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Sex hormone levels at midlife linked to heart disease risk in women

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As hormone levels change during the transition to menopause, the quality of a woman's cholesterol carriers degrades, leaving her at greater risk for heart disease, researchers at the University of Pittsburgh Graduate School of Public Health discovered.

The first-of-its-kind evaluation, supported by the National Institutes of Health (NIH), was done using an advanced method to characterize cholesterol carriers in the blood and is published in the July issue of the

Journal of Lipid Research.

The results call for further research to evaluate the menopause-related dynamic changes in sex hormones on the quality of cholesterol carriers over time, as well as increased emphasis on the importance of healthy diet and exercise for women undergoing menopause.

"Higher levels of HDL, or what we know as 'good cholesterol,' may not always be protective, as we have thought before," said lead investigator Samar R. El Khoudary, Ph.D., M.P.H., assistant professor in Pitt Public Health's Department of Epidemiology.

Dr. El Khoudary explains that normal levels of LDL, or "bad cholesterol," do not imply normal cholesterol levels in all individuals. Rather, quality of cholesterol carriers may provide more accurate information about risk related to levels of cholesterol.

"We found that lower levels of estradiol, one of the main hormonal changes that mark menopause, are associated with low-quality cholesterol carriers, which have been found to predict risk for heart disease," she said. "Our results suggest that there may be value in using advanced testing methods to evaluate changes in cholesterol carriers' quality in women early in menopause so that doctors can recommend appropriate diet and lifestyle changes."

Cholesterol travels through the bloodstream in small particles called lipoproteins, or cholesterol carriers. Conventional blood tests show the amount of cholesterol carried by these lipoproteins, rather than the characteristics of the lipoproteins themselves. There are two major types of lipoproteins: high-density lipoprotein (HDL), which helps keep cholesterol from building up in the arteries, and low density lipoprotein (LDL), the main source of cholesterol buildup and blockage in the arteries. Research studies have shown that the characteristics of LDL

and HDL particles, including the number and size of these particles, significantly predict risk of heart disease.

Previous studies evaluating the associations between sex hormones and cardiovascular disease as women went through menopause looked only at cholesterol measured through conventional blood tests. Dr. El Khoudary and her colleagues used nuclear magnetic resonance spectroscopy to measure the size, distribution and concentration of lipoproteins that carry cholesterol in the blood. The Pitt Public Health team found that as estrogen levels fall, women have higher concentrations of low-quality, smaller, denser LDL and HDL particles, which are associated with greater risk of heart disease. The conventional blood tests often don't pick up on such a nuance in particle size.

The study evaluated 120 women from Pittsburgh who were enrolled in the Study of Women's Health Across the Nation (SWAN). The women were an average of 50 ½ years old and not on hormone replacement therapy.

SWAN is an ongoing study of the biological, physical, psychological and social changes in more than 3,000 middle aged women who were recruited at seven sites across the U.S. The goal is to help scientists, health care providers and women learn how mid-life experiences affect health and quality of life during aging.

"As a woman transitions to menopause, many biological changes take place that can put her at greater risk of many conditions, including osteoporosis and heart disease," said Dr. El Khoudary. "Our most recent study underscores the importance of having clinicians aware of these risk factors and prepared to work with their patient to help her best mitigate these risks."

Dr. El Khoudary is collaborating with other scientists to identify funding

to study a larger sample of women over time to definitively tie changes in hormone levels and the quality of cholesterol carriers with heart disease.

Provided by University of Pittsburgh Schools of the Health Sciences