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Abstract

Due to their evolutionary proximity to humans, non-human primates are ideal animal models for studying higher cognitive functions unique to the primate species and in developing animal models for neurotechnology development and for treatments of human brain disorders. New genetic editing methods are now used in generating macaque monkeys carrying human disease phenotypes, on which therapeutic neurotechnology could be tested prior to human clinical trials, facilitating the success rate in developing new drugs and effective therapeutic approaches for brain disorder-related phenotypes. I will summarize new development in our Institute on the spatial transcriptome mapping at single-cell resolution, and generation of macaque models exhibiting disease phenotypes, including CRISPR/Cas9 and base editing of early NHP embryos, cloning of monkeys by somatic cell nuclear transfer, and generation of chimera monkeys with high contribution from cultured embryonic stem cells (more than 90% in brain tissues). I will also discuss several monkey models phenotypes for brain diseases (including autism spectrum disorders, circadian disorders, psychosis, movement disorders, and drug addiction) that have been developed by gene-editing or acute treatments, and potential applications of these “disease phenotype models” in developing drug and neuromodulation treatments of brain disorders.