Overview

Women comprise slightly more than half of the U.S. population, utilize health care services more frequently than men, and make most of the health care decisions for their families. Though during the past 20 years there have been successful efforts to include more women in research and expand women’s health research beyond breast- and reproduction-related topics, progress related to conditions that disproportionately or differentially affect women has been limited.

To advance research in women’s health-related areas — and address disparities between the sexes in diagnosis, treatment and outcomes of many diseases — Mayo Clinic established the Women’s Health Research Center in 2011. The Women’s Health Research Center at Mayo Clinic is focused on understanding and improving women’s health across their lifespan.

Studied in the center are conditions that are:

- Unique to women, such as breast and gynecologic disorders
- More common in women, such as osteoporosis and autoimmune diseases
- Expressed differently in women, such as cardiovascular disease and irritable bowel syndrome.

The center is built on Mayo Clinic’s strong foundation of basic, translational and clinical research, as well as its many women’s health-related clinical services at its campuses in Arizona, Florida and Minnesota.

By expanding existing initiatives and developing new multidisciplinary collaborations, the Women’s Health Research Center is advancing the science of women’s health and ensuring that sex and gender-based perspectives are incorporated into the design, conduct and reporting of research at Mayo Clinic.

Every cell has a sex

Research areas encompassed by women’s health are broad, and united by studying sex and gender determinants of health and disease. Well-established research programs at Mayo Clinic are already contributing to our understanding of some of the diseases that affect women differently than men. However, there is a compelling need to expand research to develop better diagnostics, therapeutics and prevention strategies to improve the health of women.
Building on existing efforts

The Women’s Health Research Center complements and builds on a strong base of women’s health-related research, educational and patient care activities at Mayo Clinic, such as:

- **Significant existing research.** A total of more than 1,400 research studies related to women’s health are under way across Mayo’s campuses in Arizona, Florida and Minnesota.

- **Office of Women’s Health.** Since 2001, the Office of Women’s Health at Mayo Clinic has been coordinating and promoting women’s health research, clinical care, community outreach and education.

- **Advanced training opportunities.** The Interdisciplinary Women’s Health Research Program and Women’s Health Fellowship offer postgraduate training opportunities.

- **Strong clinical programs.** Women’s health-related patient care services at Mayo Clinic include programs such as the Women’s Cancer Program, Breast Clinic, Women’s Heart Clinic, and Women’s Health Clinic.

  Additionally, Mayo has extensive specialty services — from gynecologic surgery to urogynecology to reproductive endocrinology — in its Department of Obstetrics and Gynecology.

- **Small grants funding.** Each year, the Office of Women’s Health funds several sex-based or women’s health research projects that are likely to result in publications and generate preliminary data for extramurally funded grant applications.

Research focus areas

While recognizing that research areas encompassing women’s health are broad, the Women’s Health Research Center has selected eight initial focus areas. The center focusing on unique aspects of the following conditions in women:

- Autoimmune diseases
- Cardiovascular diseases
- Digestive diseases
- Neurodegenerative diseases
- Obesity
- Osteoporosis
- Sex steroid metabolism and aging
- Women’s cancer prevention and screening
Cardiovascular disease

Cardiovascular disease is the most common killer of women. During the last two decades, the prevalence of myocardial infarction — heart attack — has increased in women while it has decreased in men.

Women have higher rates of death after myocardial infarction, and younger women have higher mortality during hospitalization after myocardial infarction than do men of the same age — the younger the person, the higher the mortality among women as compared to men.

Additionally, among people ages 45 to 54, women are twice as likely as men to have a stroke.

Researchers have also learned that among women, microvascular dysfunction, subendocardial ischemia, inflammation, cardiometabolic dysfunction and neurohormonal imbalance are particularly important factors in myocardial ischemia.

Specific areas of research focus
Cardiovascular disease research in the Women’s Health Research Center is focused on:
• Microvascular dysfunction
• Inflammation
• Genetic predisposition
• Cardiometabolic dysfunction
• Hypertension
• Sex differences in autonomic control of the cardiovascular system

Digestive disease

Sex hormones affect smooth muscle contraction, gastrointestinal transit time, visceral sensitivity, central nervous system pain processing and gut function.

In irritable bowel syndrome (IBS) — a relatively common condition which affects 15 to 20 percent of adults — disease prevalence and expression are linked to sex. By a 3-to-1 ratio, IBS is more common in women than men.

In women, IBS symptoms are most severe during the postovulatory and premenstrual phase of their cycle, and two-thirds of women with IBS report rheumatologic symptoms.

Specific areas of research focus
In the Women’s Health Research Center, research related to digestive diseases is focused on:
• Molecular, genetic, cellular and physiological regulatory mechanisms underlying gastrointestinal motility
• Nerve reflexes within the gut wall, and between the gut and brain
• Mechanisms underlying sensory nerve function
• Pelvic floor dysfunction
**Immunity (autoimmunity)**

Eighty percent of individuals affected by autoimmune diseases are women. Many autoimmune diseases are more prevalent in women, and other autoimmune diseases affect women almost exclusively.

