

Sex Differences in Cardiovascular Disease and Implications for Therapies

Noel Bairey Merz, MD, FACC, FAHA

Director, Cedars-Sinai Medical Center Women's Heart Center

Barbra Streisand Women's Cardiovascular Research and Education Program

Executive Summary

Cardiovascular disease is the leading killer of both women and men, and yet little knowledge exists with regard to sex differences, ranging from basic science inquiry to pathophysiological understanding to diagnostics and therapeutics. The research agenda for the new Barbra Streisand Cardiovascular Research and Education Program will include pursuit of the following three objectives: 1) determine the current knowledge of sex differences in cardiovascular disease; 2) to identify important knowledge gaps in sex differences in cardiovascular disease, and prioritize research areas; 3) develop novel approaches to cardiovascular disease detection and management by leveraging the "female cell advantage".

Thought leaders including Drs. Noel Bairey Merz, Saralyn Mark, Leslee Shaw, Doris Taylor, Alice Jacobs, Barbara Boyan, PK Shah and Eduardo Marban recently summarized their research at a scientific symposium held at Cedars-Sinai Medical Center in February 2008 on *Sex Differences in Cardiovascular Disease*. While understanding sex differences can promote women's health in cardiovascular disease, where there are clear gaps in knowledge that disadvantage women, identification of sex differences will also contribute to optimize male health. If important sex differences exist in a given area, future investigation into the area allows more sex-specific targeting of therapies.

Summary messages from the scientific symposium include:

1. There is a need to differentiate between male and female patterns of cardiovascular disease and response to treatment when considering all aspects of research and development – extending from the research bench to the patient’s bedside.
2. The current pattern of research is to combine male and female data without any planning to ensure differences between sexes can be observed. There is also a failure to consider hormonal status, e.g. menopausal or menstrual phase status is rarely collected. Future study must change this.
3. The role of reproductive hormones, especially estrogen in cardiovascular protection is understudied in women and men. It is clear that hormones are impacting processes throughout the body suggesting that future study should be directed to “follow the hormones”.
4. International and national research conferences and investigators remain focused on attending sessions on their area of research, whereas *interdisciplinary* meetings presenting data from animal models to angiogenesis (new blood vessel repair and growth) to nanotechnology can identify collaborative research areas and novel strategies.
5. Data are emerging in the area of stem cells and regenerative medicine that suggest that female stem cells, when used in males as well as the females regenerate (grow new tissue or organs in the petri dish or in the body), whereas the male cells do not. We need to understand what makes the female cells superior, and harness this “female cell advantage” in order to repair or replace damaged or failing hearts and blood vessels in women and men.

