Compounds in non-stick cookware may be associated with elevated cholesterol in children and teens

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Children and teens with higher blood levels of chemicals used in the production of non-stick cookware and waterproof fabrics appear more likely to have elevated total and LDL cholesterol levels, according to a report in the September issue of *Archives of Pediatrics & Adolescent Medicine*.

Humans are exposed to the man-made compounds known as perfluoroalkyl acids—including perfluorooctanoic acid (PFOA) and perfluorooctanesulfonate (PFOS)—through drinking water, dust, food packaging, breast milk, cord blood, microwave popcorn, air and occupational exposure, according to background information in the article. Recent national survey results reported detection of PFOA and PFOS in almost all samples of human serum. Perfluoroalkyl acids are used during the manufacture of fluoropolymers, which give non-stick heat resistance to cookware and breathable, waterproof properties to fabrics and upholstery. PFOA and PFOS may also result from the breakdown of compounds used as coating for commercial food packaging, factory treatments for fabrics and carpets and manufacturer pretreatment for stain-resistant clothing.

Animal studies have identified the liver as the primary organ affected by perfluoroalkyl acid exposure, with potential effects in human including alterations in cholesterol levels. Stephanie J. Frisbee, M.Sc., M.A., of West Virginia University School of Medicine, Morgantown, and

colleagues assessed serum lipid levels in 12,476 children and adolescents (average age 11.1) included in the C8 Health Project, which resulted from the settlement of a class-action lawsuit regarding PFOA contamination of the drinking water supply in the mid-Ohio River Valley.

After enrolling in 2005 or 2006, the children and teens submitted blood samples; their average PFOA concentration was 69.2 nanograms per milliliter and average PFOS concentration was 22.7 nanograms per milliliter. Among 12- to 19-year old participants, PFOA concentrations were higher than those detected in a nationally representative survey (29.3 nanograms per milliliter vs. 3.9 nanograms per milliliter), but PFOS concentrations were similar (19.1 nanograms per milliliter vs. 19.3 nanograms per milliliter).

After adjusting for related variables, higher PFOA levels were associated with increased total cholesterol and LDL or "bad" cholesterol, and PFOS was associated with increased total cholesterol, LDL cholesterol and HDL or "good" cholesterol. There was no association between either compound and triglyceride levels.

On average, the one-fifth of children and teens with the highest PFOA levels had total cholesterol levels 4.6 milligrams per deciliter higher and LDL cholesterol levels 3.8 milligrams per deciliter higher than the one-fifth with the lowest PFOA levels. In addition, there was an average difference of 8.5 milligrams per deciliter in total cholesterol levels and 5.8 milligrams per deciliter in LDL cholesterol levels between the one-fifth of participants with the highest and lowest PFOS levels.

"The non-linear nature of the observed associations, particularly for PFOA, suggests a possible saturation point in an underlying physiologic mechanism," the authors write. "PFOA and PFOS specifically, and possibly perfluoroalkyl acids as a general class, appear to be associated

with serum lipids, and the association seems to exist at levels of PFOA and PFOS exposure that are in the range characterized by nationally representative studies."

Although the design of the study limits cause-and-effect interpretations, the results suggest the association between PFOA and PFOS and elevated cholesterol levels warrant further study, the authors note. "Should the association prove to be etiologic, the cumulative effects of such an elevation in cholesterol on long-term cardiovascular health are unclear given the early age at which these associations were observed."

More information: Arch Pediatr Adolesc Med. 2010;164[9]:860-869.

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