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Toxoplasma gondii induced changes in neurotransmitter regulation in neurons in brains of infected animals and potential neurological consequences

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During chronic *Toxoplasma gondii* infection, these ubiquitous, single-cell protozoan parasites are encysted in neurons in the host animal's brain. Changes have been observed in dopaminergic, glutamatergic, and GABAergic neurotransmission. To understand the effect that these parasites impose on neurons during infection, RNA sequencing (RNA-Seq) analysis was performed on infected, differentiated neurotransmitter-expressing cells. *T. gondii* infection altered gene expression of several neurological functions including host genes involved in catecholamine regulation, cell-cell signaling, neuro development, and behavior. The most significantly changed genes during *T. gondii* infection are involved in catecholamine regulation (i.e., dopamine, norepinephrine, and epinephrine). Altered gene expression was also observed in the brains of rats chronically infected with *T. gondii*. Indeed, gene changers were sex-specific which may help clarify differences in behavioral responses to infection. Neurotransmission changes are consistent with observed behavioral effects associated with toxoplasmosis. Hence, parasitic infection alters several host neurological functions with specific direct effects on neurotransmission that may explain observations of behavioral and neurological deficits with infection.

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