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CHANGES OF SATB2 IN THE CEREBRAL CORTEX OF SYRIAN HAMSTER DURING HIBERNATION

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INTRODUCTION

Satb2 is a Cut homeodomain protein and belongs to the homeobox gene superfamily which determines neuronal projections in the neonatal cortex and regulates synaptic plasticity/physiology in adulthood. Until now Satb2 has only been studied in the mouse, so we have analyzed the localization of Satb2 in the central nervous system (CNS) of the Syrian hamster *Mesocricetus auratus*. Likewise, the changes of Satb2 during hibernation have been investigated, because this species constitutes a facultative hibernating model. During most of hibernation the animal is in a state of torpor, a phase interspersed with brief periods of arousal where the animal has increased brain activity and a normal body temperature.

RESULTS

The expression of Satb2 in the Syrian hamster CNS is exclusive of neurons and mainly located in the cerebral cortex

Using immunohistochemical techniques we have determine that Satb2 expression is mainly in the cerebral cortex and in a more restricted way is expressed in several extracortical nuclei.

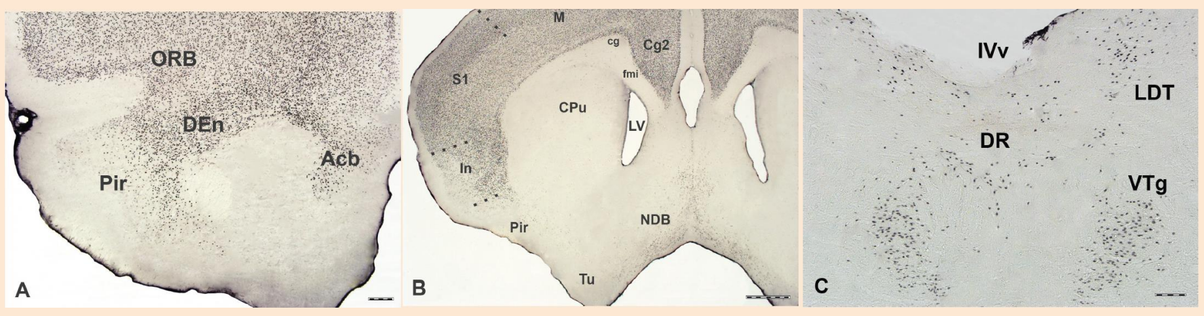


Figure 1. Examples of some extracortical nuclei with Satb2-immunoreactive neurons. **A**: Dorsal endopiriform nucleus (DEn), accumbens nucleus (Acb); **B**: nucleus of the diagonal band of Broca (NDB); **C**: Dorsal raphe nucleus (DR), lateral dorsal tegmental nucleus (LDT), ventral tegmental nucleus (VTg).

Double immunohistochemistry experiments with Satb2 and NeuN showed that Satb2 expression is exclusive of neurons.

The cortical immunoreactivity of Satb2 shows drastic variations between the different phases of hibernation

