

THE ENDOCRINE SOCIETY



The mission of The Endocrine Society is excellence in hormone research and care of patients with endocrine disease.



Endocrinology

Endocrinology encompasses the study of the body's natural communication pathway whereby chemical signals from one organ initiate a response in another, usually distant, organ. Hormones affect nearly every organ and system in the body, and hormonal defects are often responsible for many human diseases. Academic researchers and educators as well as clinicians in the field of endocrinology impact the daily treatment of patients with diabetes, hyperthyroidism, thyroid malignancies, hypothyroidism, osteoporosis, infertility, obesity, menopause, lipid disorders, pituitary tumors and other endocrine disorders.

Great strides have been achieved in endocrine research, much of it funded by the National Institutes of Health (NIH), which now allows detection, treatment, and in many cases, amelioration of endocrine diseases that plague a substantial number of Americans. Recent examples of endocrine success stories include production of recombinant growth hormone for treatment of children with growth deficiencies and the availability of recombinant reproductive hormones for treatment of infertility.

With the completion of the Human Genome Sequencing Project, a new era of endocrinology has emerged. Still in its infancy, the genomic era promises to accelerate efforts to bring new detection and treatment options to patients with endocrine diseases. In addition, understanding the genetic basis of common endocrine diseases could lead to better determination of which therapeutic options will work for different

patients, as well as lead to development of new therapeutic interventions. This brochure will highlight research advances in several of the most common endocrine disorders.



Genetics and Endocrine Health

- Many common endocrine diseases are due to subtle, but complex genetic alterations combined with effects of environment and behavior.
- Knowledge of the human genome sequence will greatly enhance research efforts in the identification of causative mutations as well as potential therapeutic targets.
- A single endocrine disease can have many genetic causes, necessitating tailoring treatment to particular patients.
- Recombinant growth and reproductive hormones, now available as pharmaceutical products, and insulin are previous successes of basic and clinical endocrine research efforts.

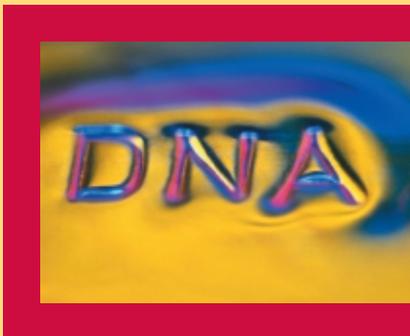
Thyroid

Thyroid hormone is a critical regulator of the body's metabolism. When thyroid hormone levels are too high or too low, there may be severe effects on health. Deficiency or excess of thyroid hormone has been diagnosed in 5-20% of Americans. These disorders increase in frequency with aging. Low thyroid hormone levels are especially problematic in pregnancy because thyroid hormone is critical for normal brain development in the fetus. Synthetic thyroid hormone is widely used to treat low thyroid hormone levels. Endocrinologists provide very effective treatment for overactive thyroid glands. Thyroid cancer, the most common endocrine gland cancer, is also a major disease in Americans that is treated by teams of endocrinologists, surgeons, and nuclear medicine specialists.

Research Advances

Ongoing research is now providing a better understanding of autoimmune thyroid disease, the most common cause of both underactive and overactive thyroid glands. Earlier diagnosis of thyroid cancer by needle biopsy of thyroid nodules has improved the outcome of treatment.

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Obesity

Obesity has become a national epidemic. Estimates from the U. S. Surgeon General indicate that over 50 percent of all Americans are overweight. Fat, hunger, weight and metabolism are all regulated by hormones. Research by endocrinologists has shown that obesity, especially in children, can lead to numerous medical problems later in life, including diabetes, heart disease and infertility. Recent studies suggest that up to 80 percent of obesity cases involve inherited traits affecting appetite, energy use and hormone balance in various parts of the body.

Research Advances

Recent endocrine research has shown that fat cells themselves can act as endocrine organs, secreting hormones such as leptin. Leptin acts on several tissues, including the brain, where it controls the urge to eat. Drugs based on leptin or related molecules could be useful for treating eating disorders and obesity.

Diabetes

The hormone insulin is required to control how the body uses or stores glucose. Diabetes is an endocrine disease where the insulin system breaks down. In Type 1 diabetes, the pancreatic cells that make insulin are destroyed. In Type 2 diabetes, cells that respond to insulin are defective. The Center for Disease Control and Prevention report that 17 million Americans have diabetes, and more than 200,000 people die each year from related complications.

Research Advances and Genetics

A major NIH funded endocrine research program, known as “The Diabetes Prevention Program,” has clearly shown that diet and exercise can prevent or delay diabetes. Endocrinologists use recently developed oral medications and insulin to treat diabetes. In addition, there are several new drugs in development and clinical trials that reduce future risk of heart disease, stroke, kidney disease and blindness.

Recent genetic studies by endocrinologists have revealed gene defects that cause, or at least facilitate disruption of the insulin system. Current endocrine research also seeks to generate new insulin secreting cells, perhaps using embryonic stem cells as a source.

Bone Formation and Osteoporosis

Bones exist in a constant state of flux between bone formation and destruction. These processes are mediated by hormones and are an important area of endocrinology. Osteoporosis is a state of imbalance where bone is broken down faster than it is formed, leading to weakened bones in critical parts of the body. According to the NIH, osteoporosis is a health threat for more than 28 million Americans.

