$GABA_A$ Receptor Subunit Expression in Early Adolescent Mice

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Gamma-Aminobutyric acid (GABA) is the major inhibitory neurotransmitter in the mammalian central nervous system (CNS). Of the known receptors for GABA, the pentameric $GABA_A$ receptor appears to mediate fast GABA neurotransmission in the CNS. A number of different $GABA_A$ receptor subunits have been described to date, including α1-6, β1-3, γ1-2, and δ, with the specific functionality of any one receptor dictated by the combination of subunits. Although much is known about the pattern of $GABA_A$ subunit expression across the adult brain, the pattern of such expression during the critical developmental period of adolescence, which is a time of rapid neurobiological, hormonal, and behavioral change, remains largely unknown. $GABA_A$ receptor systems play a key role in normal neural, hormonal, and behavioral function, warranting a basic understanding of adolescent-specific alterations in the pattern of subunit expression. The current project focuses on determining the pattern of mRNA expression of $GABA_A$ receptor subunits in early adolescent (postnatal day 30) versus adult (postnatal day 65) mice. The prefrontal cortex, hippocampus, nucleus accumbens, midbrain, amygdala and cerebellum were harvested at these two ages; thus far the midbrain has been the focus due to the presence of the ventral tegmental area and its well-known role in motivation, reward and drug addiction. Midbrain tissue was processed for determination of $GABA_A$ receptor subunit mRNA expression using RT-PCR. We predict that early adolescence will be associated with a unique pattern of $GABA_A$ receptor subunit expression, suggesting an important role for $GABA_A$ receptors in the neurobiological, hormonal, and behavioral profile of this developmental period in mice. Preliminary findings indicate an increase in $GABA_A$ delta subunit expression in the adult midbrain.

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