Convergent transcriptomic and genomic adaptation in xeric rodents

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Résumé

Repeated adaptations rely in part on similar genomic changes, to an extent that may depend on the evolutionary history of the species. Rodents have repeatedly adapted to life in arid conditions, including with altered renal morphology and physiology. This occurred at different time periods, allowing us to test the importance of time in convergent genomic evolution. We analyzed kidney transcriptomes from 34 species to quantify and characterize convergent evolution at the level of gene expression, tissue composition, and coding sequences. We found that several genes showed convergent expression changes, some of which also carried convergent changes in their coding sequence. We then subdivided these data to test the influence of evolutionary history. First, within the subfamily Murinae, we found more convergent gene expression, reflecting convergent changes in cell proportions. Second, we compared data for recent and ancient adaptations, and observed more convergent changes in the latter. Our study shows that adaptation to xeric environments in rodents involves repeated changes in tissue composition, gene expression and coding sequences, and that the degree of convergent evolution increases with the age of the adaptations and species relatedness.

Mots-Clés: convergent evolution, aridity, gene expression, rodents

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