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## The Effect of time Training on Serum Immunoglobulin Alterations and Cortisol Testosterone Responses in Male Athlete Students

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**Abstract:** The purpose of this study was to examine the effect of incremental continuous running as well as a morning and evening training on changes in serum immunoglobulins including IgA, IgG, IgM and testosterone and cortisol responses. For this reason 28 male athletic students were purposefully selected and randomly divided into two groups. The participants trained according to an incremental continuous running program with a certain heart rate for two months (16 sessions). To determine the amount of serum immunoglobulins as well as cortisol and testosterone hormones, the participants' blood samples were taken twice, once 24 hours before the first training session and once 24 hours after the training session. The results showed that was not any significant difference between the two groups in the amounts of IgA, IgM, IgG serum in the pre-test and the post-test.

### Key words

Circadian rhythm, immunoglobulin, Cortisol, Testosterone, Continuous aerobic running.

IgA, IgM, IgG  
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/ ± / n= ) ( )  
: / ± / ( )  
IgA, IgM, IgG

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1 - Biological Clock  
2 - Chronobiology  
3 - Reilly

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*IgA*

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*IgA*

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- 1 - Klentrou
  - 2 - Nieman
  - 3 - Deschenes
  - 4 - Bird

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IgA

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IgA

IgA

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Vo2max

IgA

IgA

IgA

Ig

IgA, IgG, IgM

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1 - Dimitriou  
2 - Tzai

Vo2max

IgA, IgG, IgM

± / n = )

n = ) ( : / ± / /  
( : / ± / / ± /

IgA, IgG, IgM

Vo2max

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Vo2max

$$Vo_{2max} \text{ (mL.kg}^{-1} \cdot \text{min}^{-1}) = [0.0268(D)] - 11.3$$

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*Cortisol Im*

1841

*IgG, IgA, IgM*

ANOVA

(P = / )

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- 1 - Radio Immunoasay
  - 2 - Immunoturbidimetric Test
  - 3 - Scheffe

Vo2 <sub>max</sub> (ml.kg.min)	IgM (mg/dl)	IgA (mg/dl)	IgG (mg/dl)	(nnol/L)	(nmol/L)		
/ ± /	/ ± /	± /	/ ± /	/ ± /	/ ± /		
/ ± /	± / /	/ ± /	/ ± /	/ ± /	/ ± /		
/ ± /	± /	/ ± /	/ ± /	/ ± /	/ ± /		
/ ± /	/ ±	/ ± /	/ ± /	/ ± /	/ ± /		

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IgM (P = / ) IgA (P = / )  
(P = / ) IgG (P = / )

(P = / ) (P = / )

VO2max (P = / )  
(P = / )

*IgA, IgM, IgG*

*ANOVA*

P	F	
/	/	
/	/	
/	/	<b>IgA</b>
/	/	<b>IgM</b>
/	/	<b>IgG</b>

*IgM, IgG, IgA*

*IgA* ( )  
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*IgA*

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*IgA*

*IgA*

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