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Research tools in psychiatric and neurological diseases: Where we are and where we are heading to

Sakalem M E

Sao Paulo State University (UNESP), Botucatu, Brazil

Animal models lead the rank of most used research tools in health sciences. Experimentation with rodents, the most common research animals, allows investigations in concern of safety and effectiveness of new drugs as well as therapeutic interventions. Underlying mechanisms can also be better understood, and theories can be easily tested. In the neuroscience field, due to the possibility of behavioral investigation, rat and mouse models are vastly explored. Aligned with clinical data, animal experimentation has brought grand knowledge to our understanding of brain functions and behavioral patterns. This is possible due to the fact that the basic mechanisms of brain function are similar between rodents and humans, allowing a complementary and correlated conversation between what are observed in the bench and what happens with patients. Thus, rodents can

be used for a variety of neuroscience-related investigations, such as mood-related studies (including different models for depression-like and anxiety-like behavior) and cognitive tests (with the different learning mazes and memory tasks). In the last decade, the increasing concern about ethics with experimentation and unnecessary animal use has gained a relief with the emerging and rapidly spreading organoid technology. The co-cultivation of different cell types of the desired organ in a 3D structure, on a dish, mimics the living, in-vivo tissue. The possibility of cultivating different brain areas with the organoid modeling helps advance the understanding of the onset of different neurodegenerative and psychiatric diseases, and will surely be a valuable tool for testing therapeutic approaches and other interventions.

marna7@gmail.com