

## MEDICAL INNOVATION: BENZODIAZEPINES (PHARMACEUTICAL: SMALL MOLECULE)

**Physician: Dr. Leo Sternbach**  
**Industry: Hoffmann-La Roche Ltd**

### Situation

***40 million Americans suffering from anxiety disorders***

Anxiety disorders -- or long-term bouts of anxiety that are persistent, seemingly uncontrollable, and overwhelming -- have long represented a major overall threat to public health. The [Anxiety Disorders Association of America \(ADAA\) reports](#) that some 18% of the U.S. population over the age of 18, or 40 million people, suffer from a form of anxiety disorder. Additionally, this serious but often treatable illness costs over \$42 billion a year, or approximately one-third of the overall amount spent on mental health in the U.S. annually.

Despite the prevalence of anxiety disorders, a half century ago, few good medications existed for treating them. Opiates used in the turn of the twentieth century and barbituates routinely prescribed in the 1930s proved too strong and addictive. In the 1950s, drugs known as phenothiazines had too many side-effects for widespread use, and a new drug called Meprobamate, or Miltown, often proved too weak and caused excessive drowsiness. As a result, physicians possessed no good pharmaceutical options to address a widespread mental health condition that affected millions of Americans each year.

### Physician-Industry Collaboration

***A chance discovery leads to a breakthrough***

In 1954, a distinguished pharmaceutical researcher named Leo Sternbach, working in New Jersey for the drug maker Hoffmann-La Roche, was assigned the task of heading up the company's research into new compounds for treating anxiety disorders and depression. An Austrian immigrant, Sternbach had worked in Europe twenty years before to help synthesize a number of compounds known as benzheptoxdiazines. While they seemed to be useful only as synthetic dyes, he believed they might hold promise in this new area.

Working with several dozen of these compounds, Sternbach came up empty in his search: they all proved inert, and he was soon moved off of the assignment. On a whim, he decided to treat one of the compounds with a substance known as methylamine, and produced a white crystal powder that he promptly shelved as he turned to his new work. Over a year later, a colleague was cleaning up Sternbach's laboratory and asked him what to do with the substance, and, before disposing of it, Sternbach decided to send it to the research lab for a quick examination.

The results came back – the new compound produced powerful, relaxing and sedative properties in laboratory animals, yet the animals remained alert enough to function. Further development and testing of the compound in humans resulted in its being approved by the FDA as Librium, the first of a new class of anti-anxiety and anti-depressant drugs known as benzodiazepines. Three years later, Sternbach received approval for a much more potent and efficient compound in this class under the name of Valium. The search was over -- finally the world had a drug that effectively and safely treated anxiety disorders and depression with few side effects.

### Innovation Benefits

## ***Transforming the treatment of mental health conditions worldwide***

In a few short years, Valium and subsequent benzodiazepines transformed the treatment of a variety of mental health conditions worldwide, including anxiety, depression, schizophrenia, insomnia and alcohol withdrawal, among others. Valium became the most prescribed pharmaceutical product in the U.S. between 1969 and 1982, with a peak annual consumption of 2.3 billion units in 1978.

Though overused at times, and now less popular than in the first quarter-century following its introduction, Valium and other benzodiazepines remain among the most widely prescribed drugs for the treatment of anxiety disorder and other mental health conditions. Decades after his discovery, Dr. Sternbach himself [pointed to the positive impact the class of drugs has had on patients](#): “Not enough people kept in mind the suicides that were averted and the marriages that were saved because of this drug.”

### **Patient Benefits**

***“It’s important to know you’re not alone...”***

The advocacy group [ADAA](#) relates a moving [testimonial](#) about one woman’s struggle with anxiety disorder, and her successful treatment of the condition with the use of modern medications such as benzodiazepines:

“My name is Diane. I’m from New York.

“I was becoming anxious about very small things, not being able to sleep, getting really upset over things that I really had no control over, and then I started to get actually really strong chest pains. And I went to the doctor and they tried to diagnose me with asthma for the chest pains, but none of that worked.

“The anxiety complicated my life mentally and inwardly, just having to deal with such heightened anxiety about certain situations, not being able to think about anything else but one specific thing that is often unimportant and uncontrollable. And then when I finally became aware of that, almost an embarrassment came with knowing that other people didn’t think this way because, you know, I used to think that it was normal and everybody thought that way. So then, as I grew older, it was kind of like, ‘Well, why am I this way, and other people aren’t?’

“We decided to go to a therapist and see if it was related to any kind of disorder. He prescribed me medication. It took at least a month for it to really start showing effect, in my opinion, and I took it - I made sure that I took it every day, and I could really tell like a big difference. I didn’t have any panic attacks, didn’t have any chest pains and it really took care of the problem.

“I definitely recommend any kind of therapy. Medication also works, and if you’re opposed to that, I think just talking to someone is important. It’s important to know that you’re not alone and that somebody can sit down and talk to you and really help you understand yourself better and I think that’s what’s most important.”

