SERUM IGF-I, IGFBP-3 AND ALS CONCENTRATIONS AND PHYSICAL PERFORMANCE IN YOUNG SWIMMERS DURING A TRAINING SEASON

Tourinho Filho, H.[1]; Pires, M[1]; Puggina, E.F.[1]; Papoti, M.[1]; Barbieri, R.[1]; Martinelli Jr, C.E.[2]

1-School of Physical Education and Sports of Ribeirao Preto, *USP, Ribeirão Preto, Brazil*

2-Department of Paediatrics - Ribeirão Preto Medical School, *USP, Ribeirão Preto, Brazil*

Introduction

- Physical activity is closely related to the anabolic function of the GH/ IGF-I axis; Basal IGF-I concentrations are positively correlated to muscle mass and physical aptitude in children, adolescents, and adults.
- Possible adverse effects of physical training during childhood and adolescence, such as stress and decreased growth velocity, seem to be unrelated to the type of activity performed but result instead from the intensity of training.
- Although there are many reports in the literature related to IGF system and exercises, few have studied the changes of anabolic and catabolic mediators throughout a training season .
- It has been suggested that the GH/IGF-I axis exhibits biphasic response during the training season with a catabolic phase characterized by a reduction in hormone concentrations followed by an anabolic phase characterized by an increase in hormone concentrations
- However, the IGF-I response to chronic training is not yet fully understood and this bi-phasic IGF-I response is speculative and has not been experimentally demonstrated. .

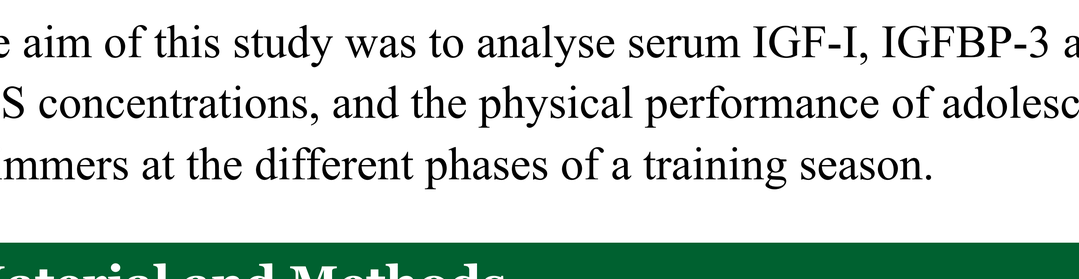
Aim

The aim of this study was to analyse serum IGF-I, IGFBP-3 and ALS concentrations, and the physical performance of adolescent swimmers at the different phases of a training season.

Material and Methods

- **Sample**: Nine male volunteer athletes aged between 16 and 19 years (18.2 ± 1.1) at puberty stage IV and V (Tanner).

- **Study Design**: Evaluation of the athletes took place thrice throughout the season: at the initial phase (extensive), intermediate phase (intensive) and at the end of the season (tapering). At each phase the athletes were evaluated at:
  - **Day 1**- anthropometric evaluation (body composition: % fat and lean body mass) and blood sampling before and after (pre x pro) a standardized training session;
  - **Day 2**- anaerobic fitness in tied swimming;
  - **Day 3**- aerobic endurance in freestyle swimming.



Assays: IGF-I, IGFBP-3 (Immulite 2000, Siemens, Los Angeles, CA, USA), and ALS (DSL, Diagnostic Systems Laboratories, USA) were determined by specific immunoassays using commercial kits.

Statistical analysis: Friedman and Wilcoxon non-parametric tests were used when appropriated. Analysis was performed using the software STATA version 12.0. Significance was considered at P≤0.05.

- Disclosure statement: there is nothing to disclosure

Results

The present study is the first to demonstrate a significant reduction in IGF-I concentrations during the intensive phase and a significant increase during the tapering phase.

Figure 1 enables the visualization, for the first time, of a catabolic and an anabolic phase of IGF-I during the season; a response that has been hypothesized by several authors as the "two phase theory".

Catabolic phase was characterized by reduction in IGF-I levels during the intensive stage (ΔIGF-I: -43±47ng/ml; $p<0.05$) while anabolic phase was marked by an increase in post-training IGF-I levels during the tapering stage following similar basal concentrations at the different stages of training (319±40, 298±36, 359±94ng/ml; $p<0.05$).

