

EFFECTS OF ACUTE AND CHRONIC NICOTINE EXPOSURE ON PLASMA NT 3 LEVELS

T. Michel^{1,2}, V. Kumari², A. Krüttgen³, J. Weis⁴, A. Nwaigwe², F. Schneider¹, S. Williams², U. Ettinger^{2,5}

¹Psychiatry, RWTH Aachen University, Aachen, Germany, ²Institute of Psychiatry, King's College London, London, UK, ³Dept. Neuropathology, ⁴Neuropathology, RWTH Aachen University, Aachen, ⁵Klinikum der Universität München Campus Innenstadt Klinik für Psychiatrie und Psychotherapie, Munich, Germany

A growing body of evidence suggests that synaptic plasticity is involved in addictive behaviour and nicotine dependence (ND). Neurotrophic factors, such as neurotrophin 3 (NT3) play a key role in modulating neuronal plasticity. Therefore, an association between nicotine, smoking and neurotrophic factors has been suggested. However, the role of NT3 in ND has not been thoroughly investigated in humans so far.

We investigated the influence of chronic (long-term smoking) and acute nicotine administration on the plasma level of NT3. We measured plasma NT3 levels at baseline and then 15 and 45 minutes after nicotine or placebo administration using an enzyme-linked-immunoabsorbent-assay (ELISA). Smokers showed higher NT3 level than non-smokers at baseline. Interestingly, 15 minutes after acute nicotine injection, plasma level of NT3 in both smokers and non-smokers decreased significantly and went back to baseline levels after 30 minutes. We found that plasma nicotine and NT3 levels were positively correlated in smokers at baseline.

There is a direct interaction of nicotine with NT3, which is different in acute and chronic exposure. Interestingly, the concentration of NT3 is correlated and up-regulated in smokers. We propose that neuroplasticity, which plays a role in addictive behaviour such as smoking or nicotine dependence (ND) might be mediated by these interactions of nicotine and NT3. We speculate that these might even play a part in the so called “self-medicating” with cigarettes that is often seen in patients with certain mental disorders.