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**Program#/Poster#:** 289.4/MM20  
**Title:** Trace amine immunolabeling and motor patterning in the neonatal rat spinal cord  
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The trace amines (**TAs**), tyramine, tryptamine, b-phenylethylamine (**PEA**), and octopamine, are found in the mammalian CNS in low concentrations with uncertain physiological actions. Like the classic monoamine transmitters, their synthesis is via decarboxylation of the precursor aromatic amino acids (**AAAs**), tyrosine, tryptophan, and phenylalanine, by the enzyme aromatic-L-amino acid decarboxylase (**AADC**). Tyramine is further enzymatically converted by b-hydroxylase into octopamine. Metabolism of the TAs is primarily via monoamine oxidases (**MAOs**). Previously, we demonstrated that the TAs and AADC are present in the ventral horn, including motoneurons (**MNs**) and TAs can activate spinal locomotor-like activity (Gozal et al SfN 2006). Here, we examine factors contributing to immunoexpression of TAs in the spinal cord motor region and their actions on spinal motor patterns recorded in attached hindlimb muscles.

For immunolabeling studies, isolated neonatal rat spinal cords were maintained *in vitro* in artificial cerebrospinal fluid (**aCSF**) and the expression of TAs was compared to cords incubated in various factors which could putatively affect TA expression (e.g. AAAs, TAs, MAO inhibitors). We incubated in the AAAs and found increases in TA expression. Tyrosine incubation increased tyramine, tryptamine, and octopamine labeling, while tryptophan incubation primarily increased tryptamine labeling. Phenylalanine incubation was without overt effect. The TAs are metabolized by MAOs. Incubation in the MAO inhibitors, clorgyline and deprenyl, increased TA immunolabeling. Incubation of spinal cord in TAs also increased TA expression suggesting the presence of TA uptake mechanisms into neurons. Uptake was still observed in zero Na<sup>+</sup> suggesting a mechanism independent of the Na<sup>+</sup>-dependent monoamine transporters. Thus, our immunolabeling studies indicate that levels of TAs in spinal neurons can be altered by: (i) changes in precursor amino acids, (ii) exogenous TA sources, and (iii) TA degradation.

Electrophysiological studies were undertaken in the isolated spinal cord with hindlimbs attached and EMG electrodes were placed on hindlimb flexors and extensors. Applied alone, the TAs, tryptamine, tyramine, and octopamine, produced slight increases in motor activity, while in the presence of NMDA, rhythmic motor patterns in both extensors and flexors were observed including those consistent with locomotor activity. These observations further support the TAs as an intrinsic spinal cord modulatory system capable of facilitating spinal motor systems (Gieseke et al SfN 2004, Gozal et al SfN 2006).

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