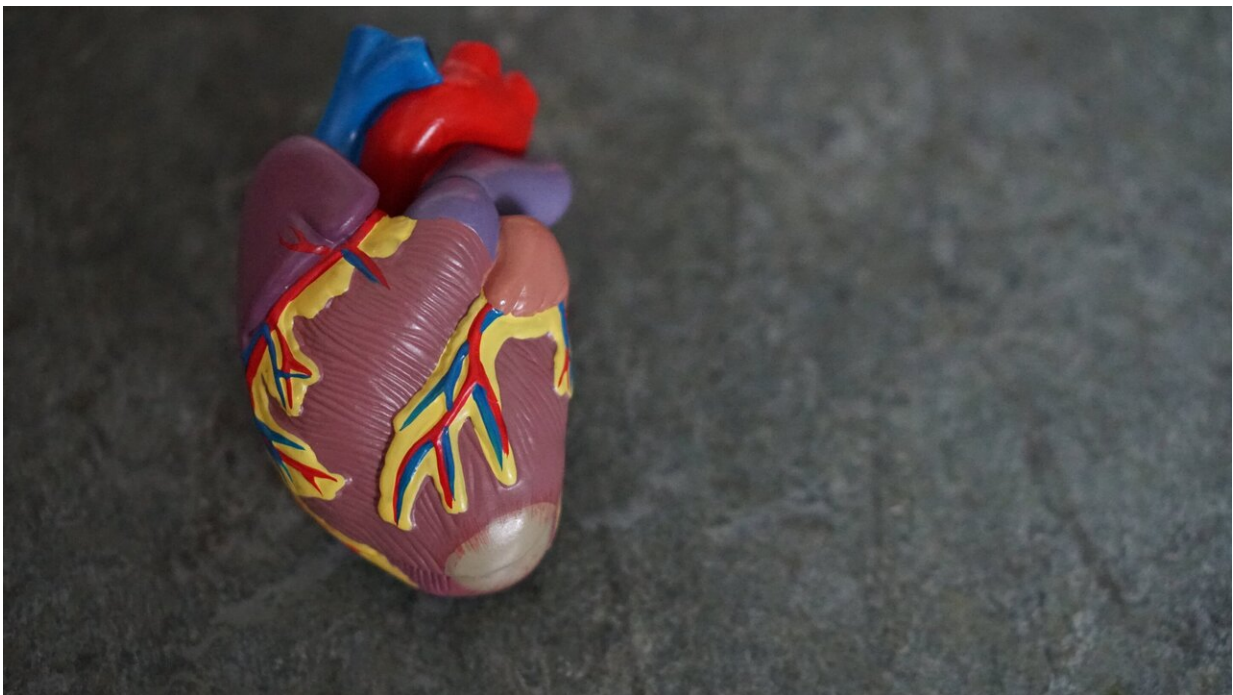


# Investigating hormonal influence of ethanol-evoked cardiac oxidative stress and dysfunction in women

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The hormone estrogen helps keep blood vessels open and flexible and is generally thought to help protect women from heart disease. These higher estrogen levels may lead to fewer heart attacks and strokes in premenopausal women than in men of the same age.

However, [alcohol exposure](#) worsens [cardiovascular function](#) more in women than in men, researchers have said. Also, in previous animal studies, alcohol has been confirmed to worsen heart function more in those animals with the highest estrogen levels.

This study explored whether several measures of heart function and the proteins that regulate it differed with regular alcohol exposure in [female rats](#) that received hormones to replenish their estrogen supply and those that did not.

The [study](#) is being presented at the American Heart Association's [Basic Cardiovascular Sciences Scientific Sessions 2024](#), held in Chicago, July 22–25, 2024.

The eight-week study included female rats with ovaries removed to simulate menopause (when the ovaries make virtually no estrogen). Researchers compared the menopausal rats who received regular alcohol exposure (delivered as 5% ethanol in a liquid diet) to those who were given alcohol and estrogen replacement.

The study found that, compared to those receiving alcohol alone, the menopausal rats treated with estrogen replacement plus alcohol had:

- both positive (lower weight gain and fat mass) and negative (higher blood pressure and [heart rate](#)) changes in measures related to heart health;
- a reduction in the heart's ejection fraction, the heart's ability to pump oxygen-rich blood to the rest of the body, as well as two other indicators of poorer pumping that may eventually result in heart failure; and
- disruption in circadian clock proteins, which are known to regulate [heart function](#) and other body processes, increased both oxidative stress (which can trigger plaque build-up in the

arteries) and ferroptosis (a type of cell death that is a result of too much iron) in the heart's cells.

"It was surprising to see the significant impact estrogen had on alcohol-induced heart dysfunction, despite its known cardioprotective effects. Premenopausal and menopausal women taking hormone replacement therapy should be cautious about [alcohol consumption](#) because it may be a factor in heart dysfunction," said Syed Anees Ahmed, Ph.D.

Ahmed is lead author of the study and a postdoctoral researcher in pharmacology and toxicology at the Brody School of Medicine at East Carolina University in Greenville, North Carolina.

The study findings are limited by the short duration and the use of an animal model. Because the study was conducted in rats, the results may not fully represent the longer-term impact of taking estrogen and regularly consuming alcohol in menopausal women as they age.

**More information:** Study: [Estrogen modulation of ethanol-evoked cardiac oxidative stress and dysfunction: Role of circadian clock period-2 and ferroptosis in estrogen deficient rats](#)

Provided by American Heart Association

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