Why coffee drinking reduces the risk of Type 2 diabetes

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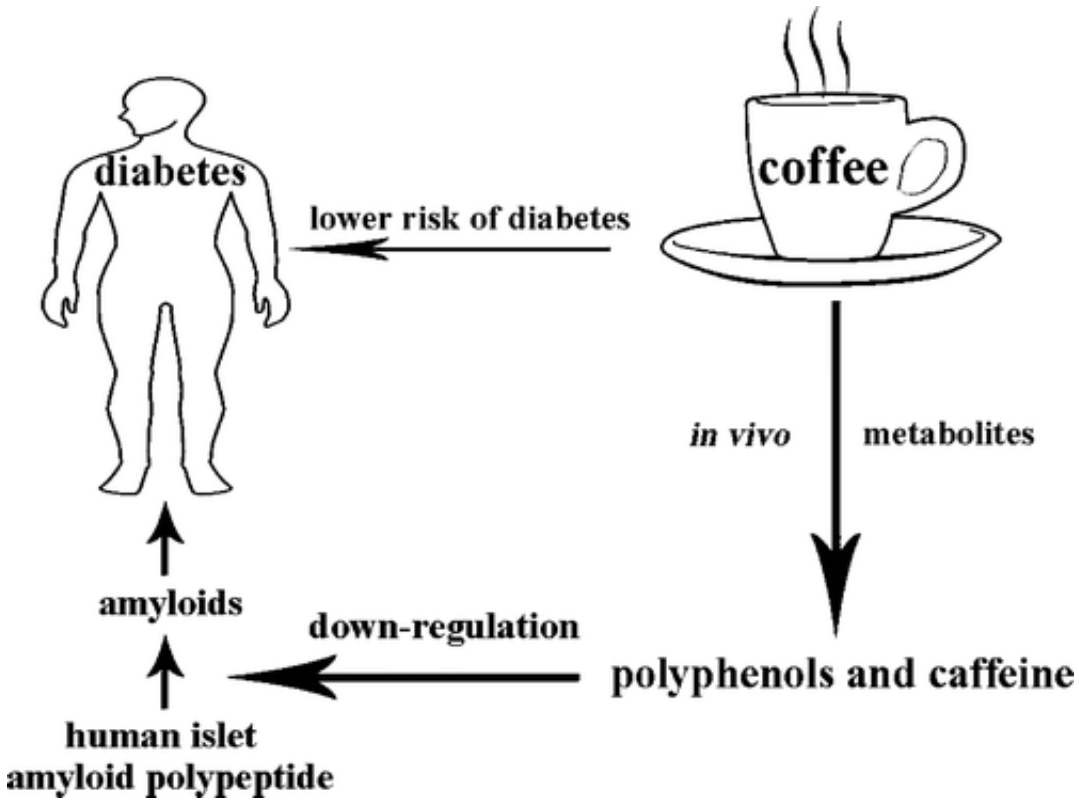

Why do heavy coffee drinkers have a lower risk of developing Type 2 diabetes, a disease on the increase around the world that can lead to serious health problems? Scientists are offering a new solution to that long-standing mystery in a report in ACS' *Journal of Agricultural & Food Chemistry*.

Ling Zheng, Kun Huang and colleagues explain that previous studies show that coffee drinkers are at a lower risk for developing Type 2 diabetes, which accounts for 90-95 percent of diabetes cases in the world. Those studies show that people who drink four or more cups of coffee daily have a 50 percent lower risk of Type 2 diabetes. And every additional cup of coffee brings another decrease in risk of almost 7 percent. Scientists have implicated the misfolding of a substance called human islet amyloid polypeptide (hIAPP) in causing Type 2 diabetes, and some are seeking ways to block that process. Zheng and Huang decided to see if coffee's beneficial effects might be due to substances that block hIAPP.

Indeed, they identified two categories of compounds in coffee that significantly inhibited hIAPP. They suggest that this effect explains why coffee drinkers show a lower risk for developing diabetes. "A beneficial effect may thus be expected for a regular coffee drinker," the researchers conclude.

More information: Coffee Components Inhibit Amyloid Formation of Human Islet Amyloid Polypeptide in Vitro: Possible Link between Coffee Consumption and Diabetes Mellitus, *J. Agric. Food Chem.*, 2011, 59 (24), pp 13147–13155. DOI: 10.1021/jf201702h

Abstract
Global epidemic studies have suggested that coffee consumption is reversely correlated with the incidence of type 2 diabetes mellitus (T2DM), a metabolic disease. The misfolding of human islet amyloid polypeptide (hIAPP) is regarded as one of the causative factors of T2DM. Coffee extracts have three major active components: caffeine, caffeic acid (CA), and chlorogenic acid (CGA). In this study, the effects of these major coffee components, as well as dihydrocaffeic acid (DHCA) (a major metabolite of CGA and CA), on the amyloidogenicity of hIAPP were investigated by thioflavin-T based fluorescence emission,

transmission electronic microscopy, circular dichroism, light-induced cross-linking, dynamic light scattering, and MTT-based cell viability assays. The results suggest that all components show varied inhibitory effects on the formation of toxic hIAPP amyloids, in which CA shows the highest potency in delaying the conformational transition of the hIAPP molecule with the most prolonged lag time, whereas caffeine shows the lowest potency. At a 5-fold excess molar ratio of compound to hIAPP, all coffee-derived compounds affect the secondary structures of incubated hIAPP as suggested by the circular dichroism spectra and CDPro deconvolution analysis. Further photoinduced cross-linking based oligomerization and dynamic light scattering studies suggested CA and CGA significantly suppressed the formation of hIAPP oligomers, whereas caffeine showed no significant effect on oligomerization. Cell protection effects were also observed for all three compounds, with the protection efficiency being greatest for CA and least for CGA. These findings suggest that the beneficial effects of coffee consumption on T2DM may be partly due to the ability of the major coffee components and metabolites to inhibit the toxic aggregation of hIAPP.

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