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Session P078 - Comparative Anatomy: Evolution

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P078.11 - Serotonin innervation of the ventral pallidum and nucleus accumbens is conserved among primates.

November 9, 2021, 11:00 AM - 12:00 PM

Virtual Only

Grant Support

NSF BCS-1846201

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Disclosures

H.N. Smith: None. **D.N. Jones:** None. **E. Munger:** None. **P.R. Hof:** None. **C.C. Sherwood:** None. **M. Raghanti:** None.

Abstract

Previously identified differences in serotonin innervation have been proposed to underlie differences in behavior, such as personality style and sociability. Contrasting serotonergic fiber densities have been found in the amygdala of chimpanzees versus bonobos, and humans and apes are known to have more serotonin than monkeys in the dorsal and medial caudate nucleus and dorsal putamen. Our present work builds on earlier results by examining serotonergic axon innervation density in the nucleus accumbens and ventral pallidum, two important nodes in the reward system. The present sample included humans (n = 6; NIH NeuroBioBank), pigtailed macaque monkeys (n = 5; National Primate Research Center, University of Washington), and capuchin monkeys (n = 6; Alpha Genesis). All individuals were adult and free of neuropathological alterations. Brain sections were immunohistochemically processed for serotonin transporter (SERT) (Millipore, MAB 5618), and stereological methods (SpaceBalls probe, MBF Bioscience) were used to quantify the length density of SERT-immunoreactive axons and neuron densities from adjacent Nissl-stained sections. Repeated measures ANOVA was used to evaluate differences of SERT-immunoreactive axon densities and neuron densities among species. The main effect of brain region was significant ($F_{1,2} = 12.25$, $p = 0.004$) with greater SERT innervation in ventral pallidum compared to the nucleus accumbens in all species. The main effect of species and the interaction of species x brain region were not significant. Based on these results, the serotonergic system in the nucleus accumbens and ventral pallidum appears to be evolutionarily conserved in the amount of innervation supplied to neurons among human and other anthropoid primates.