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Title:	Social instability, hippocampal plasticity and resilience
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Abstract:	Experience-dependent changes in the production and function of new neurons may serve as a means to fine-tune the hippocampus to the predicted environment. Here we describe a series of studies done to examine the effects of naturalistic social disruption on structural plasticity and behavior in adult rats. Our results provide novel mechanistic evidence that social disruption shapes behavior in an adaptive way by reducing adult neurogenesis in the hippocampus. First, we developed an ethologically relevant model of social instability by forming stable dominance hierarchies in a visible burrow system and then switching dominant rats between hierarchies, a manipulation that increased aggression. Next, we examined the brains of rats subjected to social disruption and compared them to those living in a stable hierarchy and to those living in standard laboratory cages. We found that social disruption dramatically reduced the number of neural stem cells, as well as the number of new neurons, in the hippocampus regardless of social position. Instead of producing the predicted deleterious consequences of social stress, like impaired cognition and increased anxiety, we found no change in cognition and reduced anxiety-like behavior in rats from a disrupted hierarchy. We also found that socially disrupted rats did not show impairments in the ability to detect novelty in a social setting, but they did show a preference for familiar, as opposed to novel, conspecifics. Taken together, this behavioral profile suggests a potential "stress inoculation" or resilience, as opposed to the emergence of pathology. Next, we used two approaches to investigate whether these behavioral effects were causally linked to the reduction in adult neurogenesis in the hippocampus. We used oxytocin to stimulate adult neurogenesis just after social disruption occurred and found that this manipulation prevented the preference for familiar conspecifics. Then we used transgenic conditional neurogenesis knockout (GFAP-TK) rats to reduce adult neurogenesis in rats without social disruption experience and found that these rats preferred familiar rats, similar to what we observed in social disrupted wild-types. The mechanisms by which new neurons influence social preference remain to be determined.
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