

Researchers identify mechanisms that link compulsive binge eating with hypertension

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An estimated eight million adults in the U.S. suffer from binge eating disorder. Now, researchers have shown that compulsive binging on foods that are high in fat and sugar can trigger specific molecular changes that can lead to high blood pressure (hypertension). While others have studied the effects of binge eating on the brain, this study is the first to look at its molecular effects on the expression of certain proteins in the body.

"Our work is helping build a link in terms of how consistently poor diets of high fat and high sugar start a cascade that sets your body up for potentially developing diseases or other metabolic issues down the road," said Kimberlei Richardson, Ph.D., assistant professor at Howard University College of Medicine and member of the research team. "Our research may lead to therapeutic and pharmacological treatments that reduce the risk of compulsive binge eaters developing hypertension and [cardiovascular disease](#)."

Richardson collaborated with Dexter L. Lee, Ph.D., associate professor at Howard University College of Medicine, to examine how binge eating affects proteins in the liver and kidneys of rats. They specifically investigated levels of the orexin receptor 1, which is associated with food and drug reward, and NADPH oxidase 4 (NOX-4), an enzyme that is expressed at higher levels in people with [high blood pressure](#).

The researchers used female rats in their study because binge eating is known to affect women more than men. To model binge eating, they

intermittently gave nine female rats the opportunity to choose chow with high fat and sugar content or regular chow over several weeks and then divided the rats into two groups – those who most often ate the highly palatable chow chronically and those who most often ate the regular chow, with only an acute exposure to palatable chow. Chronic and acute exposure groups were used to compare levels of orexin receptor 1 and NOX-4.

"This model mimics what happens in the human population. There are those who rarely eat high fat and high sugar and then there are individuals who consistently eat high fat and high sugar in their diets," said Richardson. "Everyone doesn't binge consistently, but there is a group who has more of an affinity for high sugar, high fat diets. Within that group you have those who binge, but people don't usually binge every day."

Compared to female rats that had a short exposure to chow containing high amounts of fat and sugar, rats with chronic exposure (modeling binge eating), showed a 58 percent decrease in the expression of the orexin receptor 1 in the kidneys, which may indicate that the increased consumption of high fat and sugar might help maintain the pleasurable effect received in previous exposure to high fat and sugar. The bingeing rats also had increased levels of NOX-4 in the kidney (40 percent) and the liver (50 percent), making them more likely to develop hypertension.

"Our research demonstrates eating high fat, high sugar foods affects the expression of orexin-1 receptors and NOX-4 levels in the kidneys and liver of [female rats](#)," said Lee, who will present the research at the American Physiological Society (APS) Annual Meeting during Experimental Biology 2015. "These changes trigger biological pathways that can lead to hypertension and other cardiovascular disease risk factors. Since the orexin-1 receptor is involved, there is a possibility that drugs targeting it could decrease a person's urge to binge, which would

also help prevent the development of hypertension."

The researchers are now repeating their experiments on larger groups of animals and plan to conduct similar studies to better understand how molecular changes linked to [binge eating](#) can increase inflammation as well as risks for diabetes, metabolic syndrome and obesity.

Provided by Federation of American Societies for Experimental Biology

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