

Diet and lifestyle critical to recovery, says study

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Diet and lifestyle may play a much more significant role in a person's ability to respond favourably to certain drugs, including some cancer therapies, than previously understood, say scientists.

Writing in *Nature Genetics*, University of Manchester researchers have shown how the nutrients in the environment are critical to the fitness of cells that carry genetic mutations caused by diseases.

The findings for the first time provide a scientific insight into why some people might respond better to certain medications than others and form the foundations for more individualised drug therapy in the future.

The team used baker's yeast – a model organism studied by biologists to reveal molecular processes in higher organisms – to explore the relationship between environment and genetic background.

The large-scale study involved removing one of the two copies of all yeast genes – similar to removing one parent's set of genes in a human – and analysing the resulting fitness under different dietary restrictions.

“If the gene targeted is quantitatively important, you would normally expect the yeast to show a reduction in fitness,” said Dr Daniela Delneri, who carried out the research in the University's Faculty of Life Sciences.

“But what we found was that in certain environmental conditions, removing one copy of certain genes actually produced the opposite

effect and surprisingly the yeast cells grew more quickly and were healthier.”

The team further established that this effect was mainly occurring in genes involved in the proteasome – the quality-control system within the cell that degrades unwanted proteins.

“The proteasome is important as it maintains the equilibrium of the cell,” said Dr Delneri. “When this equilibrium is lost it can result in a number of diseases, including cancer, diabetes, Huntingdon’s, Alzheimer’s and Parkinson’s.

“For example, in rapidly-growing cancerous cells the high proteasome activity renders the tumour cells immortal, so drugs that block or inhibit the proteasome’s actions are currently used as therapeutic compounds.

“Our study shows that reduced proteasome activity could be either advantageous or damaging to the cell depending on the nutrients available to it in the surrounding environment.”

The findings suggest that, ideally, when therapeutic drugs are administered to alter the proteasome activity, the environment – governed by the type of tissue or a person’s diet and lifestyle – should be taken into consideration to assure the correct beneficial effect.

Source: University of Manchester

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