

Polar Bear Genome Reveals Adaptations to High-Fat Diet

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TEMPO.CO, Jakarta - Living its life in the high Arctic, polar bears have developed extreme adaptations to survive in this cold sea ice environment. One important trait is their thick layer of blubber. Like other arctic animals, this layer of fat helps insulate species from the cold. Consequently, polar bears have adapted to subsist on a blubber-rich, high-fat diet of marine species. But is a high-fat diet healthy for the species?

As reported by the *Environmental News Network*, a new study found that the polar bears' adapted genes are related to fatty acid metabolism and cardiovascular function, and may explain the bear's ability to cope with a high-fat diet while avoiding fatty plaques in their arteries and the cardiovascular diseases that afflict humans with diets rich in fat. These genes may provide insight into how to protect humans from the ill effects of a high-fat diet.

UC Berkeley researcher, Eline Lorenzen explains: "For polar bears, profound obesity is a benign state," said Lorenzen, one of the lead authors and a UC Berkeley postdoctoral fellow. "We wanted to understand how they are able to cope with that."

"The promise of comparative genomics is that we learn how other organisms deal with conditions that we also are exposed to," said Rasmus Nielsen, a member of UC Berkeley's Center for Theoretical Evolutionary Genomics. "For example, polar bears have adapted genetically to a high fat diet that many people now impose on themselves. If we learn a bit about the genes that allows them to deal with that, perhaps that will give us tools to modulate human physiology down the line."

The genome comparison reveals that over several hundred thousand years, natural selection drove major changes in genes related to fat transport in the blood and fatty acid metabolism. One of the most strongly selected genes is APOB, which in mammals encodes the main protein

in LDL (low density lipoprotein), known widely as "bad" cholesterol. Changes or mutations in this gene reflect the critical nature of fat in the polar bear diet and the animal's need to deal with high blood levels of glucose and triglycerides, in particular cholesterol, which would be dangerous in humans.

"The life of a polar bear revolves around fat," Lorenzen said. "Nursing cubs rely on milk that can be up to 30 percent fat and adults eat primarily blubber of marine mammal prey. Polar bears have large fat deposits under their skin and, because they essentially live in a polar desert and don't have access to fresh water for most of the year, rely on metabolic water, which is a byproduct of the breakdown of fat."

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