



PRESS RELEASE

IIT Mandi researchers discover the molecular mechanism by which excess sugar consumption causes fatty liver disease

This research has conclusively shown that excessive sugar intake leads to a fatty liver. This should offer incentive to the public to reduce sugar intake to stop NAFLD in its early stages

MANDI, 14th June 2021: A team of researchers from IIT Mandi, led by Dr Prosenjit Mondal, Associate Professor, School of basic Sciences, has used complementary experimental approaches, to establish the underlying biochemical relationship between the consumption of excessive sugar and the development of 'fatty liver', medically known as Non-Alcoholic Fatty Liver Disease (NAFLD). This research comes at a time in which the Government of India has included NAFLD in the National Programme for Prevention & Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).

The results of the IIT Mandi team's path-breaking work have been published in the Journal of Biological Chemistry. The research paper has been co-authored by Dr Prosenjit Mondal along with his research scholars, Mr. Vineeth Daniel, Ms. Surbhi Dogra, Ms. Priya Rawat, Mr. Abhinav Choubey from IIT Mandi, in collaboration with Dr. Mohan Kamthan and Ms. Aiysha Siddiq Khan from Jamia Hamdard Institute, New Delhi, along with Mr. Sangam Rajak from SGPGI, Lucknow.

NAFLD is a medical condition in which excess fat deposits in the liver. The disease starts silently, with no overt symptoms for as much as two decades. If left untreated, the excess fat can irritate the liver cells, resulting in scarring of the liver (cirrhosis), and in advanced cases, can even lead to liver cancer. The treatment of advanced stages of NAFLD is difficult.

Explaining his research, Dr. Prosenjit Mondal, Associate Professor, School of Basic Sciences, IIT Mandi, said, "The molecular mechanisms that increase hepatic DNL due to overconsumption of sugar have not been clear."



"Our goal was to unravel this mechanistic pathway between excessive sugar consumption and onset and development of fatty liver Through DNL", he further added.

India is the first country in the world to identify the need for action on NAFLD and with good reason. The prevalence of NAFLD in India is about 9% to 32% of the population, with the state of Kerala alone having a prevalence of 49% and a staggering 60% prevalence among obese school-going children.

One of the causes for NAFLD is the overconsumption of sugar – both table sugar (sucrose) and other forms of carbohydrates. The consumption of excess sugar and carbohydrates causes the liver to convert them into fat in a process called hepatic De Novo Lipogenesis or DNL, which leads to fat accumulation in the liver.

Through a complementary experimental approach involving mice models, the IIT Mandi team has shown the hitherto unknown link between the carbohydrate-induced activation of a protein complex called NF- κ B and increased DNL.

"Our data indicates that the sugar-mediated shuttling of hepatic NF- κ B p65 reduces the levels of another protein, sorcin, which in turn activates liver DNL through a cascading biochemical pathway," explained the lead scientist.

The unravelling of the molecular link between sugar and fat accumulation in the liver is key to developing therapeutics for the disease. The team has shown that drugs that can inhibit NF- κ B can prevent sugar-induced hepatic fat accumulation. They have also shown that the knockdown of sorcin reduces the lipid-lowering ability of the NF- κ B inhibitor.

The IIT Mandi team's finding that NF- κ B plays a key role in lipid accumulation in the liver opens up a new avenue of therapeutics for NAFLD. NF- κ B also plays a role in other diseases that involve inflammation, such as cancer, Alzheimer's disease, atherosclerosis, IBS, stroke, muscle wasting and infections, and scientists around the world are developing therapeutics that can block NF- κ B. The IIT Mandi research shows that NAFLD can now be added to the repertoire of diseases that can be treated with drugs that block NF- κ B.

From the preventive angle, the IIT Mandi team's research has conclusively shown that excessive sugar intake leads to a fatty liver. This should offer incentive to the public to reduce sugar intake to stop NAFLD in its early stages.



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About IIT Mandi

Since the first batch of 97 students joined in July 2009, IIT Mandi has grown to currently host 125 faculty and 1,833 students who are enrolled in various programmes of studies in undergraduate, postgraduate and research programmes, and 1516 alumni. IIT Mandi is a fully residential campus with 1.4 lakh sq. m. buildings completed. It has a guest house with 88 rooms, a 750-seater Auditorium, campus school, sports complex and hospital.

IIT Mandi has four Academic Schools and three major Research Centers. The Schools are: School of Computing and Electrical Engineering, School of Basic Sciences, School of Engineering, and School of Humanities and Social Sciences. The Centers are: Advanced Materials Research Centre (AMRC; set up with an investment of Rs. 60 crores), Centre for Design and Fabrication of Electrical Devices (C4DFED; has Rs. 50 crores worth of fabrication tools), and BioX Centre (has acquired research equipment worth Rs. 15 crores). In 2017, the Department of Biotechnology, Government of India, selected IIT Mandi to lead the prestigious Rs. 10 crore FarmerZone® Project.

To cater to the growing and changing needs of the Indian industry and the aspirations of students, IIT Mandi has introduced 7 B.Tech., 7 M.Tech., 5 M.Sc., 4 Ph.D., 1 I-Ph.D and 1 M.A programmes in the past 10 years. The unique, project-oriented B.Tech. curriculum is centred around its 4-year long Design and Innovation stream. From August 2019, IIT Mandi started 3 new and unique B. Tech. programmes in Data Science and Engineering, Engineering Physics, and Dual Degree in Bioengineering.

Since the inception of the Institute, IIT Mandi faculty have been involved in over 275 Research and Development (R&D) projects worth more than Rs. 120 crore. In the past 10 years, the Institute has signed a Memorandum of Understanding (MoU) with as many as 11 international and 12 national universities.

IIT Mandi Catalyst, the first Technology Business Incubator in Himachal Pradesh, has helped over 75 startups since 2017 and is changing both the industry profile and entrepreneurial mindset in the state. So far, Catalyst has secured external funding of Rs. 24 crores from various funding agencies. Enabling Women of Kamand Valley (EWOK) is another innovative programme run by IIT Mandi, which focuses on imparting skills training to rural women to enable them to start village-scale businesses.

IIT Mandi has been ranked no. 31 in the Engineering Institutions Category in the [India Rankings 2020](#) released by National Institutional Ranking Framework, Ministry of Education, Govt. of India.



Apart from this, IIT Mandi is the only second-generation IIT to be featured at rank no. 7 in the Atal Ranking of Institutions on Innovation Achievements, of the Innovation Cell, Ministry of Education, Govt. of India.

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