

# **Molecular imaging of enhanced Na<sup>+</sup> expression in the liver of total sleep deprived rats by TOF-SIMS**

麥富德

**Chang HM;Chen BJ;Wu UI;Huang YL;Mai FD**

摘要.

## **Abstract**

Sleep disorder is associated with metabolic disturbances, which was related to oxidative stress and subsequently sodium overload. Since liver plays important roles in metabolic regulation, present study is aimed to determine whether hepatic sodium, together with oxidative stress, would significantly alter after total sleep deprivation (TSD). Sodium ion was investigated by time-of-flight secondary ion mass spectrometry (TOF-SIMS). Parameter for oxidative stress was examined by heat shock protein-25 (HSP-25) immunohistochemistry. TOF-SIMS spectrum indicated that hepatic Na<sup>+</sup>/K<sup>+</sup> ratio counting as  $82.41 \pm 9.5$  was obtained in normal rats. Sodium ions were distributed in hepatocytes with several aggregations. However, following TSD, the intensity for Na<sup>+</sup>/K<sup>+</sup> ratio was relatively increased ( $101.94 \pm 6.9$ ) and signals for sodium image were strongly expressed throughout hepatocytes without spatial localization. Quantitative analysis revealed that HSP-25 staining intensity is  $1.78 \pm 0.27$  in TSD rats, which was significantly higher than that of normal ones ( $0.68 \pm 0.15$ ). HSP-25 augmentation suggests that hepatocytes suffer from oxidative stress following TSD. Concerning oxidative stress induced sodium overload would impair metabolic function; enhanced hepatic sodium expression after TSD may be a major cause of TSD relevant metabolic diseases