# CHANGES IN THE WHOLE-BODY BIOELECTRICAL IMPEDANCE VECTOR INDUCED BY TRAINING IN YOUNG ELITE SYNCHRONIZED SWIMMERS: PRELIMINARY RESULTS

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## Introduction and aim

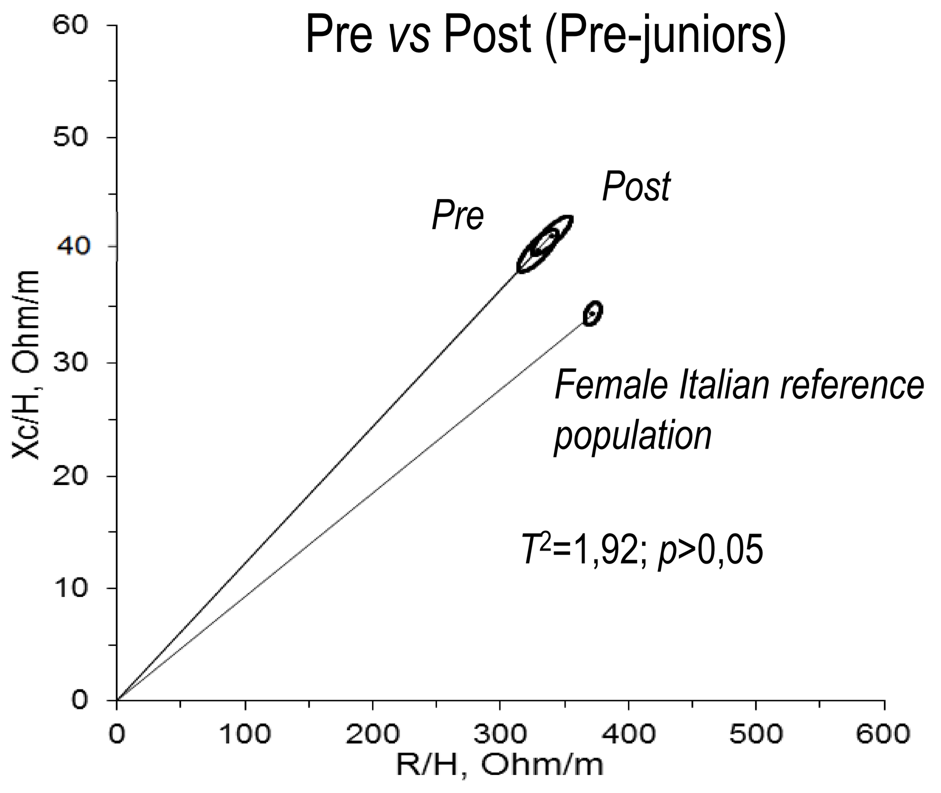
Synchronized swimming (SS) requires high-volume and high-intensity training that is assumed by young swimmers from an early age. A typical training session may include specific drills, choreography, and physical conditioning exercises, imposing complex physiological demands (Rodríguez-Zamora et al., 2012). Bioelectrical impedance vector analysis (BIVA) is a non-invasive and safe technique for assessing hydration and body composition changes (Lukaski & Piccoli, 2012). This study applied BIVA to the assessment of hydration changes evoked by training sessions in swimmers of different age and competitive level.

