

Hypoxia Tolerance, Longevity and Cancer-Resistance in the Mole Rat Spalax - a Liver Transcriptomics Approach

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Abstract : The blind subterranean mole rat Spalax shows a remarkable tolerance to hypoxia, cancer-resistance and longevity. Unravelling the genomic basis of these adaptations will be important for biomedical applications. RNA-Seq gene expression data were obtained from normoxic and hypoxic Spalax and rat liver tissue. Hypoxic Spalax broadly downregulates genes from major liver function pathways. This energy-saving response is likely a crucial adaptation to low oxygen levels. In contrast, the hypoxiasensitive rat shows massive upregulation of energy metabolism genes. Candidate genes with plausible connections to the mole rat's phenotype, such as important key genes related to hypoxia-tolerance, DNA damage repair, tumorigenesis and ageing, are substantially higher expressed in Spalax than in rat. Comparative liver transcriptomics highlights the importance of molecular adaptations at the gene regulatory level in Spalax and pinpoints a variety of starting points for subsequent functional studies.

Keywords : cancer, hypoxia, longevity, transcriptomics

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