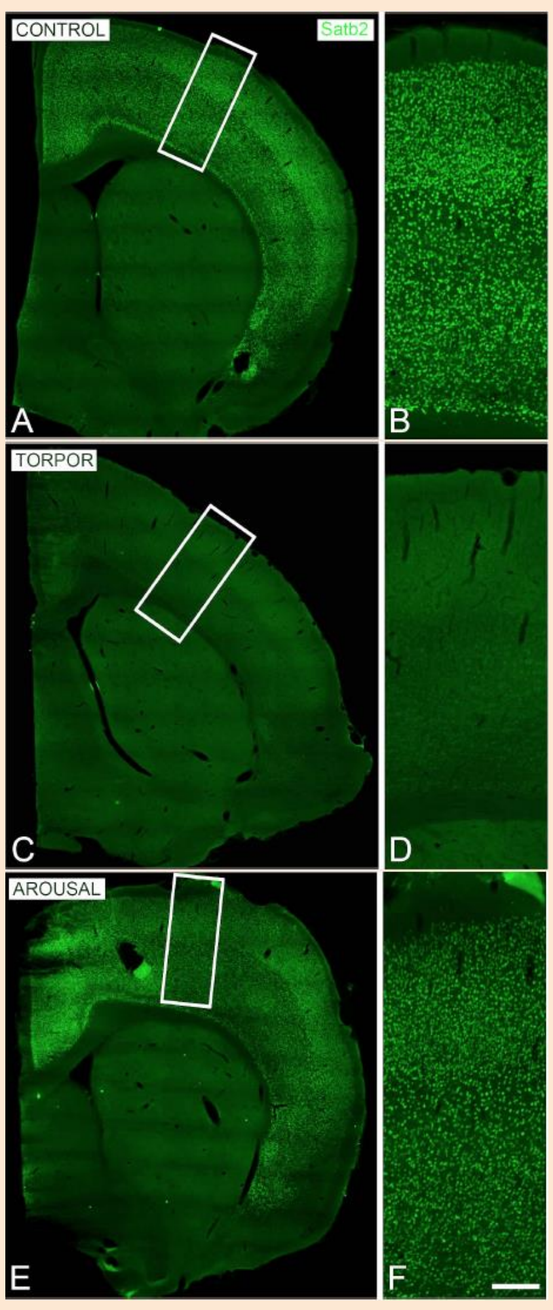


Figure 2 and 3. Fluorescence photomicrographs of *Mesocricetus auratus* neocortex illustrating the marked drop in Satb2 immunolabeling in torpor phase expression and partial recovery of levels in arousal phase.

Satb2 shows a redistribution in the nuclear labeling pattern

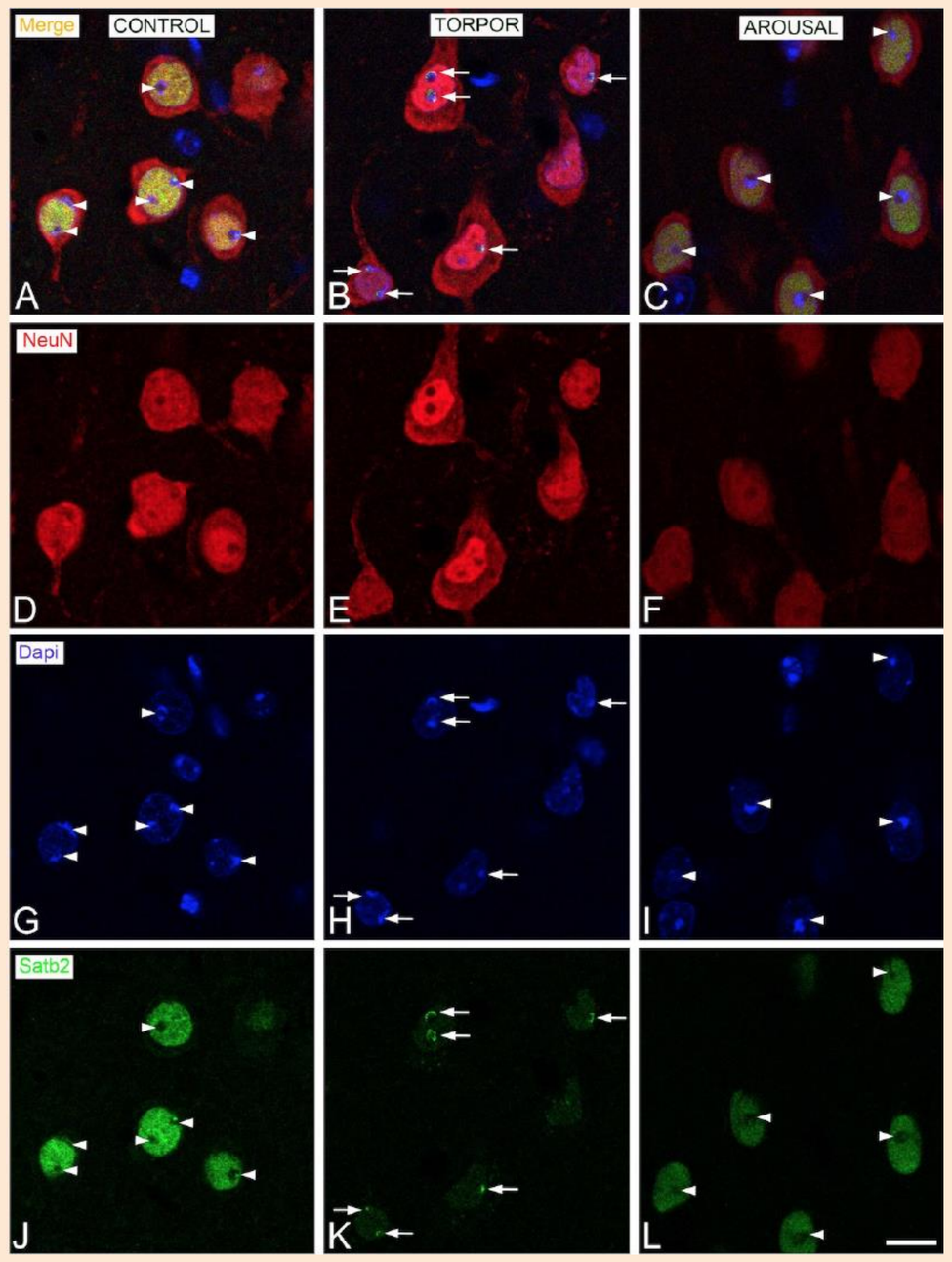
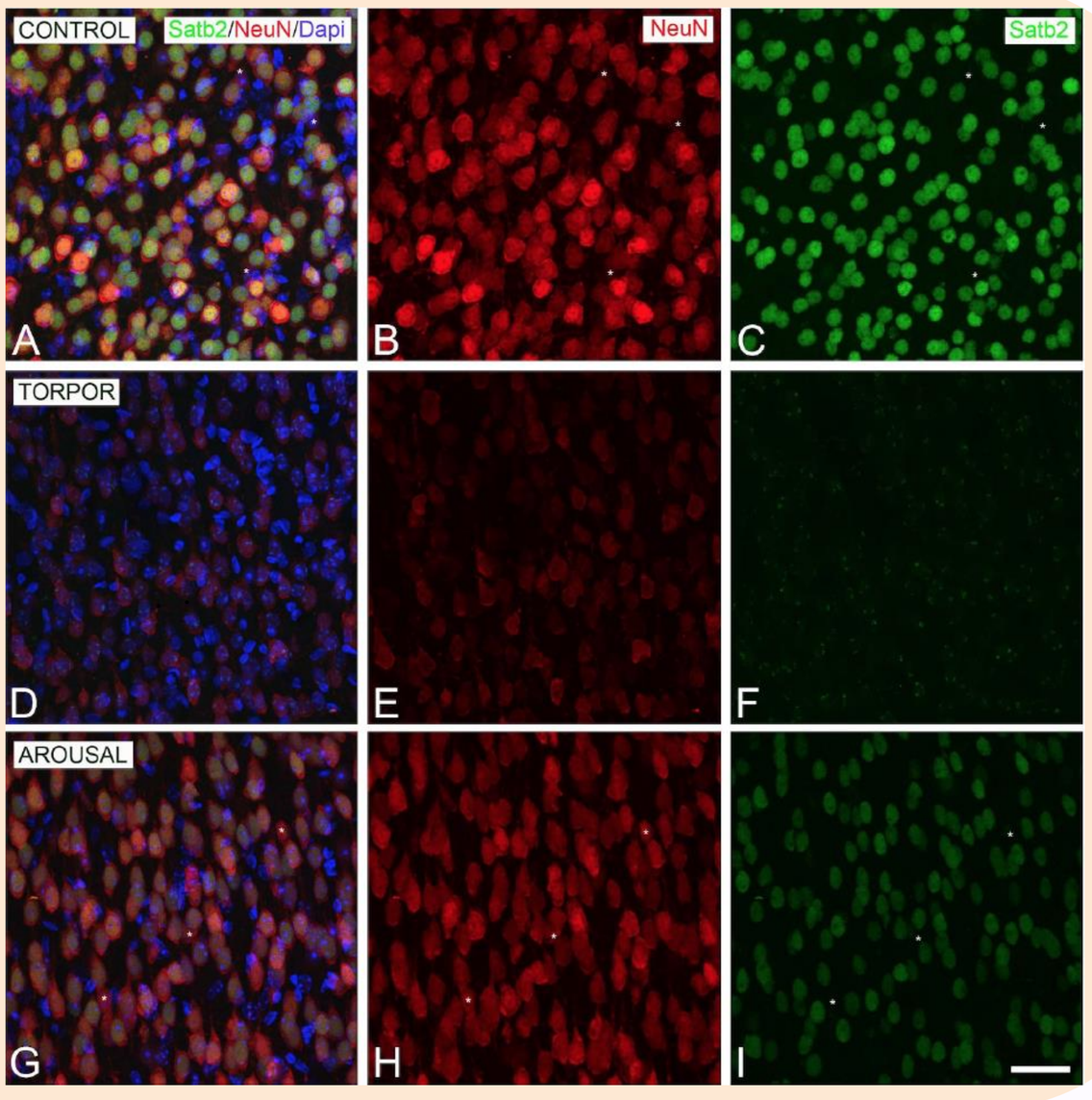


Figure 4. Fluorescence images showing Satb2 changing from a homogeneous nuclear distribution in non-hibernating and arousal phase animals to a distribution in form of aggregates in the torpor phase.



DISCUSION AND CONCLUSION

Satb2 shows variations in its cortical expression in the different phases of Syrian hamster hibernation in accordance with the activity of the animal, leaving the structures not related to the survival of the animal hypoactive in the torpor phase. In addition, in torpor phase the nuclear labeling of Satb2 forms aggregates that seem to be located around heterochromatin clusters suggesting that Satb2 could be inactivated by SUMOylation as it occurs in other cell types, a fact that could have a translation in pathologies associated with low energy and hypoxia as a therapy focused on Satb2 relocalization.

These changes in Satb2 immunolabeling suggest that Satb2 may be an important transcription factor that determines the change in gene expression between the different phases of *Mesocrietus auratus* hibernation.