Medical Xpress

Research reveals a broccoli boost for arteries

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The new research suggests a way vegetables may help prevent heart disease.

(PhysOrg.com) -- New British Heart Foundation (BHF) research from Imperial College London may have revealed why vegetables are good for the heart. The findings suggest that a chemical found in vegetables such as broccoli, cabbage and cauliflower, can boost a natural defence mechanism to protect arteries from disease.

Arteries don't clog up in a uniform way. Bends and branches of blood vessels - where blood flow is disrupted and can be sluggish - are much more prone to the build-up of fatty plaques known as atherosclerosis. Atherosclerosis can lead to angina, heart attack and stroke.

BHF-funded researchers from Imperial College London have discovered that a normally-protective protein called Nrf2 is inactive in areas of arteries that are susceptible to disease. But, they also found that

treatment with a chemical found in certain vegetables - known to gardeners as ‘brassicas’ - can activate Nrf2 in these disease-prone regions.

Dr Paul Evans, from the National Heart and Lung Institute at Imperial College London, who led the research team, said: “We found that the innermost layer of cells at branches and bends of arteries lack the active form of Nrf2, which may explain why they are prone to inflammation and disease. Treatment with the natural compound sulforaphane reduced inflammation at the high-risk areas by 'switching on' Nrf2.

“Sulforaphane is found naturally in broccoli, so our next steps include testing whether simply eating broccoli, or other vegetables in their ‘family’, has the same protective effect. We also need to see if the compound can reduce the progression of disease in affected arteries.”

Brassicas - also called ‘cruciferous’ vegetables - include broccoli (which has the highest levels of sulforaphane), cabbage, kale, Brussels sprouts, cauliflower, bok choy and rocket.

Professor Peter Weissberg, Medical Director at the BHF, said: “These fascinating findings provide a possible mechanism by which eating vegetables protects against heart disease.

“As well as adding evidence to support the importance of eating ‘five-a-day’, the biochemistry revealed in this research could lead to more targeted dietary or medical approaches to prevent or lessen disease that leads to heart attacks and strokes.”

Using normal mice, and mice engineered to lack the Nrf2 protein, the research found that in straight sections of arteries Nrf2 was present in the endothelial ‘lining’ cells. Through its action on other proteins, it prevented the cells from becoming inflamed, which is an early stage in

the development of atherosclerosis.

In the lining cells of disease-prone sites - such as bending or branched arteries - Nrf2 was attached to a protein that made it inactive. This stifled its protective properties.

The addition of sulforaphane re-activated Nrf2 in the disease-prone regions of the artery, restoring the cells' ability to protect themselves from becoming inflamed. The researchers believe that this will enable these artery regions to remain healthy for longer, or even reduce the progression of existing disease. This will be tested in their next phase of research.

The research is published today in the *Journal Arteriosclerosis Thrombosis and Vascular Biology*.

More information: Activation of Nrf2 in Endothelial Cells Protects Arteries From Exhibiting a Proinflammatory State. M Zakkar et al. Arteriosclerosis Thrombosis and Vascular Biology, DOI: 10.1161/ATVBAHA.109.193375

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