

# Breathing Problems Underwater Are Common In The Compressed Gas Divers, A Retrospective Study.

Robert W. Sanders, MD, FACEP<sup>1</sup>, Louise H. Anderson, PhD FSA<sup>2</sup>, Thomas Rublein, BA<sup>3</sup>

<sup>1</sup>American Hyperbaric Centers, Inc., Anchorage, AK. <sup>2</sup>Technomics Research, Minneapolis, MN. <sup>3</sup>TR Healthcare Services, Minneapolis, MN.

## Introduction / Background

Immersion Pulmonary Edema (IPE) is a poorly understood and potentially fatal malady that affects swimmers, divers, men and women. The one ubiquitous symptom that these patients experience is difficulty breathing. This study was designed to determine the frequency of breathing problems in a group of experienced divers.

## Materials and Methods

Attendees at a regional diver’s education meeting were asked to complete a 19 question questionnaire about the frequency of breathing problems experienced underwater, their diving experience, usual diving environment, age and gender. The data was compiled and analyzed using Chi-squared and analysis of variance (ANOVA) where indicated.

## Results

- 32% of attendees completed the forms
  - 19%** of respondents reported **at least one episode of difficulty breathing** underwater.
  - 6% of attendees** (“intention to treat model”) reported difficulty
  - 62% of those affected reported more than one incidence of breathing problems.
- 
- The two groups *did not* differ in terms of
    - age (p=0.11)
    - experience (p=0.31),
    - deepest dive depth (p=0.15).
  - There was evidence that divers who experience breathing difficulty:
    - Have greater usual depth than divers without difficulty (average usual depth 78 fsw vs. 60 fsw p=.052)
    - Those who reported using rental regulators had a higher rate of breathing problems than those who owned their gear (p=0.05),
    - A trend that women had a lower incidence of breathing problems than men (p=0.08),
    - Although their deepest dive was shallower than their male counterparts (123 fsw vs. 176 fsw p=.017).

## Summary / Conclusions

The scope of this study was *not* to identify and diagnose cases of Immersion Pulmonary Edema; it is understood that not all breathing problems are IPE. However, the fact that 19% of respondents (6% of paid attendees) have experienced breathing problems underwater is significant. While equipment problems are often “blamed” for breathing problems, 95% of respondents who own regulators have them serviced at regular intervals, making this a less likely cause. If this study can be validated, then further investigation into (and the contribution of resources towards) this topic and IPE is clearly warranted.

## Implications for Future Research

These data *are* significant. The next step is to validate this research with a different diver population (i.e. another regional group with a different focus). If similar results are found then an expanded questionnaire would be developed with the hopes of identifying significant factors in the cause of breathing difficulties and possibly find diagnostic criteria that can be applied retrospectively to separate out those divers who suffered IPE, and try to understand the causes of breathing problems in the others.

On average, how deep is your usual dive? \_\_\_\_\_ Ft      What was your deepest dive \_\_\_\_\_ Ft

On average what is your typical bottom time? \_\_\_\_\_ Min

Do you: Own your regulator \_\_\_\_\_ or Rent your regulator \_\_\_\_\_

If you use your own regulator how often do you have it serviced? Annually \_\_\_\_\_ Every 3-5 years \_\_\_\_\_ Never \_\_\_\_\_ Don't recall \_\_\_\_\_

Have you ever experienced difficulty breathing while underwater? Yes \_\_\_\_\_ No \_\_\_\_\_ Don't recall \_\_\_\_\_

If YES, how many times: Once \_\_\_\_\_ 2-5 times \_\_\_\_\_ More than 5 \_\_\_\_\_

When this happens do you feel like you have to cough on the way to, or when you get to the surface? Yes \_\_\_\_\_ No \_\_\_\_\_

Would you describe your self as Physically Fit or in-shape: No \_\_\_\_\_ Yes \_\_\_\_\_

How many years have you been diving: Less than 1 year \_\_\_\_\_ 2-5 years \_\_\_\_\_ 5-10 years \_\_\_\_\_ More than 10 Years \_\_\_\_\_

How many dives have you made (lifetime): 1-10 \_\_\_\_\_ 11-50 \_\_\_\_\_ 51-100 \_\_\_\_\_ 100-250 \_\_\_\_\_ more than 250 \_\_\_\_\_

Are you a: Recreational Diver \_\_\_\_\_ Technical Diver \_\_\_\_\_ Commercial Diver \_\_\_\_\_

Do you have Specialty Certifications: No \_\_\_\_\_ Yes \_\_\_\_\_ If yes, list up to 3 \_\_\_\_\_

In which do you dive more: Cold Water: Fresh water/inland lakes \_\_\_\_\_ Salt Water: North Atlantic/Pacific \_\_\_\_\_

Warm Water: Caribbean/Gulf/Atlantic/Pacific \_\_\_\_\_

Do you primarily wear: a dry suit \_\_\_\_\_ wetsuit \_\_\_\_\_ T-shirt & shorts \_\_\_\_\_

Are you are familiar with the following terms:

DCI: Yes \_\_\_\_\_ No \_\_\_\_\_ IPE: Yes \_\_\_\_\_ No \_\_\_\_\_ Immersion Pulmonary Edema: Yes \_\_\_\_\_ No \_\_\_\_\_

Are you: Male \_\_\_\_\_ Female \_\_\_\_\_ Age: Under 18 \_\_\_\_\_ 18-45 \_\_\_\_\_ 45-60 \_\_\_\_\_ 61+ \_\_\_\_\_ Prefer not to answer \_\_\_\_\_