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Behavioral and System Neurobiology

Chronic Stress Causes Frontostriatal Reorganization and Affects Decision-Making

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About the work

The ability to shift between different behavioral strategies is necessary for appropriate decision-making. Here, we show that chronic stress biases decision-making strategies, affecting the ability of stressed animals to perform actions on the basis of their consequences. Using two different operant tasks, we revealed that, in making choices, rats subjected to chronic stress became insensitive to changes in outcome value and resistant to changes in action-outcome contingency. Furthermore, chronic stress caused opposing structural changes in the associative and sensorimotor corticostriatal circuits underlying these different behavioral strategies, with atrophy of medial prefrontal cortex and the associative striatum and hypertrophy of the sensorimotor striatum. These data suggest that the relative advantage of circuits coursing through sensorimotor striatum observed after chronic stress leads to a bias in behavioral strategies toward habit.

About the author

Eduardo Dias-Ferreira graduated in Pharmaceutical Sciences at the University of Coimbra in 2004. His first contact with neuroscience was as an undergraduate during a research training with Dr. José M. Medina and Dr. Arantxa Tabernero at Salamanca University, within the Socrates/Erasmus program. After graduation, he joined Dr. Joana Palha's lab at the University of Minho for 1 year, with a research fellowship within the project "Searching of an essential function for transthyretin in the central nervous system". In 2005 he entered the PDBEB graduate program from University of Coimbra, and in 2006 started his Ph.D. studies with Dr. Nuno Sousa at the University of Minho, and Dr. Rui M. Costa at the NIH and, currently, at the Champalimaud Neuroscience Program at Instituto Gulbenkian de Ciência. This work has been supported by a Doctoral Fellowship from the Foundation for Science and Technology, and a

Research Grant from the Bial Foundation. Eduardo Dias-Ferreira is interested in understanding the impact of stress, as an essential response for adaptation, in decision-making strategies, using an integrative approach: from the major output of the brain – behavior, through the physical dynamics of the circuits, into molecules.