevent a clinical trial from enrolling enough patients to result in meaningful data.</li> <li>If a study cannot enroll enough patients, the study may not be able to attain the high level of statistical proof for safety and efficacy required for approval by the FDA.</li> </ul>	<p><b>Review and approval</b></p> <ul style="list-style-type: none"> <li>Potential therapies intended to treat rare diseases, or other serious diseases with few or no other treatment options, may be reviewed by the FDA via special, faster pathways and become available to patients sooner. However, it's important to be aware that these faster pathways still require drugs to meet high standards of safety and efficacy.</li> </ul>	<p><b>Approval and beyond</b></p> <ul style="list-style-type: none"> <li>Many people with rare diseases face significant challenges in accessing drugs they need to treat their conditions.</li> </ul> <p>Uninsured or underinsured patients are at special risk, but even those who have insurance may find that their coverage for rare diseases has limitations.</p>
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For Discovery: <https://www.fda.gov/ForPatients/Approvals/Drugs/default.htm> | For numbers: BIO industry analysis, January 2016

\* This chart outlines the general process that potential therapies follow during regulatory review by the FDA. However there are also variations in this process that may include innovative clinical trial designs or expedited approval, for example.