

Original Article

Low MHC variation in the polar bear: implications in the face of Arctic warming?

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Abstract

Animals in the Arctic have low pathogen diversity but with rapid climate warming, this is expected to change. One insidious consequence of climate change is exposure of Arctic species to new pathogens derived from more southern species expanding their range northward. To assess potential vulnerability of polar bears to disease exposure, we examined genetic variation in major histocompatibility complex (MHC) loci (part of immune system) in Canadian polar bears and found low genetic diversity, consistent with long-standing exposure to low pathogen/parasite loads. All polar bears surveyed showed maximum linkage disequilibrium between *DRB/DQB* loci and 12% of individuals had a duplicated *DQB* gene haplotype. These results may reflect balancing selection at these loci, a response to an earlier immune-challenge and/or be artifacts of polar bear-brown bear divergence. Consistent with the latter, we found one *DQA* allele in polar bears that was also a brown bear *DQA* allele. The reported low MHC diversity and high linkage disequilibrium may have serious implications for polar bear resistance to new pathogens, which would be maladaptive to species in an environment undergoing rapid climate change, such as the Arctic.