A new study found higher levels of neurodegeneration in rats that consumed reused deep-fried cooking oils and their offspring compared
to rats on a normal diet. Deep frying, which involves completely
submerging food in hot oil, is a common method of food preparation
around the world.

Results from the study also suggest that the increased neurodegeneration
is tied to the oil's effects on the bidirectional communication network
between the liver, gut and brain. The liver–gut–brain axis plays a crucial
role in regulating various physiological functions, and its dysregulation
has been associated with neurological disorders.

Kathiresan Shanmugam, an associate professor from Central University
of Tamil Nadu in Thiruvarur, led the research team.

"Deep-frying at high temperatures has been linked with several
metabolic disorders, but there have been no long-term investigations on
the influence of deep-fried oil consumption and its detrimental effects
on health," said Shanmugam, formerly at Madurai Kamaraj University,
Madurai. "To our knowledge we are first to report long-term deep-fried
oil supplementation increases neurodegeneration in the first-generation
offspring."

Sugasini Dhavamani, a research collaborator from the University of
Illinois at Chicago, will present the research at Discover BMB, the
annual meeting of the American Society for Biochemistry and Molecular
Biology, which will be held March 23–26 in San Antonio.

Deep frying food not only adds calories; reusing the same oil for frying,
a common practice in both homes and restaurants, removes many of the
oil's natural antioxidants and health benefits. The oil that is reused also
can contain harmful components such as acrylamide, trans fat,
peroxides, and polar compounds.

To explore the long-term effects of reused deep-fried frying oil, the
researchers divided female rats into five groups that each received either
standard chow alone or standard chow with 0.1 ml per day of unheated
sesame oil, unheated sunflower oil, reheated sesame oil, or reheated
sunflower oil for 30 days. The reheated oils simulated reused frying oil.

Compared with the other groups, the rats that consumed reheated sesame
or sunflower oil showed increased oxidative stress and inflammation in
the liver. These rats also showed significant damage in the colon that
brought on changes in endotoxins and lipopolysaccharides—toxins
released from certain bacteria.

"As a result, liver lipid metabolism was significantly altered, and the
transport of the important brain omega-3 fatty acid DHA was decreased.
This, in turn, resulted in neurodegeneration, which was seen in the brain
histology of the rats consuming the reheated oil as well as their
offspring."

Additional studies in which MSG was used to induce neurotoxicity in the
offspring showed that the offspring that consumed the reheated oils were
more likely to show neuronal damage than the control group receiving no
oil or those that received unheated oil.

Although more studies are needed, the researchers say that
supplementation with omega-3 fatty acids and nutraceuticals such as
curcumin and oryzanol might be helpful in reducing liver inflammation
and neurodegeneration. They added that clinical studies in humans are
needed to evaluate the adverse effects of eating fried foods, especially
those made with oil that is used repeatedly.

As a next step, the researchers would like to study the effects of deep-
frying oil on neurodegenerative diseases such as Alzheimer's and
Parkinson's, as well as on anxiety, depression, and neuroinflammation.
They would also like to explore further the relationship between gut
microbiota and the brain to identify potential new ways to prevent or treat neurodegeneration and neuroinflammation.

Provided by American Society for Biochemistry and Molecular Biology

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