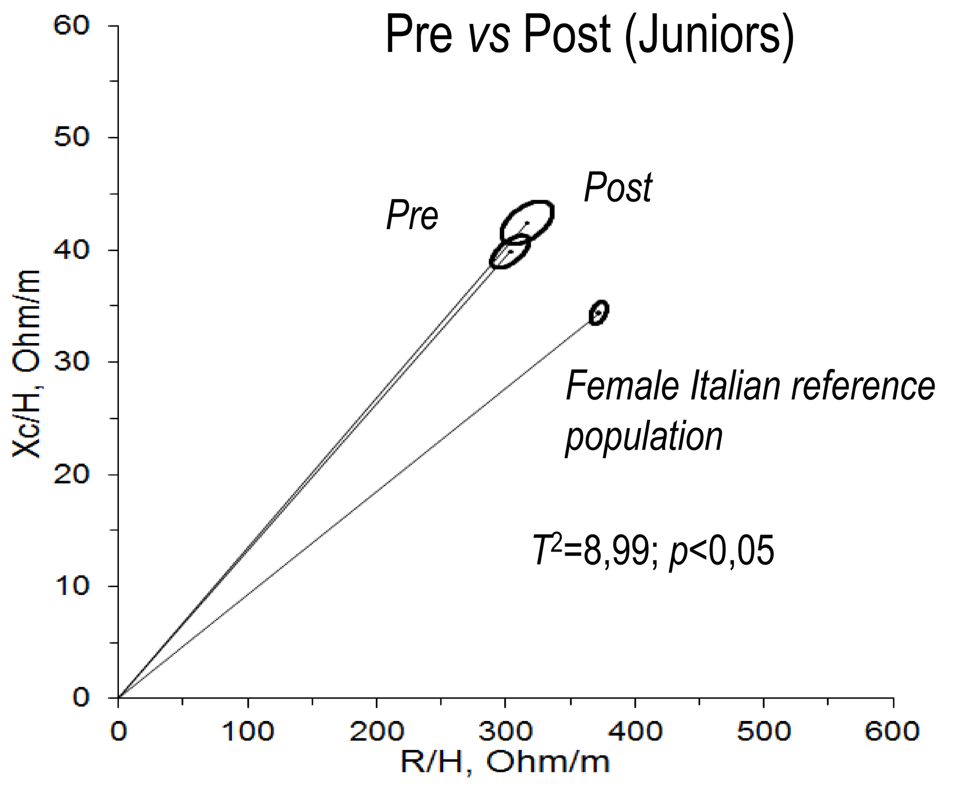
## Materials and methods

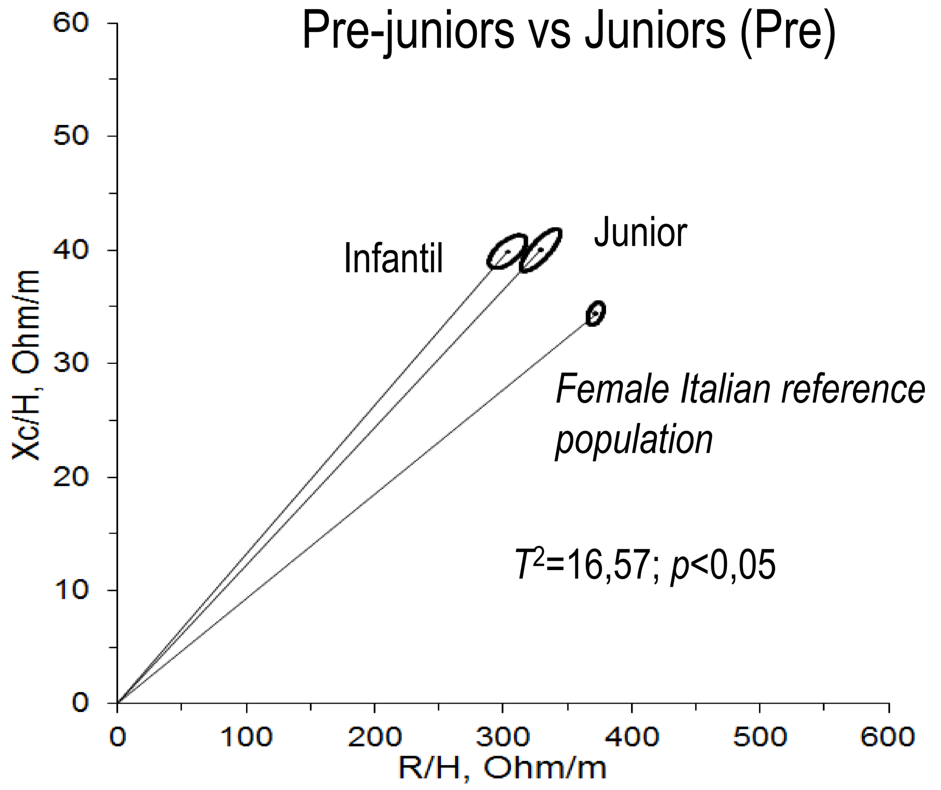
59 swimmers were divided into 1) pre-juniors (pre-JR): mean age 13.9 (SD 0.9) y, body mass (BM) 47.0 (7.2) kg, height 161.8 (8.2) cm, fat mass 15.1 (4.8 %BM, muscle mass 37.6 (5.0 %BM); and 2) juniors (JR): 16.7 (0.9) y, BM 53.7 (4.9) kg, height 165.8 (5.2) cm, fat mass 18.6 (2.6 %BM), muscle mass 38.8 (3.7 %BM). Anthropometric assessment (ISAK) and BIVA analysis were conducted PRE and POST a typical training session (p-JR 2.5 (0.1) h, JR 4.0 (0.2) h). A multi-frequency wrist-to-ankle BIA meter device (Z-Metrix®, BioparHom Co, France) was used and 50 kHz whole-body BIA vectors were analyzed by the resistance-reactance (R/Xc) graphic method, and Z mean values plotted (Piccoli et al., 1994). Hotelling's T2 test determined differences in the complex localized vector through the 95% confidence and tolerance intervals.

