Hormonal response to physical exercise

Codruta Lencu*,Teodora Alexescu**,Monica Lencu***,Carmen Georgescu*

* Department of Endocrinology, University of Medicine Cluj-Napoca, Romania
** 4th Medical Clinic, University of Medicine Cluj-Napoca, Romani
*** Medical Centrum“Interservisan”Cluj-Napoca, Romania

Hypothesis

Hormonal response to physical exercise is a field of wide interest, which depends on the nature, intensity and duration of exercise. The effects of aerobic/anaerobic physical exercise on the endocrine system were monitored.

Material and method

Material

- 60 young subjects (aged between 20-35 years)
- without associated chronic diseases
- with normal weight
- not under drugs treatment
- non smokers
- who followed a constant physical exercise program over the past year

Material

- group A (30) performed anaerobic exercise for 50 minutes:
  - running on the treadmill at a speed of 8 km/hour (20 minutes)
  - walking on the treadmill at a speed of 5km/hour (10 minutes)
  - running on the treadmill at a speed of 8 km/hour (20 minutes)
- group B (30) performed aerobic exercise for 50 minutes:
  - running on the treadmill at a speed of 15 km/hour (20 minutes)
  - walking on the treadmill at a speed of 5km/hour (10 minutes)
  - running on the treadmill at a speed of 15km/hour (20 minutes)

Method

All the studied subjects underwent the measurement of GH, PRL, cortisolemia, adrenaline, noradrenaline, insulinemia, estradiol, before exercise, at the end of exercise, at 1 hour, 6 hours and 24 hours after exercise.

Results

Changes in levels of hormones for group A (values are means)

Hormone	Pre-test	Immediately post-test	1 h post-test	6 h post-test	24 h post-test
GH	1,3 ng/ml	28,1ng/ml**	28,0 ng/ml**	9,7 ng/ml*	2,5 ng/ml
PRL	10 ng/ml	33,8 ng/ml**	11,9 ng/ml	11,0 ng/ml	10,8 ng/ml
Cortisol	220 nmol/l	571nmol/l*	550 nmol/l*	377 nmol/l	220 nmol/l
Adrenaline	70 pg/ml	140 pg/ml**	140 pg/ml**	110 pg/ml	98 pg/ml
Noradrenaline	102 pg/ml	244 pg/ml**	240 pg/ml**	201 pg/ml	191 pg/ml
Insuline	11µu/ml	7,1µu/ml*	7,1µu/ml*	7,8 µu/ml*	10 µu/ml
Estradiol	34,8 pg/ml	58,4 pg/ml**	54,1 pg/ml**	50,8 pg/ml**	47,1 pg/ml**

Significantly different from pre-test:
* p<0,05
** p < 0,01

Changes in levels of hormones for group B (values are means)

Hormone	Pre-test	Immediately post-test	1 h post-test	6 h post-test	24 h post-test
GH	1,7 ng/ml	20, 1ng/ml**	20, 1ng/ml**	10,8 ng/ml*	1,9 ng/ml
PRL	12 ng/ml	36,3 ng/ml**	12,7 ng/ml	12,5 ng/ml	12,1ng/ml
Cortisol	181 nmol/l	648 nmol/l*	571 nmol/l*	450nmol/l	188 nmol/l
Adrenaline	71 pg/ml	139 pg/ml**	139 pg/ml**	119 pg/ml	89 pg/ml
Noradrenaline	102 pg/ml	250 pg/ml**	250 pg/ml**	202 pg/ml	185 pg/ml
Insuline	14 µu/ml	8 µu/ml*	8 µu/ml*	9,7 µu/ml	10,7 µu/ml
Estradiol	40,6 pg/ml	65 pg/ml**	64,1 pg/ml**	61,7 pg/ml**	60,7 pg/ml**

Significantly different from pre-test:
* p<0,05
** p < 0,01

Conclusions

- During physical activity, a significant increase of GH in both groups occurred; the values remained high at one hour after exercise.
- PRL increased during physical training proportionally to the difficulty of training in all the studied women, and returned to its initial value after the cessation of training.
- Cortisol varied proportionally to the intensity of training.
- Physical exercise determined an increase of catecholamine secretion; the response was more marked for noradrenaline.
- During physical activity, we found a significant decrease of insulin in both groups of women.
- Estradiol secretion increased significantly in both groups of women; the values remained high at 24hours after cessation of physical training.
- The imbalance between energy consumption and the much higher energy expenditure causes the onset of neuroendocrine mechanisms of adaptation of the body to increased physical exercise.

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Codruta Lencu
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