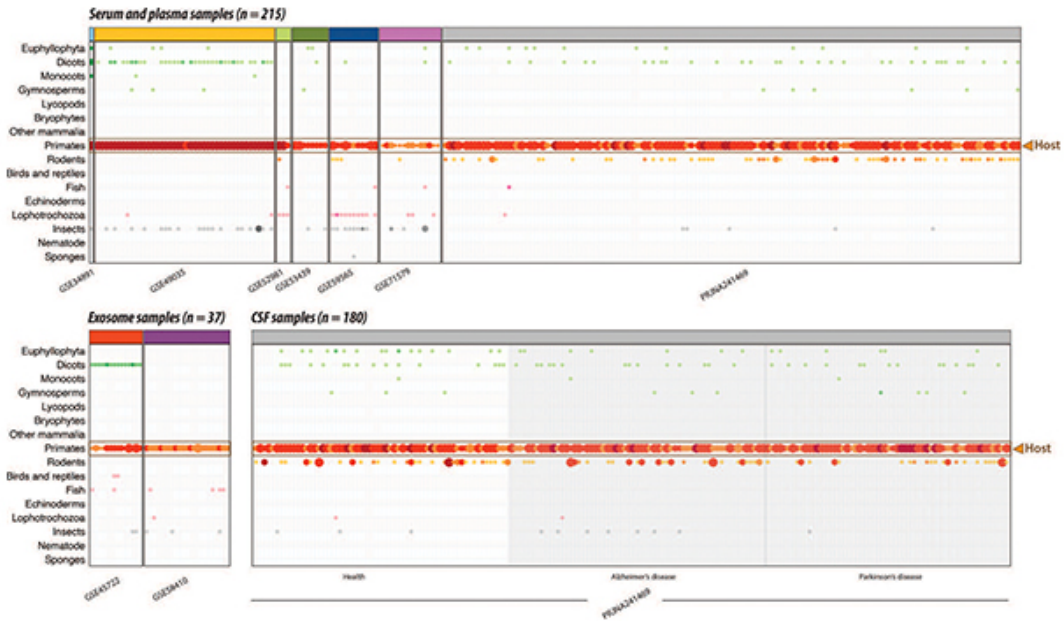
The body does not absorb genetic material from our food

February 23 2017



Credit: Technical University of Denmark (DTU)

A study from the National Food Institute, Technical University of Denmark, finds no evidence that genetic material from food is absorbed in the human body where it would e.g. be able to change the body's ability to regulate the cholesterol metabolism or influence the immune system.

A major new study carried out by researchers from the National Food

Institute has found no evidence that genetic material from the food we eat is absorbed via the intestine into the bloodstream from where it has the ability to change the body's functions.

The study has been carried out in cooperation with researchers from Stockholm, Barcelona, University of Copenhagen and hospitals in the Capital Region of Denmark. It has tried to validate the conclusion from several controversial studies which in recent years have put forward the hypothesis that genetic material from food can be absorbed in the body of the person who eats the food.

As such a recent study found small regulatory RNAs (called microRNA) from rice in the blood of humans and subsequently showed that these can affect the body's cholesterol metabolism. Another study found that microRNA in breast milk can affect newborns' immune system.

Study only finds microRNA in small amounts

The new study from the National Food Institute and partners consists of two parts: In the first part the researchers have analyzed available microRNA sequencing data from 824 human blood and tissue samples to see if they contain genetic material that could have been derived from food.

The analysis shows that microRNAs from other organisms than humans are only present in 17% of the tissue samples and in 69% of the blood samples, but in negligible amounts (0.001%) compared to the total amount of microRNA present in the samples. Moreover, the overwhelming majority of the identified foreign microRNA comes from organisms, which humans rarely eat, but which are often used in laboratory experiments and animal testing, such as rats and insects.

In the second part researchers studied blood samples from animals that

have been fed certain feed to see whether the samples contain microRNA from that particular feed. The researchers have been unable to find evidence that microRNA from the feed had entered the animals' blood stream.

"The study shows that genetic material from our food is not absorbed into our bodies. If it were possible to influence the body's functions through microRNA from the food we eat, it would potentially make it possible to develop tablet-based RNA-pharmaceuticals that contain microRNA," postdoc Claus Heiner Bang-Berthelsen from the National Food Institute says.

Laboratory contamination

Both the analysis and the results of the animal study indicate that when foreign microRNA is found in samples that have been isolated from human blood it is most likely because the tests have been contaminated with animal or plant material, which has been present in the laboratory.

The material examined in the study has been copied many times to provide enough material for sequencing, which allows the genetic code to be read. The less material you have at the outset, the more times the samples must be copied, which increases the risk of contamination and as such even the slightest contamination will make a big difference.

"The tiniest bit of dirt on a glove has a much greater significance when analyzing a 0.1 microgram sample of RNA than a one microgram sample," Claus Heiner Bang-Berthelsen explains.

In the analysis, researchers have observed that the presence of foreign microRNA occurs separately in the different studies and not randomly. This further strengthens the case for laboratory contamination, because if the foreign microRNAs had come from food, the findings would be

expected to correspond with what people eat and there would be greater variety in the findings.

The conclusion reached by the National Food Institute and partners is backed up by other studies, which have not been able to repeat the results from studies, which have shown that microRNAs from food enter the blood stream.

More information: Wenjing Kang et al. Survey of 800+ datasets from human tissue and body fluid reveals XenomiRs are likely artifacts, *RNA* (2017). DOI: 10.1261/rna.059725.116

Provided by Technical University of Denmark