



# Changes of neuroactive steroids caused by quitting smoking

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## INTRODUCTION:

Chronic smoking can lead to an imbalance in endocrine homeostasis and to fertility disorders in both sexes. The male reproductive system is more resistant, with mainly a worsening spermiogram being described for smokers. The literature on the influence of smoking on steroid hormone levels in men largely inconsistent, and few data can be found regarding the effects of quitting smoking.

## METHODS:

This study included 76 male smokers aged 18-70 years who decided to quit smoking and sought medical assistance in the Tobacco Addiction Centre of the General Faculty Hospital, Prague. We analysed 26 men who successfully stopped smoking. Those who were not successful were not studied. Samples were taken during the period of smoking and then at 6, 12, 24, and 48 weeks after quitting. The steroid spectrum was analysed for all samples using GC-MS. Also measured were LH, FSH, SHBG using RIA, and basic anthropomorphic data. Repeated measures ANOVA was used for statistical analysis.

## RESULTS:

We analysed steroid levels in 26 men who successfully stopped smoking. There was a significantly increase in BMI in ex-smokers one year after quitting, and a statistically significant decrease in SHBG that decreased during the first 6 weeks of non-smoking and then was stable. Testosterone and some other androgens decreased continuously during the whole first year of non-smoking, as did FSH. However, changes in SHBG and testosterone were not correlated with BMI.

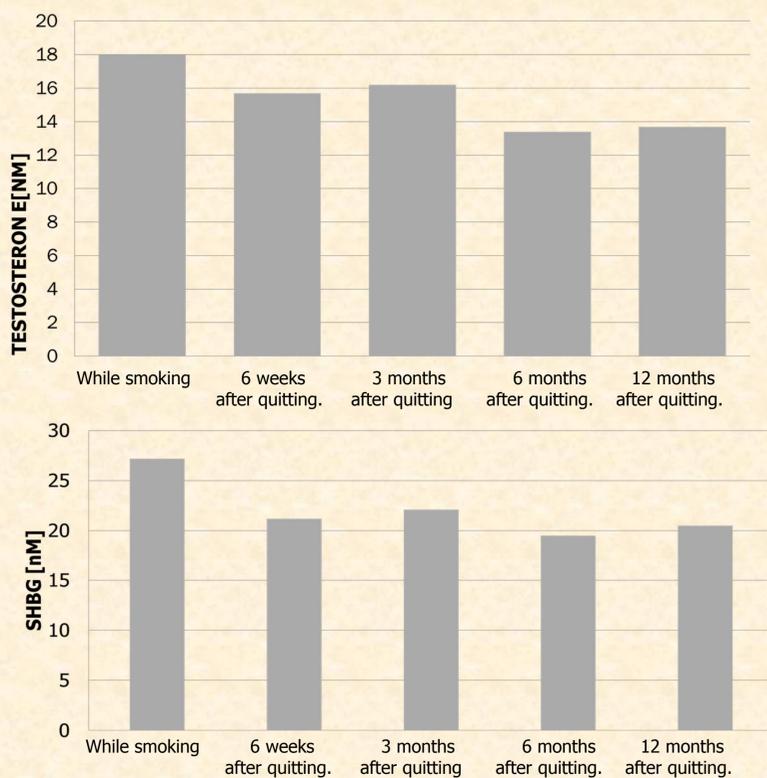


Table. Profile of parameters that significantly decrease continually after quitting smoking in males who successfully quit. Time period of measurement is 1 year. Values are given as medians and quartiles. Units: steroid hormones (nM), gonadotropins (U/l). Significance level  $P < 0.05$ .

Parameters measured	Time				
	While smoking	6 weeks after quitting	3 months after quitting	6 months after quitting	12 months after quitting
Pregnenolone sulphate	55.8 (39.9, 69)	56.6 (31.4, 61.3)	44.6 (22.4, 66.3)	52.6 (31.4, 63.2)	39.3 (27.9, 57.9)
20 $\alpha$ -Dihydropregnenolone	1.36 (0.644, 1.66)	1.46 (0.682, 2.24)	1.09 (0.604, 1.82)	0.639 (0.562, 1.52)	0.722 (0.475, 1.38)
16 $\alpha$ -Hydroxy-pregnenolone	0.402 (0.302, 0.52)	0.385 (0.285, 0.7)	0.365 (0.289, 0.415)	0.336 (0.265, 0.557)	0.277 (0.217, 0.437)
Allopregnanolone	0.306 (0.23, 0.345)	0.348 (0.217, 0.476)	0.274 (0.181, 0.418)	0.297 (0.196, 0.339)	0.277 (0.193, 0.353)
Isopregnanolone sulphate	4.05 (2.93, 4.99)	3.72 (3.13, 4.22)	3.89 (3.28, 5.26)	3.44 (2.47, 3.99)	2.76 (2.12, 3.5)
5-Androstene-3 $\beta$ ,17 $\beta$ -diol	2 (1.73, 3.13)	2.39 (1.29, 4.48)	1.96 (1.12, 2.82)	1.75 (1.26, 2.49)	1.74 (1.05, 2.19)
Testosterone	18 (13.4, 31.1)	15.7 (13.3, 18.5)	16.2 (11.8, 19.6)	13.4 (9.83, 16.6)	13.7 (10.8, 15.2)
Androsterone	0.653 (0.507, 0.725)	0.507 (0.406, 0.807)	0.573 (0.356, 0.764)	0.595 (0.398, 0.671)	0.493 (0.384, 0.647)
Androsterone sulphate	1470 (852, 1800)	1220 (1010, 1370)	1290 (540, 1860)	1150 (810, 1550)	1280 (705, 1690)
Epietiocholanolone sulphate	15 (6.21, 36.3)	14 (9.82, 19.8)	13.7 (8.13, 19.1)	12.4 (7.36, 26.3)	10.2 (7.41, 19.9)
5 $\alpha$ -Androstane-3 $\alpha$ ,17 $\beta$ -diol	0.281 (0.234, 0.436)	0.303 (0.235, 0.328)	0.266 (0.202, 0.363)	0.254 (0.193, 0.343)	0.224 (0.179, 0.296)
16 $\alpha$ -hydroxy-DHEA sulphate	17.6 (9.48, 33.9)	11.4 (7.41, 25.8)	13.2 (6.67, 20.3)	14 (10.6, 18.2)	11.9 (9.34, 18.3)
7 $\alpha$ -hydroxy-DHEA	0.855 (0.548, 1.12)	0.947 (0.564, 1.34)	0.596 (0.465, 1.06)	0.526 (0.452, 0.715)	0.543 (0.441, 0.744)
7 $\beta$ -hydroxy-DHEA	0.602 (0.299, 0.65)	0.549 (0.337, 0.968)	0.408 (0.246, 0.575)	0.302 (0.278, 0.454)	0.287 (0.251, 0.502)
LH	4.92 (3.46, 5.66)	4.52 (3.87, 5.36)	3 (2.28, 3.54)	3.47 (2.77, 4.57)	2.89 (2.29, 3.42)

## CONCLUSION:

While recovering from their smoking addiction, the males studied had a continual decrease in androgen levels. SHBG levels fall in the first weeks after quitting, and then stay lowered. The men also gained weight. Surprisingly, however, BMI was not correlated with SHBG levels, so it may be hypothesized that there is a direct influence from stopping smoking responsible. This is further evidence of the complex effects of smoking.

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