

## E-News

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**Details:**

### **Genetic adaptation key to polar bears staying warm (Source: The Times of India, 11 February, 2014)**

NEW YORK: How do polar bears keep warm in winter? It may be in their genes! A genetic adaptation that helps convert food into heat may be key to how polar bears survive extreme arctic winters without hibernating, scientists have found. In the winter, brown and black bears go into hibernation to conserve energy and keep warm, but for their Arctic relative, the polar bear, only pregnant females den up for the colder months. A new study points to genetic adaptations related to the production of nitric oxide, a compound that cells use to help convert nutrients from food into energy or heat. A team led by the University at Buffalo reports that genes controlling nitric oxide production in the polar bear genome contain genetic differences from comparable genes in brown and black bears. "With all the changes in the global climate, it becomes more relevant to look into what sorts of adaptations exist in organisms that live in these high-latitude environments," said lead researcher Charlotte Lindqvist. "This study provides one little window into some of these adaptations," she said.

"Gene functions that had to do with nitric oxide production seemed to be more enriched in the polar bear than in the brown bears and black bears. There were more unique variants in polar bear genes than in those of the other species," said Lindqvist. The genetic adaptations the research team saw are important because of the crucial role that nitric oxide plays in energy metabolism. Typically, cells transform nutrients into energy. However, there is a phenomenon called adaptive or non-shivering thermogenesis, where the cells will produce heat instead of energy in response to a particular diet or environmental conditions. Levels of nitric oxide production may be a key switch triggering how much heat or energy is produced as cells metabolise nutrients, or how much of the nutrients is stored as fat, Lindqvist said. "At high levels, nitric oxide may inhibit energy production," said first author Andreanna Welch from the Durham University. "At more moderate levels, however, it may be more of a tinkering, where nitric oxide is involved in determining whether - and when - energy or heat is produced," said Welch. The team said comparative studies between the DNA of the three species uncovered some distinctive polar bear traits, such as genetic differences that may affect the function of proteins involved in the metabolism of fat - a process that's very important for insulation.

The study was published in the journal Genome Biology and Evolution.