however, this is impractical for the majority of prosectors. It is important to dissect carefully so that assessment of the distribution and significance of any air within the cerebral vessels can be made. The chest cavity can be opened underwater by creating a shallow pool by pouring water within the reflected flaps of thoracic skin. Aspirating the ventricles of the heart by using a syringe partly filled with water will reveal any intracardiac air. The presence and size of any patent foramen ovale should be recorded. Blood should be taken for estimation of alcohol, carbon monoxide and other drugs. Vitreous humour biochemistry may sometimes be of value.

Correlation of findings for the Coroner

The post-mortem findings are interpreted with the knowledge of all the circumstances of the accident so that the event or events leading to the fatality may be completely defined. This correlation, however, needs to be made by a knowledgeable person.

I urge SPUMS members to volunteer their services to the pathologist or government medical officer at the time of an autopsy of a diver and if necessary to write a definitive correlation for the coroner. In this way relevant findings should be handed down and appropriate lessons learned.

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OXYGEN AS A DRUG: A DOSE RESPONSE CURVE FOR RADIATION NECROSIS.

WJ Ehler, RE Marx and MJ Peleo

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Background

Hyperbaric oxygen is a well known adjunct in the treatment of human clinical radiation necrosis. Its mechanism of action has been determined to be a stimulation of macrophage derived angiogenesis factor and macrophage derived growth factor by establishing physical oxygen gradients in radiated tissue. Angiogenesis is directly proportional to the oxygen pressure in the hyperbaric environment.

Methods

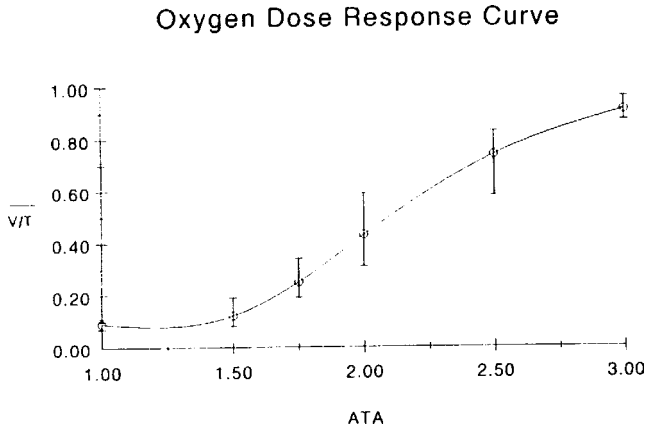
42 New Zealand white rabbits (*Oryctologus cuniculus*) received 320 cGy fractions of cobalt (^{60}Co) radiation twice weekly for a total dose of 5,440 cGy. Resulting tissue damage which develops over six months does not produce overt necrosis. The 42 animals were divided into 6 groups of 7 animals each. Each group of animals was then exposed to oxygen at 1, 1.5, 1.75, 2.0, 2.5, and 3.0 ATA. The animals were then killed painlessly with infusion of 30% Barium Sulfate and 5 ml of Hypaque. The radiated tissue was harvested and prepared for tissue microradiographic angiography. The radiographs were coded and analysed by a blinded investigator (MP) using a random point analysis of vessels per tissue area (V/T). A mean score V/T versus dose of oxygen in atmospheres was derived (Table 1 and Figure on page 87.

TABLE 1

ATA	1.00	1.50	1.75	2.00	2.50	3.00
Vessels (V/T)	0.09	0.12	0.25	0.43	0.74	0.91

Conclusions

The results indicate that oxygen does indeed behave as a drug. The optimum dose in this model is 3.0 ATA



which borders on acute oxygen toxicity. The curve of V/T versus ATA shows a minimal and only gradual increase to 2.0 ATA. At 2.5 ATA, a sharp increase in angiogenesis is noted ($p<0.001$ ANOVA). This study strongly implies a greatly reduced response at treatment depth of 2.0 ATA as compared to 2.5 ATA and to 3.0 ATA.

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ARTICLES OF INTEREST REPRINTED FROM OTHER JOURNALS

WHY US DIVERS DIED IN 1991

Ben Davidson

The National Underwater Accident Data Centre (NUADC) at the University of Rhode Island has been recording diving fatalities involving US citizens for 20 years. To further your awareness of the causes of death so that you may dive more safely, *Undercurrent* has been reporting their analysis for 15 years. The 1991 report on scuba fatalities is the second joint effort between DAN and NUADC.

In 1991, 67 recreational scuba fatalities were reported. While 67 is the second lowest number of scuba deaths recorded since 1970, at least 90 scuba related deaths have been reported for 1992. Of the 67 deaths in 1991, the youngest was 16 years of age and the oldest was 72. Twenty-one percent of all fatalities were 50 years of age or older. The female deaths were 25 percent of the total.

In determining the overall fatality rate, it is difficult to obtain the exact number of active divers. The number of newly certified divers is not available and not all divers remain active after their first year of diving, while some drop out and then re-enter. Nonetheless, NUADC estimates the active diver population at 2.5 to 3.2 million divers at the end of 1991, leading to a fatality rate of 2.09 to 2.68 per 100,000 participants.

(Undercurrent Editor's note:
The National Sporting Goods Association surveys 20,000 households annually to determine participation in recreational sports; they estimate 2,000,000 divers.)

Location of Diving Fatalities

Florida recorded 14 scuba fatalities in 1991, down from 22 in 1990. There were 10 scuba fatalities in California in 1991, while 14 were noted in 1990. Pennsylvania had four deaths in 1991, two occurring in the same quarry, several months apart. New Jersey had four wreck-diving deaths, Hawaii three fatalities, while two were recorded in Texas. One of these victims died of hypothermia after 20 hours in the water without a wet-suit, while his wet-suited partner survived. They had been diving offshore, but drifted away from their boat in the current. They reached a buoy after several hours in the water and clung to it overnight. The decedent died shortly before rescue.

Five Americans died in Cozumel, Mexico. The Bahamas accounted for three fatalities, and one death each was reported in Okinawa, Palau, Dominica, Bonaire and St. Maarten.

Dive Activity and Certification Status

Of the 67 scuba fatalities, 59 divers were certified to dive (five of whom were taking advanced level classes), while four were undertaking their initial training. Four divers were without proper certification or supervision.

The percentage of charter boat fatalities was 30.2% in 1991 and of shore-based fatalities was 46%.

Nine persons conducting technical level dives were killed. As stated in Technical Diver, "technical diving is a discipline that utilises special equipment and methods to improve underwater safety and performance, enabling divers to extend their range beyond the established recreational