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U. MARECK-ENGELKE, H. GEYER, M. DONIKE:  
Stability of Steroid Profiles

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## Stability of Steroid Profiles

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In the present study the intraindividual variation i.e. the stability of ratios of endogenous steroids in male and female urine was investigated. In this study five male (age:  $\bar{x} = 33 \pm 4,9$  years) and five female subjects (age:  $\bar{x} = 33 \pm 3,5$  years) participated. Morning urine samples were collected for 30 days (men) respectively for one menstrual cycle (women). The urines were prepared according to the screening procedure of conjugated anabolic steroids and analyzed by GC/MS (1). The following steroid glucuronides were measured: androsterone (and), etiocholanolone (etio), testosterone (t), epitestosterone (epit),  $11\beta$ -OH-androsterone (OHa),  $11\beta$ -OH-etiocholanolone (OHe),  $5\alpha$ -androstane- $3\alpha,17\beta$ -diol (a-diol) and  $5\beta$ -androstane- $3\alpha,17\beta$ -diol (b-diol). The results of selected ratios of the endogenous steroids and their statistical evaluation are shown in Tables 1-4.

Following conclusions may be drawn:

- the steroid profile of men is more stable than that of women
- most stable parameter in all volunteers is the ratio androsterone/etiocholanolone
- the ratio testosterone/epitestosterone shows also little variation in men
- the instability of the ratio testosterone/epitestosterone in women may be due to:
  - a) concentrations are near by detection limit
  - b) frequently other endogenous substances like 11-ketosteroids are coeluted with testosterone and epitestosterone (extraction of the urine by n-pentane removed a part of these substances)

## References

- (1) Donike M., Geyer H., Gotzmann A., Kraft M., Mandel F., Nolteernsting E., Opfermann G., Sigmund G., Schänzer W. and Zimmermann J.: Dope Analysis. In: Official Proceedings of the International Athletic Foundation World Symposium on Doping in Sport. P. Bellotti, G. Benzi, A. Ljungqvist (Hrsg.). IAAF Florence (1988) 53-87.

Table 1: Stability of steroid profile (male urines): coefficient of variation (%) of some selected ratios (V1-V4 = Volunteer 1-4)

	V1	V2	V3	V4	V5
and/etio	10	9.8	6.5	11.2	10.6
t/epit	11.4	11	11	16.2	16
and/t	13.1	13.6	18	16.4	22
a-diol/b-diol	26	13.1	11.2	7.5	18.3
and/a-diol	15.2	18.6	16.1	16.2	24
and/b-diol	21	23	16.7	15.8	29
etio/a-diol	21	23	14.7	18.9	22
etio/b-diol	17.5	23	13.7	15.7	24
OHa/OHb	35	56	22	29	50

Table 2: Stability of steroid profile (male urines): statistics of some selected ratios (min = minimum value; max = maximum value; st. dev. = standard deviation; c.v. = coefficient of variation (%); V1-V4 = Volunteer 1-4)

	V1	V2	V3	V4	V5
<u>and/etio</u>					
min	1.24	1.00	0.93	1.08	1.07
max	1.99	1.42	1.20	1.75	1.76
mean	1.54	1.20	1.04	1.40	1.44
st.dev.	0.15	0.12	0.07	0.16	0.15
c.v. (%)	10	9.8	6.5	11.2	10.6
<u>t/epit</u>					
min	1.41	0.11	0.79	0.69	0.76
max	2.20	0.16	1.22	1.46	1.53
mean	1.82	0.13	0.91	0.90	1.04
st.dev.	0.21	0.01	0.10	0.15	0.17
c.v. (%)	11.4	11	11	16.2	16

Table 3: Stability of steroid profile (female urines): coefficient of variation (%) of some selected ratios (V1-V4 = Volunteer 1-4)

	V1	V2	V3	V4	V5
and/etio	12.4	10.6	12.3	15.9	15.3
t/epit	38.2	59	56	61	26.5
and/t	23.3	37.5	39.7	71	28.1
a-diol/b-diol	10.3	16.2	24.8	13.3	54
and/a-diol	18.4	29	34.9	10.9	18.2
and/b-diol	19.2	32.7	33.5	20.8	50
etio/a-diol	12.1	32.1	37.1	11.9	17.2
etio/b-diol	13	36.5	31.7	10.2	36.1
OHa/OHb	47	41.8	39.2	26.2	30.7

Table 4: Stability of steroid profile (female urines): statistics of some selected ratios (min = minimum value; max = maximum value; st. dev. = standard deviation; c.v. = coefficient of variation (%); V1-V4 = Volunteer 1-4)

	V1	V2	V3	V4	V5
<u>and/etio</u>					
min	0.83	1.09	0.59	0.54	0.51
max	1.29	1.84	0.99	0.95	0.94
mean	1.08	1.55	0.76	0.76	0.65
st.dev.	0.13	0.16	0.10	0.12	0.10
c.v. (%)	12.4	10.6	12.3	15.9	15.3
<u>t/epit</u>					
min	1.65	0.47	1.07	0.16	1.12
max	5.70	3.10	7.74	1.50	2.78
mean	3.07	1.07	2.35	0.65	1.71
st.dev.	1.17	0.63	1.31	0.40	0.45
c.v. (%)	38.2	59	56	61	26.5