Examples include Hashimoto’s disease (affects more women than men by a 10-to-1 ratio); lupus (8-to-1 ratio); Graves’ disease (7-to-1 ratio); multiple sclerosis (3-to-1 ratio); and rheumatoid arthritis (2.5-to-1 ratio).

**Specific areas of research focus**

Autoimmune disease research in the Women’s Health Research Center will initially focus on risks, determinants and outcomes of:

- Autoimmune rheumatic diseases
- Autoimmune thyroid disease
- Multiple sclerosis

**Neurodegenerative disease**

Brain structure and function differ between men and women, and some evidence suggests that the age-adjusted risk for dementia is higher in women than men.

Studies have also shown that Parkinson’s disease, cognitive decline, and mood disorders are more frequent in women who’ve undergone oophorectomy (surgery removing the ovaries).

**Specific area of research focus**

In the Women’s Health Research Center, neurodegenerative disease research is focused on cognitive, motor and emotional decline in women including:

- Cognitive impairment and dementia
- Long-term health consequences of oophorectomy and early menopause

**Obesity**

Obese women outnumber obese men by a nearly 2-to-1 ratio, and obesity has a more adverse effect on health outcomes in women than men.

Obese women have a greater risk than obese men of developing diabetes, cardiovascular disease, cognitive dysfunction and dementia. Additionally, obesity in women is associated with increased rates of infertility, polycystic ovary syndrome, pregnancy complications and adverse fetal outcomes.

Research has shown that lipid metabolism differs considerably between women and men, and that sex hormones, as well as genetic dimorphisms, have an important impact on fat deposition and lipid metabolism in women.

**Specific areas of research focus**

Related to obesity, research in the Women’s Health Research Center is focused on:

- Hormonal factors affecting body fat composition and distribution
- Fatty acid metabolism
- Health consequences of obesity in women
Osteoporosis

There are important differences in bone formation, remodeling and fracture risk between men and women. Women begin with lower bone density than men, and they lose bone mass at a faster rate than men as they age.

Eighty percent of people affected by osteoporosis are women, and 40 percent of women in the U.S. will experience at least one fragility-related fracture during their lives. In aging women, osteoporosis is the leading cause of disability and a major cause of morbidity and mortality.

Specific areas of research focus

Osteoporosis-related focus areas in the Women’s Health Research Center include:
- Molecular basis of bone remodeling defects
- Effects of estrogen on gene expression related to bone matrix proteins, growth factors, cytokines and estrogen signaling

Sex Steroid Metabolism and Aging

Normal reproductive function requires a highly coordinated and complex interplay of events in the hypothalamic-pituitary-ovarian axis, and important changes occur with menopause and aging.

Today, the evaluation of the neuroendocrine axis in women is providing important clues into the nature of aging.

Specific areas of research focus

Related to sex steroid metabolism and aging, research in the Women’s Health Research Center is focusing on:
- Estrogen stimulation of growth hormone and insulin-like growth factor-1 (IGF-1) secretion in postmenopausal women
- Estrogen signaling in health and disease
- Sex differences in cellular senescence
- Effects of declining sex steroid levels on bone and aging
Women’s Cancer Prevention and Screening

Important advances have been made in treatment for women’s cancers. Meanwhile, there are important opportunities to improve our ability to prevent and detect these cancers in their earliest and most treatable stages. Scientific advances related to tumor biology, genetic factors and environmental risks in breast cancer are making it possible to identify women at increased risk and evaluate the impact of risk reduction strategies.

Research into the prevention or early detection of breast cancer, for example, has the potential to have a major impact on women’s health, as breast cancer is the most common non-skin cancer and the second most common cause of cancer deaths among women.

Additionally, a compelling need exists for research focused on quality-of-life concerns among cancer survivors, who are living longer due to effective therapies, but are often affected by serious side effects of cancer treatment.

Specific areas of research focus

In the Women’s Health Research Center, areas of focus related to women’s cancers include:
- Breast and ovarian cancer risk stratification and risk reduction
- Novel breast and ovarian cancer screening techniques
- Survivorship concerns

Other Areas of Women’s Health Research

Multidisciplinary women’s health consultative services are offered across Mayo Clinic’s three campuses. Due to patient demand, Mayo Clinic is actively expanding these clinical services. Partnerships between basic science researchers and clinician investigators will advance the clinical care for women in these areas. The Women’s Health Research Center will provide support and mentorship for the development of robust research programs in women’s health clinical areas prioritized for growth.

Life stages and transitions

- **Maternal and perinatal health.** Research priorities include fibroids, infertility and ovarian preservation, preeclampsia, preterm birth, immunity, and pregnancy.
- **Menopause and healthy aging.** Research priorities include the consequences of induced versus natural menopause, individualized hormone therapy, female sexual dysfunction, and the preservation of quality of life and independent living with aging.

Conditions having a disproportionate burden on women’s lives

- **Pelvic floor disorders.** Research priorities include defecation disorders, pelvic organ prolapse, and other pelvic floor dysfunction syndromes.
- **Functional pain disorders.** Research priorities include endometriosis, fibromyalgia, pelvic pain and vulvodynia.
Contact Information

Scientific and center inquiries
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Support the center
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