Editorial: model organisms: a precious resource for the understanding of molecula...

Health & Medicine

Editorial on the Research Topic

Model Organisms: A Precious Resource for the Understanding of Molecular Mechanisms Underlying Human Physiology and Disease

Introduction

This issue includes eight reviews and five research articles, which highlight how research in model organisms lays the foundations for the comprehension of molecular mechanisms underlying human diseases. Although budding yeast and humans are separated by a billion years of evolutionary history, more than 400 essential yeast genes can be replaced with their human orthologs. Pioneering genetic studies in yeast have contributed to understand the mechanisms involved in autophagy and vesicle trafficking, two processes involved in cancer and neurodegenerative disorders (Novick et al., 1980 ; Takeshige et al., 1992 ; Mizushima et al., 1998). More recently, production of yeast strains expressing human genes (“ humanized yeast”) has been essential for the detailed analysis of normal and pathogenic variants (Laurent et al., 2016). *Drosophila melanogaster* provides an extremely valid resource to investigate the mechanisms involved in organ formation and in the pathology of human diseases. Nearly 65% of human genes have orthologs in *D. melanogaster* , and nearly 75% of the genes involved in human disease have functional orthologs in flies (Reiter et al., 2001 ; Chien et al., 2002). The sophisticated genetic tools offered by *Drosophila* allow rapid generation of models for human disease, assaying the functional effects of human variant alleles and testing new therapeutic drugs (Moulton and Letsou, 2016 ; Wangler et al., 2017). *Danio rerio* shares vertebrate-conserved characteristics with human including very

similar organs and is a highly suitable model system for investigating gene functions involved in hematopoiesis and screening for novel potential drugs (Wangler et al., 2017). Mouse models of human diseases are the most commonly used, reflecting the genetic and physiological similarities between humans and mice (Perlman, 2016).

Using Budding Yeast to Study the Molecular Pathways That Are Altered in Human Diseases

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