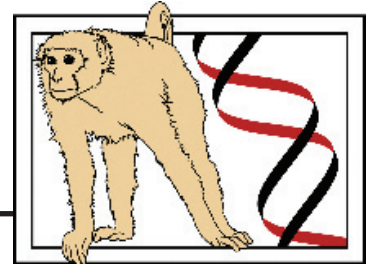


Research on Women's Health

Wisconsin National Primate Research Center

University of Wisconsin-Madison



The National Primate Research Center, University of Wisconsin-Madison, houses about 1,500 monkeys. The reproductive physiology and endocrinology of rhesus and cynomolgous macaques is almost identical to that of women. Marmosets exhibit several differences in regulation of reproduction that provide novel insights into human processes.

Following are studies related to women's health involving the center and its monkeys.

REPRODUCTIVE HEALTH

Maternal-fetal health

Thaddeus Golos, OB/GYN, uses the nonhuman primate model to study major areas of economic and societal cost pertaining to women's health. Research topics include fertility and infertility, maternal-fetal viral transmission, recurrent pregnancy loss, and fetal growth and well-being. Studies also involve the genetic control of early embryonic development, the placental regulation of maternal immunology and metabolism, and the fetal basis of adult disease.

Another goal is to integrate basic research in primate embryo development and pregnancy with assisted reproductive technologies and gene therapy approaches in the nonhuman primate. This will have broad applicability for model development in pregnancy and immunology, vaccine development, and research in primate genetics, development, aging, and behavior.

Primate Center researchers and affiliates are also concerned with placental function in women with diabetes or alcoholism.

Polycystic ovary syndrome

Polycystic ovary syndrome (PCOS) affects one out of every 15 women. It is marked by infertility and miscarriage, and is frequently associated with diabetes. Other symptoms may include excess body hair and excess abdominal fat.

Rhesus monkeys are an excellent model for this disorder. **David Abbott**, OB/GYN, is collaborating with **Daniel Dumesic** at the Mayo Clinic to reveal the causes of polycystic ovary syndrome in rhesus

monkeys and women. This research team is showing the interrelatedness between symptoms that were previously considered unrelated, as well as revealing for the first time the fetal origins of this disorder and the possibility of a preventive cure.

Endometriosis

Endometriosis causes painful abdominal inflammation and can impair reproductive function. The disease is common, but remains difficult to diagnose and treat. **Joseph Kemnitz** has a new collaboration with the Marshfield Clinic through the UW-Madison Institution for Clinical and Translational Research to advance the study and treatment of endometriosis. **Stephen Kennedy** at Oxford University has identified monkeys at risk for endometriosis and is studying the disease's genetic components to improve its diagnosis and treatment in women.

AIDS

Although HIV infection rates for men in the U.S. are declining, the infection rate for women is rising dramatically. AIDS is the leading cause of death in African American women between 24 and 44. Mother-to-infant transmission of the virus is also on the rise. **David Watkins**, director of the UW-Madison and WNPRC AIDS laboratory, and his many collaborators are helping develop potential vaccines and new treatments against HIV, including ways to prevent the transmission of HIV from mother to infant, and topical microbicides aimed toward preventing heterosexual transmission of HIV.

GENDER-BASED RESEARCH

Many diseases or disorders are common to both sexes but occur more frequently in one sex or the other. At the onset of puberty, steroid hormones increase and substantial changes in the brain's neurotransmitters occur. Because the



Rhesus monkeys (Macaca mulatta), with peanuts they have stuffed into their cheek pouches.

healthy neuronal function, understanding the mechanism of puberty and the role of steroids in neuronal function provides important insight into behaviors that occur differently between the sexes.

Ei Terasawa, Pediatrics, studies the neuroendocrine mechanisms controlling puberty and related conditions such as anorexia nervosa and clinical depression. Both of these disorders occur in young women shortly after puberty.

Marina Emborg, Primate Center, **Su-Chun Zhang** and **Clive Svendsen**, Waisman Center, are working to develop nonhuman primate models for Parkinson's Disease.

Erwin Montgomery, Primate Center and Neurosciences, is exploring the effects of deep brain stimulation and its effectiveness in treating Parkinson's disease and other movement disorders.

SENIOR HEALTH

Osteoporosis

David Abbott, **Ricki Colman** and **Wendy Saltzman** lead an inter-disciplinary team studying bone metabolism in female marmosets.

Socially dominant marmosets are reproductively active and have normal levels of estrogen. Subordinate marmosets, on the other hand, exhibit suppressed reproductive function and have low estrogen levels. Their low estrogen should put them at risk for osteoporosis, but these marmoset females do not suffer from accompanying bone loss as do human females with low estrogen. Research is aimed at uncovering the mechanisms preventing bone loss in these monkeys.



*Common marmoset
(Callithrix jacchus)*

Glaucoma

Paul Kaufman, Ophthalmology and Visual Sciences, is developing new compounds to enhance aqueous outflow from the eye and treat glaucoma, which afflicts about 3 million women and men in the United States. The rhesus monkey is an invaluable model for studying glaucoma, the second most common cause of irreversible vision loss among Americans and the most com-

mon among African Americans. Researchers are focusing on novel compounds and gene therapeutic strategies to enhance fluid drainage from the eye. They are also studying compounds to protect retinal ganglion cells and their axons from pressure-induced damage.

Aging and nutrition

WNPRC research on calorie-restricted rhesus monkeys since 1987 has revealed that the restricted animals are healthier than their age-matched controls. They show better glucoregulation and lower incidence of diabetes. They show favorable changes in plasma lipids and less risk for cardiovascular disease. They also have less incidence of osteoarthritis. Most of them appear younger looking than the controls.

Controlled caloric restriction has not disrupted menstrual cycles of female monkeys; it might affect the onset of menopause.

The studies are led by **Richard Weindruch** at the Institute on Aging. He and others are investigating diseases of aging and the normal aging process with the aim of understanding, treating and preventing age-related diseases.

Joseph Kennitz and **Ricki Colman** at the Primate Center, along with their many collaborators, are learning more about the biological mechanisms that control food intake and energy expenditure. They have found aging, calorie-restricted rhesus monkeys to be excellent models for studying obesity, diabetes, hypertension, coronary heart disease, osteoarthritis, neural function, menopause,

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