ISOFLURANE ANESTHESIA INDUCES UPPER AIRWAY DYSFUNCTION IN YOUNG TAU-P301L MICE

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Introduction: The common volatile anesthetic isoflurane is suspected to hasten tauopathy and post-operative cognitive decline in Alzheimer’s Disease (Baranov et al., 2009).

Aim: Tau-P301L mice develop early cognitive deficits and late motor dysfunction with brain tauopathy (7-8 months). Tau-P301L mice die prematurely (8-12 months) following progressive upper airway dysfunction (Terwel et al., 2005 ; Dutschmann et al., 2010). Tauopathy is precipitated in young Tau-P301L mice by isoflurane anesthesia (Planel et al., 2009). Here, we examined effect of isoflurane on upper airway function and dysfunction in young Tau-P301L mice.

Methods: Double-chamber plethysmography of wild-type and transgenic Tau-P301L mice (age 4 months) for upper airway function prior to and after anesthesia (1.3% isoflurane / 30% O₂, 4 hours) (Planel et al., 2009).

Results: At age 4 months, the Tau-P301L mice showed normal upper airway function prior to anesthesia. The same mice analyzed 1 week following isoflurane anesthesia, showed reduced airflow despite a marked increase in the respiratory chest movements, attesting significant upper airway dysfunction. In Tau-P301L mice these deleterious effects of isoflurane on upper airway function were totally abolished by preventing anesthesia-induced hypoventilation with artificial ventilation. Interestingly, upper-airway dysfunction was only partially corrected by preventing anesthesia-induced hypothermia by warming the mice.

Conclusion: Isoflurane anesthesia prematurely induces upper airway dysfunction in spontaneously breathing, but not artificially ventilated, young Tau-P301L mice. The experimental data could have implications in the use of volatile anesthesia in patients suspected to suffer a primary or secondary tauopathy.