# An Improvement of Sympathovagal Balance after Hypoxia Exposition before a Physical Activity Program for Obese Patients

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## Background

It is known that obesity is often correlated with a low cardiac variability. This is characterized by an altered mood state, chronic fatigue and sleep disorders, all of these lowering the quality of life. Moreover, this condition is linked to an increased cardio-vascular risk amongst obese patients.

## Objective

To assess whether a passive exposition to hypoxia could be related to a modification in the sympathovagal balance (LF/HF) of obese patients.

## Methods

8 patients followed a protocol were the cardiac variability was measured 1 day before (S1), 1 hour after (S2) and 24 hours after (S3) a 1 hour passive exposition to hypoxia maintaining a lying position. A normobaric hypoxic system (Metab Clean, **Figure 1**) was used to maintain blood oxygen saturation between 70 and 75 % (**Figure 2**):

**Figure 1: Normobaric hypoxic system (Metab Clean)**

**Figure 2: Correspondence between altitude and $SaO_2$**

| Patient | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| $SaO_2$ (%) | 73 | 72 | 75 | 71 | 75 | 72 | 73 | 70 |
| Altitude (m) | 3200 | 3800 | 4200 | 3900 | 4600 | 3300 | 3500 | 4000 |

**Questionnaire:** Total of 3 group questions (scale from 1 to 10), relating to

— Stress
— Fitness and Wellness
— Sleep

**Statistical analysis:**

Student *t*-test was used to compare data in experimental conditions S1, S2 and S3
*P* value ≤ 0.05 was considered as significant

## Results

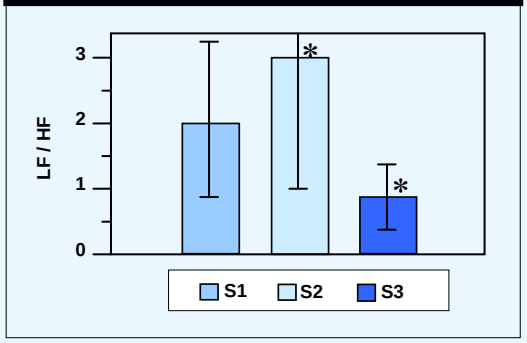
The results show that the sympathovagal balance of the patients was significantly increased from S1 to S2 and significantly decreased from S1 to S3 (**Figure 3**):

**Figure 3: Sympathovagal balance modifications**

| Sympathovagal balance (mean ± SD) | | | |
|---|---|---|---|
| **S1** | **S2** | **S3** | ***P*-value** |
| 2.0 ± 1.2 | 3.0 ± 2.1* | 0.8 ± 0.5* | <0.05 |
| * Significantly different to S1 | | | |

A significant increase was noted in HF (vagal activity) from S1 (33.2 % ± 12.1 %) to S3 (54.6 % ± 19.8 %) ($p<0.01$) (see **Figure 4**).

**Figure 4: Sympathovagal balance modifications**




Patients estimate that they are less stressed in S2 and S3 compared to S1 (**Figure 5**).

**Figure 5: Patient's stress assessment**

| Stress score (1 to 10) (mean ± SD) | | | |
|---|---|---|---|
| **S1** | **S2** | **S3** | ***P*-value** |
| 7.5 ± 2.1 | 6.1 ± 1.5* | 4.5 ± 1.8* | <0.01 |
| * Significantly different to S1 | | | |

## Conclusions

- a passive hypoxia exposition is leading to an improvement in the sympathovagal balance at 24 hours.
- This approach could allow obese patients to walk out from the chronic fatigue and altered state, which seem essential before starting a physical activity training program.

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