Simulators Help Build a Better Drug Trial

Pharmaceutical firms start to use powerful computer programs to improve human testing

By Jonathan D. Rockoff  
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Researchers have started using powerful computer simulators to design better drug trials and help bring new medicines to market with fewer failures.

Only 11% of drugs that get as far as human testing win regulatory approval, according to drug-evaluation service BioMedTracker. But the failures aren't always about the medication: Some drugs are rejected because the trials were poorly designed to measure safety and effectiveness, not because the medication itself is flawed, researchers say.

Drug companies hope computer simulators can improve the odds of medications getting a fair trial. Designing clinical tests requires a variety of choices that can affect the outcome, such as the number of people to test, the drug dose to use and the duration of the trial. Simulators help researchers make those decisions by showing them whether a certain set of test parameters will yield a statistically significant result for a given treatment. The researchers can keep tinkering until they design a test that accurately measures the effects of a drug. Then they can run that study in humans.

"If we had this five years ago, many of the recent high-risk drug failures" might not have happened, says Diane Stephenson, executive director of the Coalition Against Major Diseases at Critical Path Institute, a nonprofit that works with health regulators, pharmaceutical firms, patient groups and academics to upgrade drug development.

Drug companies are looking to new tools to improve their odds in the development process because it's currently such a long shot. The percentage of drugs in Phase I trials that advance to:

- Phase II trials 65%
- Phase III trials 22%
- Application for government approval 13%
- Approval 11%

The technology is just now coming into use. In June, the U.S. Food and Drug Administration and the European Medicines Agency endorsed the first simulator, from Critical Path Institute, for use in the development of treatments for Alzheimer's disease. Simulators are in development for tuberculosis, Huntington's disease and Parkinson's disease, Dr. Stephenson says.

Pfizer Inc. is using the simulator to help design trials for four Alzheimer's drug-development programs, says Richard Lalonde, the company's global head of clinical pharmacology. For instance, the company uses the simulator to see how long a trial must last to assess whether a drug significantly slows the progression of Alzheimer's.

To evaluate test designs, the simulator incorporates data from previous trials of Alzheimer's treatments as well as findings from a National Institutes of Health neuroimaging study of Alzheimer's patients and published academic papers.
Dr. Lalonde says the simulator can help Pfizer avoid wasting money on flawed human trials. "We're going to fail cheaply" by working the kinks out of drug tests in a computer, he says, "before conducting the very expensive clinical trial."

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