MEDICAL INNOVATION: CORTISONE (PHARMACEUTICAL: SMALL MOLECULE)

Physicians: Philip Hench and Edward Calvin Kendall (Mayo Clinic), Tadeusz Reichstein
Industry: Merck & Co. (Lewis Sackett)

Situation

No way to treat severe inflammation directly

Severe inflammation of one kind or another strikes hundreds of millions of people each year worldwide, in flare-ups from chronic conditions such as rheumatoid arthritis and Addison's disease to everyday conditions such as tendonitis, skin rashes, asthma and acne. The Centers for Disease Control estimates the overall economic burden of arthritis and other rheumatoid conditions annually in the United States is $127 billion, or 1.2% of the entire Gross Domestic Product.

Until the middle of the twentieth century, physicians had no way to treat severe inflammation directly, and they were reduced to using painkillers and salves to help patients cope with their ailments. As a result, the impact of now-treatable inflammation-related conditions – both economic and societal – remained far higher than it is today.

Physician-Industry Collaboration

A patient with jaundice leads to a Nobel Prize

In the mid-1800s, researchers identified a link between the adrenal glands and certain hormones that related to the ability of soft tissue to become more flexible in the body's "fight or flight" response to danger. In 1894, a hormone from the adrenal cortex, labeled "cortin," was identified. However, as late as the 1920's, physicians believed that arthritis and other severe inflammation conditions resulted primarily from infections.

At that time, Philip Hench, a young physician from the Mayo Clinic with a reputation for a dogged approach to scientific research, began detailed research into the causes of rheumatoid arthritis and other inflammatory conditions as head of the clinic's rheumatology practice. When he discovered a patient with jaundice realized an improvement in his arthritic condition, Hench theorized that an adrenal substance produced by the body in response to the jaundice could be identified and isolated as a treatment for inflammation.

Joining with Mayo's physiological chemistry professor, Edward Kendall, Hench began working on isolating and purifying the dozens of adrenal hormones and testing them in humans. At the same time, a Swiss researcher named Tadeus Reichstein was hard at work on the same task. In 1948, working with Lewis Sackett of the pharmaceutical company Merck, Hench and Kendall tested one of the compounds on a patient suffering from a severe bout of joint inflammation due to rheumatoid arthritis, and the results were spectacular: the 29-year old bed-ridden woman recovered enough after four days that she was able to walk right out of the clinic.

The New York Times hailed the discovery of the substance, "cortisone," as a "modern miracle." Two years later, Kendall, Hench and Reichstein were awarded the Nobel Prize in Medicine.

Innovation Benefits

One of the most important tools in a physician's armamentarium

With biological methods of producing cortisone coming online only a few years after its discovery, the hormone-based substance rapidly became indispensable in the treatment of a number of acute soft-tissue inflammatory conditions. While prolonged use of the substance can produce many significant side effects, nothing today matches the effectiveness of cortisone-based products known as "corticosteroids" in the rapid and dramatic relief of severe inflammation.

One of the physicians on the Mayo team that discovered the hormone, Howard Polley, described its impact on the modern medical landscape: "Cortisone is still the most natural, if not the best, anti-inflammatory drug to come down the pike. Everything else is compared to it, not superior to it." Since that time, cortisone has been refined and strengthened by a factor of more than twenty in some derivative products.

As a result, corticosteroids have become one of the most important tools in a physician's armamentarium for the treatment of chronic conditions like allergies, rheumatoid arthritis and Addison's disease, as well as in sports-medicine, dermatology and other medical specialty areas.

Patient Benefits

A football legend gets back in action for his team

Widely acknowledged as a future Hall of Fame quarterback, former Green Bay Packer star Brett Favre joined his longtime team's arch-rival, the Minnesota Vikings, in 2009 for a two-year contract. Favre was able to lead the Vikings to playoff berth in early 2010 that came within a few plays of delivering the team to a Super Bowl appearance.

The following season, Favre suffered from severe tendonitis of the elbow, and it looked like his career was over. What's more, he held the NFL record for the most consecutive starts, at close to 300, dating back almost twenty years, and that streak appeared in jeopardy given his elbow condition.

Three days before a matchup against longtime rival Dallas Cowboys, Vikings team doctors decided to administer a localized cortisone injection to Favre's elbow in order to address the inflammation and pain.

That weekend, Favre was not only able to keep his record string of starts alive, he led the Vikings to a 24-21 victory, completed 14-of-19 passes for 118 yards and a touchdown.

Favre's elbow "felt great," the star said after the game. Thanks to a simple but powerful treatment, a football legend was back in action for his team.