

# University of Toronto Research Group

## Respiratory Muscle Power Before and After Training

Following is a copy of a chart that demonstrates the change in actual muscle power achieved with PowerLung training. This chart is the result of a study recently completed by University of Toronto Respiratory Research Group using elite, international swimmers.

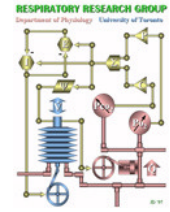
Please note the following as you review the study.

1. Inspiratory pressure is always reflected in negative numbers because it is a vacuum. The greater the negative the greater the value. Expiratory pressure is always reflected in positive numbers and again, the higher the number the greater the value.
2. This study was performed on elite swimmers who compete at the international level. Swimmers were chosen because they represent a group of individuals who traditionally have the most highly developed respiratory system and muscles due to the breathing requirements of the sport.
3. The study took place over a 12-week period.
4. This chart represents the changes in actual power of the muscles as measured in watts.
5. The measurements were taken during a 4.5-minute critical power test.
6. Inhale: Comparing the results of the Critical Power Pre-Training and Post Training results shows a 300% improvement in the power of the muscles to inhale at the end of the 4.5 minute test. It is interesting to note the Post training 4.5-minute test reading was almost the same as the Pre-training start of test reading. After training with PowerLung, the athlete's inhale muscles showed only slightly less power at the end of the critical power test than they were at the beginning of the same test before training with PowerLung. That translates into the fact that after training with PowerLung the inhale muscles had almost the same strength at the end of the 4.5 minute tests as they had at the start of the test before training with PowerLung.
7. Exhale: Comparing the results of the Critical Power Pre-Training and Post Training results shows a 233% improvement in the power of the muscles to exhale at the end of the 4.5 minute test. It is interesting to note the Post training 4.5-minute test reading was slightly above the Pre-training start of test reading. After training with PowerLung, the athlete's exhale muscles were slightly stronger at the end of the critical power test than they were at the beginning of the same test before training with PowerLung. That translates into the fact that after training with PowerLung the exhale muscles had almost the same strength at the end of the 4.5 minute tests as they had at the start of the test before training with PowerLung.

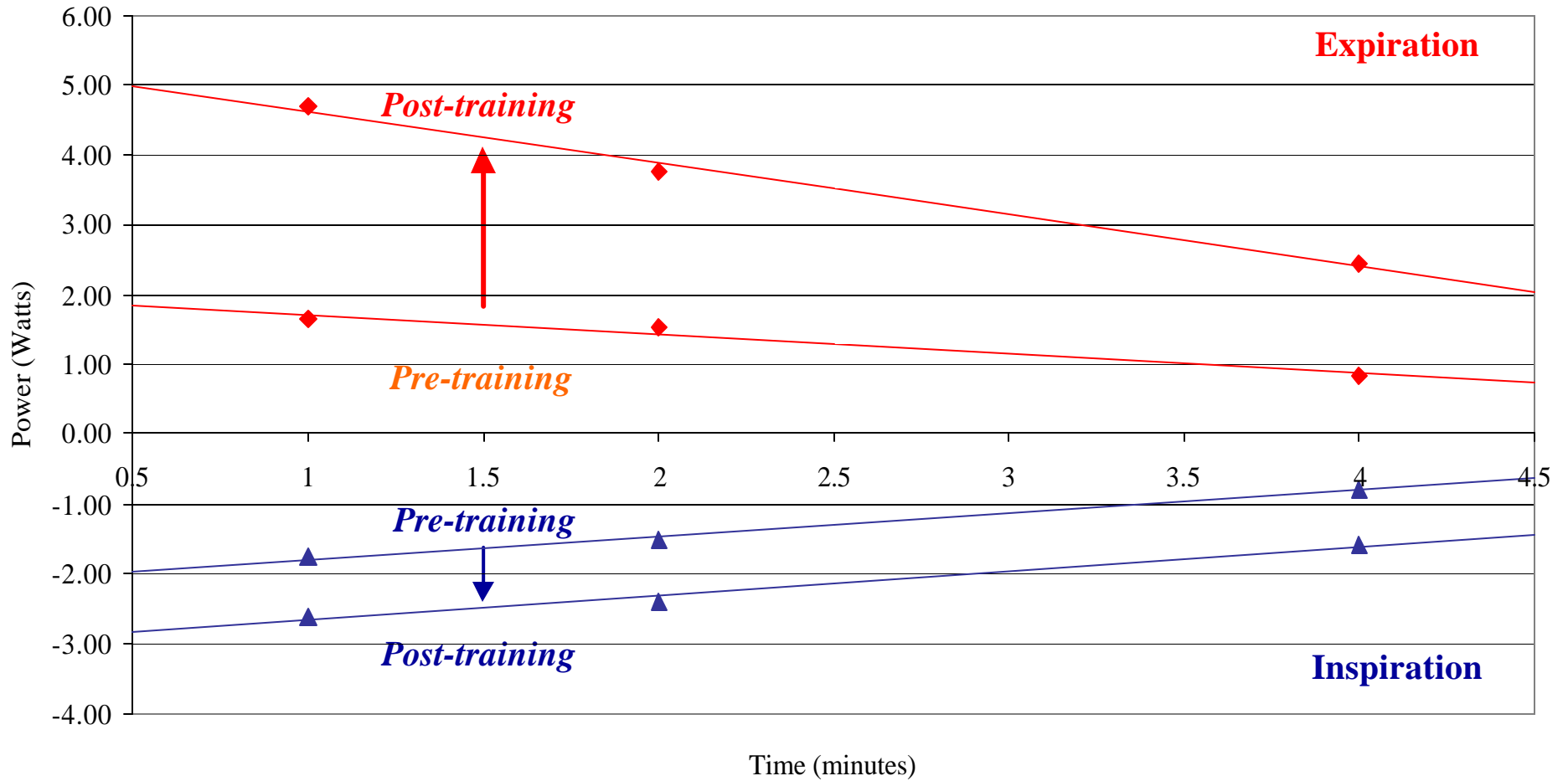
Again, it is significant to note that only the slightest changes, if any were anticipated in these users due to the advanced development of their respiratory systems. With that in mind, any change is therefore significant and to see this level of change is truly significant. It also further validates the value of training the exhale muscles.



# University of Toronto Respiratory Research Group



## Respiratory Muscle Power Before and After Training



Results for typical high performance athlete (swimmer) before and after 12 weeks of Power Lung training

Training consisted of 60 reps / day at 60-90% of Pmax , 6 days / week