

## Well-known molecule may be behind alcohol's benefits to heart health

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(PhysOrg.com) -- Many studies support the assertion that moderate drinking is beneficial when it comes to cardiovascular health, and for the first time scientists have discovered that a well-known molecule, called Notch, may be behind alcohol's protective effects. Down the road, this finding could help scientists create a new treatment for heart disease that mimics the beneficial influence of modest alcohol consumption.

"Any understanding of a socially acceptable, modifiable activity that many people engage in, like drinking, is useful as we continue to search for new ways to improve health," said Eileen M. Redmond, Ph.D., lead study author and associate professor in the Department of Surgery, Basic

and Translational Research Division, at the University of Rochester Medical Center. "If we can figure out at the basic science level how alcohol is beneficial it wouldn't translate to doctors prescribing people to drink, but hopefully will lead to the development of a new therapy for the millions of people with [coronary heart disease](#)."

Population studies looking at patterns of health and illness and associated factors have shown that [heart disease](#) and cardiac-related death is 20 to 40 percent lower in light to moderate drinkers, compared to people who don't drink. Redmond notes that even if the reduction is only 20 percent, that still translates to a considerable benefit that warrants further investigation to better understand how alcohol works its protective magic.

In the study, published in *Arteriosclerosis, [Thrombosis](#) and Vascular Biology*, scientists found that alcohol at moderate levels of consumption – generally considered one to three drinks per day – inhibits Notch, and subsequently prevents the buildup of smooth muscle cells in blood vessels, which contributes to narrowing of the arteries and can lead to a heart attack or stroke.



Vessel thickening is reduced in the carotid arteries of mice fed the equivalent of two drinks, compared to no-alcohol controls.

In trying to uncover the molecular players involved when it comes to alcohol and improved [cardiovascular health](#), Redmond and her team focused in on Notch because research has shown it influences the fate – growth, migration or death – of vascular smooth muscle cells. In blood vessels, the growth and movement of smooth muscle cells plays a key role in the development of atherosclerosis, the hardening and narrowing of arteries, and in restenosis, the re-narrowing of arteries after they have been treated to remove buildups of plaque: Both are risk factors for heart attack and stroke.

The team studied the effects of moderate amounts of alcohol in human coronary artery smooth muscle cells and in the carotid arteries of mice. In both scenarios, regular, limited amounts of alcohol decreased Notch, which in turn decreased the production and growth of smooth muscle cells, leaving vessels open and relatively free of blockages or build-up – a desirable state for a healthy heart.

Specifically, in human smooth muscle cells, treatment with moderate levels of alcohol significantly decreased the expression of the Notch 1 receptor and inhibited Notch signaling, leading to decreased growth of smooth muscle cells. The inhibitory effect of moderate alcohol on smooth muscle cell growth was reversed if the Notch pathway was artificially switched on in these cells.

In a mouse model of vessel remodeling, daily feeding of alcohol – equivalent to two drinks per day, adjusted for body weight – inhibited Notch in the vessel wall and markedly reduced vessel thickening, compared to the control, no alcohol group. Vessel remodeling occurs when vessels change shape and thickness in response to different injurious stimuli.

"At the molecular level, this is the first time anyone has linked the benefits of moderate drinking on cardiovascular disease with Notch," said David Morrow, Ph.D., an instructor in the Department of Surgery at the Medical Center, first author of the study and an expert on Notch. "Now that we've identified Notch as a cell signaling pathway regulated by alcohol, we're going to delve deeper into the nuts and bolts of the process to try to find out exactly how alcohol inhibits Notch in smooth [muscle cells](#)."

Researchers admit that uncovering how alcohol inhibits Notch signaling in these cells will not be an easy task. According to Redmond, "The Notch pathway is complex, and there are multiple potential regulatory points which could be affected by [alcohol](#)."

Provided by University of Rochester Medical Center

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