



### E47 A Fatal Dive

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The goal of this presentation is to provide a suitable model for forensic pathologists to emulate in reporting dive fatalities; therefore, in divers' deaths, it is advisable to evaluate the concentration of Carbon Monoxide (CO)/Carboxyhemoglobin (HbCO) in the blood.

This presentation will impact the forensic science community by emphasizing the rarity of diver fatalities by CO poisoning. In the international literature of the field, these deaths are rare. The vast majority of divers' deaths are due to drowning, air embolism (sudden decompression), pulmonary barotraumas, and natural causes.

One morning, after renting air cylinders from a diving center, a group of nine scuba divers went for a dive in the sea, reaching depths between 18 and 42 meters. After a few minutes in the water, all nine divers suddenly felt ill and attempted a fast ascent back to the surface. Once the divers arrived back at the boats, three of the divers' health conditions were so severe that, despite resuscitation efforts by other personnel present on the boat, they died at that time. The other four divers were transported to the nearest hospital for emergency attention and were given oxygen therapy in a hyperbaric chamber. An external examination conducted on the bodies of the three deceased divers confirmed the presence of conjunctival petechiae and diffuse and intense red cherry hypostasis. The postmortem examination found evidence of: integrity of the tympanic membrane, a hyper-expanded lung; the presence of epicardial and subpleuric petechiae; and the presence of various air bubbles inside the cerebral vessels, with interruption of the blood flow. All the internal organs and the blood exhibited an intense red cherry color. Lab tests found evidence of high values of HbCO in the blood of the three deceased divers (Sub A=79.31%, Sub B=89.66%, Sub C=95.11%). Blood tests were also conducted 24 hours after the end of the dive on the four divers who had fallen ill and high values of HbCO were also present (Sub D=1.2%, Sub E=0.8%, Sub F=0.6%, Sub G=27%). Histological examinations of all organ samples (Hematoxylin-Eosin (H&E)) showed hypoxic brain and cerebral air microembolization, myocardial contraction band necrosis, endoalveolar edema, small endoalveolar and sub pleural hemorrhages, and minimal air microembolization. A few diatoms were found in lung the samples but were absent in bone samples. Polyvisceral stasis was also present. Considering the autopsy, laboratory tests, and histological examinations, it was concluded that the death of the three divers and the illnesses of the other four were due to CO poisoning. Given these results, the cylinders used by the scuba divers during the dive were analyzed. Results confirmed the presence of CO in the cylinders in a very high concentration (Sub A= CO 2400ppmv; Sub B= CO 2015ppmv; Sub C= CO 1610 ppmv; normal CO levels in cylinders  $\leq 10$ ppm); the investigation revealed that a dual compressor was used for loading the cylinders, and there were air pollution sources close to the compressor. As a result, the owner of the diving center was investigated.

#### **Dive, Diving Cylinder, Carbon Monoxide**