

Yeast gives rise to new concept: cell fuel is 'brains' behind division

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With the cost of diesel and gasoline getting nearer to the hourly minimum wage, too bad the fuel doesn't do more work - like deciding what route to take and pressing the gas pedal.

While that concept isn't likely to work for vehicle fuel, a new study has found that it is, in fact, what goes on in the cells of yeast.

Mitochondria, the fuel of a cell, has been found to be the "driver" for cell division, according to Texas AgriLife Research biochemists. This discovery could play a big role in finding cures for many human diseases, they say.

The biochemists studied yeast cells and found that mitochondria, which generates 90 percent of the cell's energy, can be the deciding factor – the "brain power" – behind how fast cells divide.

The finding by Drs. Michael Polymenis and Mary Bryk and their research groups in Texas A&M University's biochemistry and biophysics department was published in today's open-access journal *Public Library of Science-Genetics*. The research was funded by the National Institute of Health.

"The finding changes the traditional view of the mitochondrion from an 'energy depot' at the service of its larger cellular host to a 'command center' that directs cell division," Polymenis said.

The researchers used regular baker's yeast – commonly used in breads, wine and beer making – because many of the yeast cell's processes are similar to those in human cells, according to Bryk.

“From unicellular yeast to complex mammals, the process is the same,” Bryk said. “The job of a cell is to divide and grow. Metabolism takes in ‘food’ and turns it into fuel and building blocks for DNA replication and gene expression.”

But when these processes falter, diseases can result. Too much cell division too quickly, for example, is typical of cancerous cells, Polymenis pointed out. Conversely, poor metabolism – stemming from mitochondrial deficiencies – is at the root of damage to various organs such as the brain, heart, skeletal muscles and liver.

“All of the body processes that require a lot of energy are impacted by this,” Polymenis added.” In fact, at least 1 in every 4,000 people worldwide suffer from mitochondrial deficiencies that result in problems with normal development, motor control, vision, hearing, or liver and kidney function.”

On the other hand, there are times when speeding cell division might be useful as with wound healing and plant or crop production, Bryk noted.

“If we can understand the basic pathway that regulates cell division, we can think of ways to tweak the different steps in that path with therapeutics to help people who have problems with these high-energy organs,” she said.

Polymenis said the research showed that when a yeast cell's mitochondria decided to “turn on the switch,” the cell's nucleus – which carries most of the genetic material – received the message and cell division began.

“So now we need to connect that link,” Polymenis said. “We need to understand how and when the message is sent. If we know how the message is sent from the mitochondria, we might be able to control it.”

Source: Texas A&M University

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