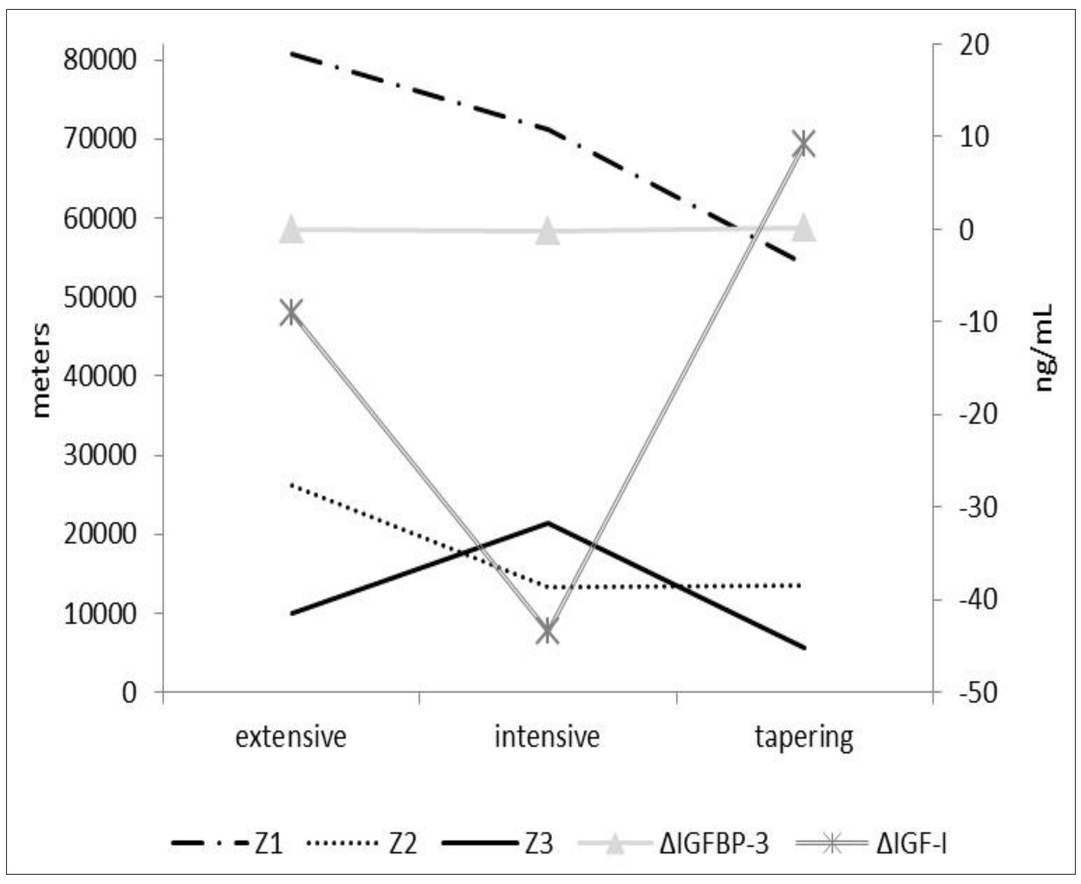


Figure 1– Peak Force, Average Force, anaerobic threshold, and the distribution of training loads (Z1, Z2 and Z3) throughout the season.

IGFBP-3 was sensitive to the chronic effects, with reduction in post-training serum levels during the intensive stage and an increase during the tapering stage (4.7±0.7, 4.6±0.4 and 5.0±0.7 mg/l; $p<0.05$). No difference was observed between pre-/post-training IGFBP-3 levels (ΔIGFBP-3) at the different stages.

ALS remained unchanged throughout the season.

Peak Force (25.0±6.3, 24.2±5.7 and 28.5±6.5N; $p<0.05$) and **Average Force** (10.3±3.6, 8.8±1.8 and 14.7±1.8N; $p<0.05$) followed IGF-I and IGFBP-3 variations, with a decrease during the intensive stage and an increase during the tapering stage ($p<0.05$).

Body composition and cardiorespiratory condition did not change throughout the season.

Conclusion

- Serum IGF-I concentrations proved sensitive to both the acute and chronic effects of exercise, while IGFBP-3 concentrations were only sensitive to the chronic effects.
- Thus, it can be suggested that these components of the GH/IGF-I axis may be used as important markers of the training condition of adolescent swimmers during their preparation throughout a season.

55ESPE 616--P1

Growth

Carlos Martinelli

DOI: 10.3252/pso.eu.55ESPE.2016

Poster presented at: ESPE 2016 PARIS