Since estrogen has an important role in regulating bone quality, osteoporosis is common in post-menopausal women due to the dramatic drop in estrogen as the ovaries cease functioning. While Endocrinologists have recommended estrogen replacement to their patients in the past, estrogen itself may also lead to certain cancers, resulting in a tremendous need for new strategies to maintain bone strength (see Breast Cancer & SERMS). Parathyroid hormone (PTH), which has been studied in basic and clinical endocrine research for over 50 years, can lead to increased bone growth and may thus provide alternate therapeutic options for some patients.

Research Advances

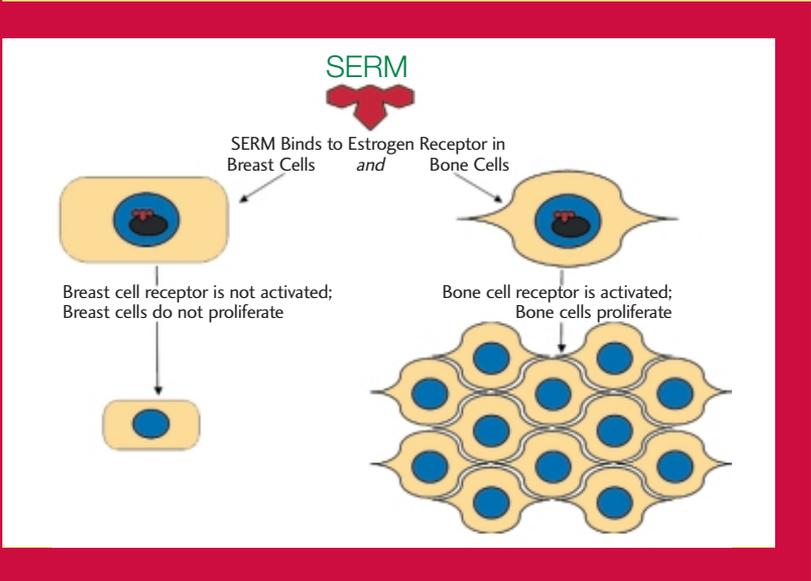
Recent clinical studies demonstrated that PTH treatment can prevent bone loss, and in some cases even increase bone formation in patients with osteoporosis, and thus, represents a new treatment option for endocrine patients.



hormones

Breast Cancer

One in nine American women will get breast cancer in her lifetime. More than 40,000 women die of breast cancer each year. Estrogens, hormones that govern female and male fertility, are implicated in the development of breast cancer. Common treatments for breast cancer are either preventing the patient's body from making estrogen or to blocking the ability of estrogen to stimulate the growth and spread of the cancer. Estrogens carry out their actions in breast cancers and other tissues by binding to proteins called estrogen receptors. Because estrogens have beneficial effects on bone, brain and other organs, endocrinologists and other scientists are developing drugs that bind to estrogen receptors. These drugs act as estrogens in tissues in which estrogen is beneficial, while blocking the action of natural estrogens in breast cancers and other tissues where estrogens have harmful effects. These compounds are called Selective Estrogen Receptor Modulators, or SERMs. Tamoxifen, one of the first SERMs to be developed, is widely used to treat existing breast cancer, and significantly reduces the recurrence rate of breast cancer following surgery.



Research Advances

A focus of current research is the development of SERMs that allow long-term use in preventing breast cancer in women who are at a high risk for developing breast cancer. At the same time, these SERMs act as estrogens in bone to help prevent osteoporosis. Raloxifene is a SERM targeted at bone that reduces the risks of osteoporosis, but does not induce cancer, and shows promise in preventing breast cancer in high-risk women.

Hypertension

Hypertension (high blood pressure, usually greater than 140/90) is a major endocrine disease, which affects at least 25 percent of the adult population in industrialized societies and is a major risk factor for heart disease, stroke and kidney failure. Despite intensive efforts, the biochemical defects causing this disease are unknown for the vast majority of patients. While current medications are often useful for treating the hypertensive symptoms in these patients, the long-term negative effects remain a significant health problem.

Research Advances and Genetics

Endocrinologists have recently identified new genetic mutations in patients with rare forms of hypertension. Many of these rare diseases are treatable with hormone therapy, raising the possibility that new endocrine treatments are on the horizon that could alleviate hypertension and its associated medical problems for the much larger hypertensive population. Thus, there is a tremendous need for continued basic and clinical endocrine research into both the genetic causes and novel treatments for hypertension.

genetics



The Endocrine Society, founded in 1916, consists of over 11,000 scientists and physicians who are dedicated to the advancement, promulgation, and clinical application of knowledge related to endocrinology. The Society publishes four peer-reviewed journals: *Endocrinology*, *Endocrine Reviews*, *The Journal of Clinical Endocrinology and Metabolism*, and *Molecular Endocrinology*. For more information, visit The Endocrine Society Web site at: www.endo-society.org

The Hormone Foundation is an independent, nonprofit organization established by The Endocrine Society in 1997. Its mission is to serve as a resource for the public by promoting the prevention, treatment and cure of hormone-related diseases, and does so through public outreach and education. For more information, visit The Hormone Foundation Web site at: www.hormone.org

