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# How We Mess Up

## *Almost no one gets it right*

Failure to check the pressure gauge — even at the beginning of the dive — is an error commonly made by divers. Since this is hardly mentioned in accident data, we studied the thoroughness of the pre-dive check.

Fifty-five divers selected at random at an annual dive exhibition were asked to perform their normal pre-dive check on diving equipment (buoyancy compensator, tank, regulator with octopus, pressure gauge, and depth gauge). The equipment had been doctored to represent nine common equipment faults. No information was given on the number of faults and there was no

time limit. The diver's qualifications were not asked for. The time to complete the check varied

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### The Faults

#### **Air Supply & Regulator Problems**

Empty tank  
Air supply not switched on  
Tape on pillar valve  
Regulator mouthpiece torn

#### **Buoyancy Jacket Problems**

Power inflator not connected  
Inflator hose mouthpiece toward base  
Emergency dump valve jammed  
Tank loose in BC harness

#### **Depth Gauge Problems**

Maximum depth indicator not zeroed

from 2 to 10 minutes, the average being 5 minutes. We suspect that this is considerably longer than the time most divers spend on an onsite pre-dive check.

Two of the divers identified all the faults; four detected eight faults. Four divers, however, failed to detect any faults, including an empty tank and a faulty BC dump valve. Only eight divers identified all the buoyancy jacket's faults. Twenty-three divers found all the air-supply faults, but only four of these noticed the torn regulator mouthpiece.

We conducted a similar study on the same equipment with only four engineered faults. Forty-six (4 percent of the divers) failed to detect all four faults. Just over 50 percent of the divemasters and dive instructors identified all four.

Both studies showed that the divers tested did not perform a thorough pre-dive check. ■

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# Pregnancy and Diving

## *No definitive evidence, but take care*

Pregnant women are told not to dive because they risk injury to the fetus. Nonetheless, some continue to dive. Others, usually in their first trimester, are unaware they are carrying a child.

Caroline Fife, M.D., and William Fife, Ph.D., who have been studying the issue for many years, wrote recently of two women who reported that their obstetricians recommended abortion following diving during the first trimester. The recommendations were based on a single, well-publicized 1982 case

of an infant who was born with "multiple dysmorphic features," including a short neck. The mother had made 20 dives in 15 days during the first trimester, to a maximum depth of 110 feet.

It is unclear, say the authors, whether diving caused these defects. In fact, they find "no case in which abnormal fetal development can conclusively be attributed to diving. Nor is there a clear pattern of increased fetal abnormalities among diving mothers.

"If compressed air diving represents a risk for the human fe-

tus," they continue, "the risk of fetal injury is probably linked to a variety of factors, including gestational age, maternal fitness, maternal age, dive profile, dive frequency, hydration state, and many other, perhaps unknown, factors.

"It is therefore impossible to make recommendations as to whether there is a gestational period in which diving is safe. However, although diving may be a risk, the odds are still in favor of a normal infant, and pregnancy termination due to a history of diving would seem an extreme measure."

The authors do report pregnancy-related complications among women divers. In one study, two spontaneous fetal losses occurred, including one first-trimester fetal demise after two dives to 60 feet.

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Physiological changes associated with pregnancy may increase the maternal risk of DCS. The authors say that increased body fluid “may alter gas exchange and the kinetics of nitrogen elimination. An increase in body fat could theoretically increase the risk of decompression illness due to the greater solubility of nitrogen in fat as compared to muscle.

“However, factors which contribute to the development of DCI are sufficiently complex, and the tables sufficiently conservative, as to make these alterations of minimal consequence to the mother.”

Should a pregnant woman get bent, they say, she should be treated by recompression therapy the same as any nonpregnant diver. Many pregnant women have been given chamber treatments and there have been no reports of effects on the fetus.

Having reviewed all available data, the authors derive these conclusions:

1. There are no conclusive data linking human birth defects to maternal diving.
2. The human fetus probably is at greater risk of injury than the diving mother. The potential risk consists primarily of injury secondary to arterialized intravascular bubbles.
3. There is insufficient experimental evidence to establish safe depth and time profiles for the pregnant woman.
4. The pregnant woman who chooses to dive should be informed that potential fetal risk probably increases as the decompression limits are approached and perhaps as pregnancy progresses.
5. Women who discover after diving that they are pregnant should not be counseled to

terminate the pregnancy solely on the basis of diving exposure.

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## **Two women who reported that their obstetricians recommended abortion following diving during the first trimester.**

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6. Until further data are available, women who know or think they are pregnant are advised

not to dive, just as they are advised against alcohol intake, radiation exposure, smoking, and other environmental factors that may increase the risk of fetal injury.

*Caroline Fife is the Director of the Hermann Center for Hyperbaric Medicine, Hermann Hospital, Houston. William P. Fife is Professor of Hyperbaric Medicine at Texas A&M, Houston. You may request a reprint of the article, which appeared in the Journal of Travel Medicine, Vol. 1, No. 3, by contacting Caroline E. Fife, M.D., Department of Anesthesiology, 6431 Fannin, MSB 5.929, University of Texas at Houston, Houston, Texas 77030. ■*

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*The following is adapted from a report by Dr. Carl Edmonds of the South Pacific Underwater Medicine Society.*

## ***Bent by a Sponge?***

A 42-year-old man on his first independent dive after certification was joined by his equally inexperienced buddy. They dived to 75 feet. Twenty-two minutes into the dive, he and his buddy both realized that they were low on air — the pressure gauge was “somewhere in the colored section and it might have been one-something-or-other.”

They ascended rapidly, through a bevy of bubbles, omitting a safety stop on the grounds that they would have drowned had they stayed there. The swim back to the boat was strenuous, against a strong current.

The following morning he awoke with a numbness and tingling “like a freeze burn” on one finger of the right hand, which later spread to all the fingers of that hand. Over the next few days it got worse, with significant tingling and pain.

Presuming he had decompression sickness, other physicians referred him to me on the sixth day following the dive. The symptoms had lessened, but they had spread to the left hand. There were no abnormalities on neurological testing.

We had to decide whether to recompress him, even though he was presented six days after the incident. Then he told me what he had not told the other physicians.

During the dive, which was done without gloves, he said, he clutched at a large orange sponge to hold himself down, but it broke off in his hand. He made a feeble attempt at grabbing it with his left hand as he floated up.

Final diagnosis: sponge injury. His symptoms disappeared two days later. He has decided to take a course on buoyancy control and to wear gloves.