



## ENDLESS DIVING PROJECT: A CASE REPORT OF A PROLONGED IMMERSION

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### Introduction

The Endless Diving project, a scientific research born from an athletic gesture, is a multidisciplinary approach to the study of human factors exposed to an extraordinary environment: we've evaluated the physiological modifications that man could face during extreme conditions, and then completed studies concerning psychophysical endurance tests.

### Materials and methods

In September 2007, into the Siracusa (Sicily, South Italy) Marine Reserve open water (5 msw; 10-15 °C), an elite athlete (34 yo, 1.73 m, 98.3 kg) performed 32 H of continuous underwater scuba diving with just a simple semi-dry one piece wetsuit, and standard fittings for booties, gloves, fins. He was wide awake during the whole test and fed (liquids, fruits and carbohydrates) every 2 hours while breath-holding. HR and cutaneous and oral temperature were monitored every hour. Neurocognitive tests blood samples and postural stability evaluations in single and double stance were performed pre and post-dive so to assess the cognitive profile, platelets activation and postural changes.

### Results

We've registered: 34,000 liters as per total air consumption, 4 kg. as per weight loss, HR ≤ 128 bpm, and 34-36 °C as per temperature mean values, in a remarkable mental discipline of the subject. Postural stability post dive appeared to be impaired both in double and single stance, at least doubling the values of instability in all sensorial conditions (open eyes, closed eyes). While the main pre-dive postural stabilizer was the proprioceptive system, at post-dive examination the visual strategy had a more important rôle, supported by the vestibular system intervention (tab.1). Psychological profile study evicted a strong emotional control. In such a high-intensity prolonged activity, there're significant changes in both the neurocognitive and coagulative profile measures: an evident increase in fatigue index as per both physical involvement (tab.2) and cognitive one (tab.3).

Table 1: Postural stability

	%		
Double stance open eyes	0.40°	0.80°	+100.00
Double stance closed eyes	0.40°	0.90°	+125.00
Av. single stance open eyes	0.91°	2.30°	+152.70
Av. single stance closed eyes	2.56°	8.00°	+212.50

Table 2: Platelet activation

	Δ%		
CD42a (Anti-gpIX)	3.10	05.23	16.21
CD62	2.60	15.40	39.60
CD61 (Anti-gpIIIa, Anti-Integrin β3)	1.80	42.30	78.20
CD41a	4.30	10.60	46.50



Table 3: CNS vital signs

Domain scores	Pre dive	Post dive
Neurocognition Index (NCI)	85	62
Memory	116	90
Psychomotor Speed	84	78
Reaction Time	86	60
Complex Attention	70	34
Cognitive Flexibility	68	49

### Conclusions

The real 'mission' here will be to assemble all data collected, so to be able to get an increased safety during subaquatic activities and also to be allowed to facilitate prolonged underwater permanence for professional divers.



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