Physiological and Genetic Adaptations to Diving in Sea Nomads

Understanding the physiology and genetics of human hypoxia tolerance has important medical implications, but this phenomenon has thus far only been investigated in high-altitude human populations. Another system, yet to be explored, is humans who engage in breath-hold diving. The indigenous Bajau people ("Sea Nomads") of Southeast Asia live a subsistence lifestyle based on breath-hold diving and are renowned for their extraordinary breath-holding abilities. However, it is unknown whether this has a genetic basis. Using a comparative genomic study, we show that natural selection on genetic variants in the PDE10A gene have increased spleen size in the Bajau, providing them with a larger reservoir of oxygenated red blood cells. We also find evidence of strong selection specific to the Bajau on BDKRB2, a gene affecting the human diving reflex. Thus, the Bajau, and possibly other diving populations, provide a new opportunity to study human adaptation to hypoxia tolerance.

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