Abstract

Neuroactive steroids are a group of steroid hormones which act non-genomically to influence the neuron excitability of neuronal synapses. Addictive substances can interfere with the synthesis of neuroactive steroids through many mechanisms, affecting their levels and changing their functionality. At the same time, neuroactive steroids play a role in the development of addiction, since their levels change during attempts to quit and therefore affect the success of treatments for addiction. This study focuses on the relationships between individual addictive substances and neuroactive steroids, the individual functional mechanisms and how they influence each other. It is generally known that addictive substances result in the release of anxiolytics that act on neuroactive steroids. This plays a role in the development of addiction. We also describe in detail the effect of smoking on steroid hormones and the endocrine system in general. Using tobacco addition as a model, we studied the relationship between addiction and neuroactive steroids.

As part of my doctoral studies we performed a prospective study that followed changes in the steroid spectra induced by smoking as well as when quitting smoking. We also developed a predictive model to predict the likelihood of success in treating tobacco addiction. It was shown that there is a lower level of androgen in male smokers, while female smokers have hyperandrogenemia. These changes were even more pronounced when quitting smoking. Levels of SHBG declined already in the first week of non-smoking and levels continued to remain lowered. This change did not correlate with changes in weight, so it is likely a direct effect of quitting smoking. Androgens also play a role in predicting the outcome of quitting smoking. Hyperandrogenemia negatively correlated with the success in quitting smoking in females. Lower levels of testosterone in males predisposed them to lower success in quitting smoking. Changes in steroid hormones were shown to be a promising marker for predicting success in overcoming addiction.