

**Blue**  
2005

BLUE 2005

Pisa, Italy, December 1-4, 2005



## human Behaviour and Limits in Underwater Environment

International Conference organised by:

CNR Institute of Clinical Physiology, Pisa - Italy  
Apnea Academy - Italy  
University of Chieti - Italy



**Abstract Book**

Congress organised by:

The Institute of Clinical Physiology, National Research Council - Italy  
Apnea Academy - Italy  
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## **Electromyographic evaluation of free divers wearing relaxing bite**

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Keywords: free diving, relaxing bite, emg

### **Research Objective**

The objective of the project was to detect possible variations of the masticator muscular tension in free divers wearing relaxing bite. The study was carried out by means of EMG evaluations performed before and after the use of the relaxing bite in order to verify its effectiveness in this specific sport.

### **Materials and Methods**

Four athletes were selected, two males and two females, of age between 23 and 39 with similar characteristics in terms of training typology and agonistic level. Upon obtaining the individual informed consensus, the anamnestic and clinic evaluations collected in a specific clinic folder, which consists of both an orthodontic part and of a gnathologic part, allowed to exclude the presence of TMD (temporomandibular disorders). Indeed, each athlete was analyzed to verify the absence of present and previous painful symptoms, the absence of pain upon palpation, the absence of functional limitation (as demonstrated by the correct ranges of opening, lateral excursion e protrusion), and the absence of joint (and even provoked) noises. Each athlete was successively examined by two roentgen ray sessions (OPT e TRX L.L.) and a series of intra and extra oral pictures were taken; moreover, studying models inserted into the articulator were realized. After an initial EMG exam, each athlete was given a bite to be worn only at night for the first three months (8 hours), and during night time and during training sessions for the following three months (more than 8 hours). In order to quantify the changes of masseter and temporalis muscles tension, two more sessions of surface EMG recordings were made during the period of use of the bite on a three monthly basis. Each session consisted of three registrations, two of them were associated with maximum voluntary contraction and in rest position respectively, while the third one was made in free diving condition for a maximum amount of time of two minutes for each individual. The latter exam allows to assess the impact of the hypoxia on the muscular condition (as it actually occurs during a sport performance) as well as to evaluate the impact of the relaxing bite on the

muscular condition in order to validate its use in this particular sport. The EMG exams consist of the application of four surface electrodes to the right and left anterior temporalis and masseter muscles upon a proper skin cleaning and the detection of muscular fibres. In order to standardize the procedure, before the registration of EMG potentials two pictures were taken to document the electrodes position. The EMG recordings were made according to the following scheme: in maximum voluntary contraction (the patient can breathe); in rest position (the patient can breathe); in free diving, emulation for a maximum amount of time of 2 minutes for each athlete. The second EMG recording (after three months of nightly bite application) and the third EMG recording (at the sixth month, after three months of bite application during night time and during sport trainings) were complemented with a fourth registration which was performed in apnea for a maximum amount of time of 2 minutes (as in the first test) while the athletics wearing the relaxing bite.

#### Conclusion

Despite the unavoidable limits of the investigation due to the small size of the sample considered (because of the difficulty of finding homogeneous free divers not affected by TMD), such exams will allow us to assess the variations of EMG potentials in free divers wearing relaxing bites during breath as well as during free diving dry runs. Moreover, the results will provide us a consistent starting point to understand whether the use of bites during sport activity may increase muscular relax in the cranium-facial district, thus inducing enhanced agonistic performance.