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20-year study finds ethnic differences in links between diabetes risk and levels of tyrosine and other amino acids

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A study of white European and South Asian men in the UK has found that levels of the amino acid tyrosine, and several other amino acids, are more strongly associated with increased diabetes risk in the South Asian men. The study is published in *Diabetologia* (the journal of the European Association for the Study of Diabetes), and is by Dr Therese Tillin, UCL Institute of Cardiovascular Science, University College London, UK, and colleagues.

South Asians, both in their home countries and as migrant populations, experience a markedly greater burden of diabetes compared with European-origin populations. The Indian subcontinent is expected to contribute the greatest increase in the number of people with diabetes in the world over the next 15 years. The reasons for the excess risk in South Asians are poorly understood and are not solely due to increased waist-level obesity or other established risk factors.

Amino acids (AAs) are the building blocks of proteins, and, in European origin populations, AA disturbances have been shown to predict development of insulin resistance and diabetes. However, until now, no studies have looked at whether AAs would predict development of diabetes in South Asians to the same extent as in Europeans. In a unique cohort of European and South Asian men, the authors compared cross-sectional associations between AAs, metabolic and obesity traits, and associations with development of diabetes over a 20-year period.

Nuclear magnetic spectroscopy was used to measure baseline (1988-1991) levels of nine amino acids in serum samples from a London population-based cohort. The participants consisted of 1279 European and 1007 South Asian non-diabetic men, aged 40-69 years from the SABRE (Southall And Brent REvisited) cohort. 801 Europeans and 643 South Asians were followed up for over 19 years.

The data showed that blood concentrations of the amino acids isoleucine, phenylalanine, tyrosine and alanine were significantly higher in South Asian men. Diabetes developed in 227(35%) South Asians and 113(14%) Europeans.

Tyrosine was a particularly, and significantly, stronger predictor of incident diabetes in South Asians than in Europeans, even after adjustment for other risk factors, including obesity and insulin resistance. A given (one standard deviation) increase in tyrosine increased diabetes risk by just 10% in Europeans, while in South Asians this increase in risk was 47%. A similar pattern was seen for several other AAs including phenylalanine, isoleucine, leucine and valine. Interestingly, most amino acids correlated with obesity measures to a lesser extent in the South Asian men. Taken together with the fact that obesity measures did not explain the links between tyrosine and some other AAs and diabetes in South Asians, this may suggest that the way we measure obesity, and perhaps other risk factors, may not capture the best indicators of future risk for developing diabetes in South Asian individuals.

Although this study was not in a position to explore the mechanisms by which tyrosine and other AAs may contribute to the extra risk of diabetes in South Asians, these are likely to involve altered AA metabolism in the liver, kidneys, muscle or adipose tissue. Further study is needed to tease out the underlying mechanisms.

The authors conclude: "These findings suggest that higher branched chain and aromatic AAs, particularly tyrosine, may be a focus for identifying novel mechanisms and potential treatment targets for diabetes in South Asian individuals and may contribute to their excess risk of diabetes."

Provided by Diabetologia

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