

## 1914: A Christmas discovery to treat thyroid disease

Mayo Clinic biochemist Edward C. Kendall, Ph.D., was a tenacious investigator known for spending most of his waking hours – holidays included – in his laboratory. On the night of December 23, 1914, he dozed off while conducting the chemical extraction of hog thyroid. He awoke to a Yuletide breakthrough in biochemistry with lasting benefit for the treatment of thyroid disease.

### First in history

Dr. Kendall came out of his nap ... and what to his wondering eyes should appear but a mysterious white crust inside a glass beaker. On December 24 and 25, while others celebrated Christmas, Dr. Kendall repeated the extraction process and studied the new substance.

Result: Dr. Kendall was the first person in history to isolate the iodine-containing compound now known as thyroxine. It is the main hormone produced by the thyroid, a butterfly-shaped endocrine gland in the front of the neck, just below the Adam's apple. The thyroid is involved in metabolic rate of cells, heart and digestive functions, as well as other biological processes.

Because of its critical role in human health, the thyroid gland was of keen interest at Mayo Clinic and other leading research centers. The goal was to find effective treatments for hypothyroidism (underactive thyroid). If untreated, this condition can lead to fatigue, weight gain, depression, goiter, heart disease and heart failure, mental health issues, nerve damage, infertility and birth defects. While the condition can affect anyone, including infants and children, women past age 60 are at increased risk.

To improve care, the Mayo brothers recruited Dr. Kendall, one of the top thyroid researchers of the day, in 1914. His reputation preceded him: The year before, he had made significant progress purifying the thyroid factor using an experimental test that measured changes in the urinary nitrogen of dogs. Next, Dr. Kendall turned to purifying hog glands. Some 6,550 pounds of mainly hog thyroid comprised the experimental media, which he referenced in his 1919 paper describing the discovery.

### Foundation of modern thyroid care

Dr. Kendall's experiments and his Christmas discovery helped lead to the development of much-needed therapies to correct thyroid disorders. The isolation of thyroxine was only the second isolation of a pure hormone, occurring just nine years after the term "hormone" was coined.

Today, an estimated 20 million Americans have some form of thyroid disease, including hypothyroidism. The modern treatment for hypothyroidism derives from Dr. Kendall's original work. It is among the most-prescribed therapies today, restoring metabolic efficiency and quality of life for millions of people.

## Advanced cases

The Mayo Clinic discovery is the basis for lifesaving treatment for an advanced complication of thyroid deficiency known as myxedema. It is characterized by swollen, dry, puffy skin; swelling of the face, legs and tongue; seizures; goiter; low energy; cold intolerance; depression and heart and breathing complications requiring mechanical ventilation. Untreated myxedema can progress to coma. Mxedema patients are frequently treated in intensive care units while thyroid levels are stabilized intravenously.

Dr. Kendall's isolation of the thyroid hormone represented one of the great achievements in the field of biochemistry, but his contributions to medical science and Mayo Clinic were not over. Redirecting his energies to new fields of study, Dr. Kendall and others would receive the 1950 Nobel Prize in Medicine or Physiology for their pioneering work in the discovery of cortisone.

## SOURCES

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