

Causes of disease can be revealed by metabolic fingerprinting

April 21 2008



The study provides new insights into the possible causes of high blood pressure, a leading cause of heart disease and stroke.

Your metabolic 'fingerprint' can reveal much about the possible causes of major diseases, according to the first 'metabolome-wide' association study ever carried out, published today in the journal *Nature*.

The study provides new insights into the possible causes of high blood pressure, a leading cause of heart disease and stroke, by analysing the metabolic fingerprints of 4,630 adults in the UK, USA, China and Japan,



from their urine samples.

Metabolic fingerprinting looks at the relative levels of many different metabolites, which are the products of metabolism, in a person's blood or urine. Metabolites act as markers which can reveal a lot about how diet and lifestyle contribute to risks for certain diseases.

The research shows that adults in the UK and USA, which have similar incidences of high blood pressure and cardiovascular problems, have similar metabolic fingerprints, reflecting similar lifestyles in spite of their geographical distance from one another.

In contrast, although adults in Japan and China have similar genetic profiles, they have very different metabolic fingerprints from one another and from adults in the UK and USA, and also have major differences in the incidence of many diseases.

Japanese people living in the USA have metabolic fingerprints that resemble other people in the USA, and dissimilar fingerprints to their counterparts living in Japan. This shows that lifestyle is a dominant feature in determining metabolism.

Professor Jeremy Nicholson, one of the authors of the research from the Department of Biomolecular Medicine at Imperial College London, said: "Our research illustrates how metabolome-wide association studies can give us important clues as to the causes of major health problems such as high blood pressure. Metabolic profiling can tell us how specific aspects of a person's diet can contribute to their risks for certain diseases, and these are things which we can't investigate by looking at a person's DNA. What is really important is that we can test out our new hypotheses directly, in a way that is not easy with genetic biomarkers."

Professor Paul Elliott, a co-author of the research from the Department



of Epidemiology and Public Health at Imperial College, added: "The flipside of this is that whereas a person can't alter their DNA, they can change their metabolic profile by changing their diet and lifestyle. This means that as we figure out where the problems lie, we should also be able to show people ways to reduce their risk of certain diseases."

The new study reveals that people with increased levels of the amino acid alanine, which is found in many foods but which is particularly high in animal protein, have higher blood pressure and also increased energy intake, levels of dietary cholesterol, and body mass index.

People with increased levels of the metabolite formate have lower blood pressure and increased energy intake. Formate arises from the action of microbes in the gut or as a product of metabolism in the body.

Increased levels of hippurate, a by-product of metabolism by microbes in the gut, are found in people with lower blood pressure, lower levels of alcohol intake, and higher levels of dietary fibre.

For the study, researchers took urine samples from volunteers aged between 40 and 59 and analysed these for over several thousand metabolite signals, using NMR spectroscopy and advanced statistics. The volunteers were participating in the INTERMAP study, an epidemiological study investigating the links between diet and blood pressure.

The study was carried out by researchers from Imperial College London, UK; Northwestern University, Chicago, USA; Akademisch Ziekenhuis St Rafael, Belgium; Shiga University of Medical Science, Japan; and the Chinese Academy of Medical Sciences, China. It was funded by the US National Heart, Lung, and Blood Institute and local funders in the participating countries.



Source: Imperial College London

Citation: Causes of disease can be revealed by metabolic fingerprinting (2008, April 21) retrieved 1 May 2024 from https://medicalxpress.com/news/2008-04-disease-revealed-metabolic-fingerprinting.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.