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MEETING ABSTRACT

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Region-specific differences in the activity of mitochondrial complexes I and II in the mouse brain

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Background: Mitochondrial dysfunction appears to be a common factor in neurodegenerative diseases. However, such diseases differ markedly in the nervous tissue affected.

Methods: To test potential differences in mitochondrial respiratory capacity of different brain tissues under physiological or pathological conditions, we established a protocol for the analysis of oxidative phosphorylation (OXPHOS) of small amounts of defined brain tissues of mice. This protocol enables us to measure independently the activities of complex I, complex II and complex IV (CI–IV, respectively), as well as the overall OXPHOS and electron-transfer system (ETS) capacity in a single run from as a little as 2 mg tissue applying the OROBOROS high-resolution respirometry system. The reproducibility within one experiment (2 parallels from the same tissue sample) as well as between experiments is very high.

Results: We observed significantly higher activities of CI in the motorcortex and of CII in the striatum when comparing motorcortex, striatum, hippocampus and brainstem obtained from healthy adult, male C57BL6/J mice. No differences were found for the ETS capacity itself and CIV activity (both, for oxygen consumption per mass and if normalized to the ETS capacity). Motorcortex and hippocampus differed in their OXPHOS capacity if normalized to the ETS capacity. We are currently performing additional experiments on healthy adult, female C57BL6/J mice to determine if the observed patterns of OXPHOS are sex-specific.

Discussion: The established protocol allows detailed analysis of mitochondrial function from small amounts of specific tissues. It thus enables comparison of different brain tissues implicated in neurodegenerative diseases of the healthy mouse and in disease models, leaving enough material for further studies on the tissues.

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