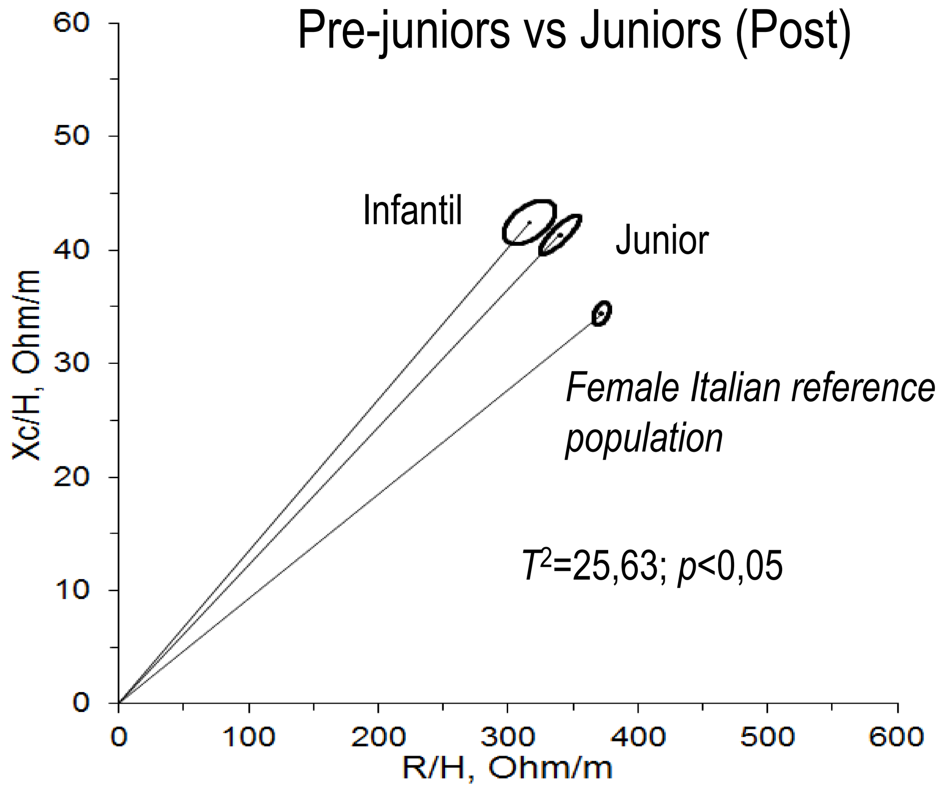
## Results

Changes ($p<0.005$) were observed between PRE and POST in BM (pre-JR: 47.0 (7.2) kg vs. 46.7 (7.3) kg; JR: 53.7 (4.9) kg vs. 53.4 (4.9) kg), R (pre-JR: 530 (46) Ω vs. 548 (45) Ω; JR: 503 (33) Ω vs. 524 (45) Ω), and Xc (pre-JR: 64.4 (5.4) Ω vs. 66.6 (4.8) Ω; JR: 66.0 (2.9) Ω vs. 70.3 (4.3) Ω). BIVA showed vector migration from PRE to POST ($T^2$=8.99; $p<0.05$) in JR, whereas no changes were found in pre-JR ($T^2$=1.92; $p>0.05$).




## Discussion and conclusions

Junior swimmers showed a migration of the BIA vector characterized by an increase in length (R) and a decrease in the dielectric mass of soft tissues (Xc), likely as a result of moderate dehydration.

In turn, pre-JR showed the maintenance of a good hydration status without significant bioelectrical changes.

These preliminary results should be considered by coaches, nutritionists and physicians in order to ensure adequate fluid intake during training in these young athletes.

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SYNCHRO project

## References

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Rodríguez-Zamora L, Iglesias X, Barrero A, Chaverri D, Erola P, Rodríguez, FA. (2012). PLoS One 7(11), e49098.

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