



G5 Diatom Analysis From Suspected Drowning Cases

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After attending this presentation, attendees will become familiar with the utility and value of the diatom test for the assistance of drowning diagnosis, including the quantitative and qualitative analysis of 105 suspected drowning cases.

This presentation will impact the forensic science community by demonstrating how diatom analysis from sphenoid sinus fluid, lung tissue, and bone marrow is valuable for the diagnosis of drowning.

Many rivers cross the crowded cities, and Taiwan is surrounded with sea. Thus, cadavers were commonly found in water or river banks. In Taiwan, 9.2% autopsy cases per year are found to be a result of drowning. Whether cause of death is actually drowning is the first question raised on these cases. The place where the corpse was discovered in water may not be the initial site of drowning, so it is a challenge to identify the cause and the manner of death for drowning victim. An autopsy conducted by a medical examiner is the essential method for the identification of drowning cases so far. Currently, there are various methods for drowning diagnosis. Diatom screening is one of the methods which can link the cadaver to the natural waters. The cell wall of diatom (also known as frustule) is made of silicon, which is acid-resistant and thermostable. A forensic investigator is capable of doing diatom test by using these characteristics. Diatoms found in sphenoid sinus fluid, lung tissue, and bone marrow can provide an excellent evidence to determine the cause of death. This study was also compared with the findings of autopsy and evaluated the applicability of diatom test for forensic use. There are 105 suspected drowning cases and 20 non-drowning cases collected from Institute of Forensic Medicine, Taipei, Taiwan. Sphenoid sinus fluid, 5g peripheral lung tissue, and rib/clavicle bone marrow were collected during autopsy for diatom analysis. After strong acid digestion, a quantitative and qualitative analysis was conducted by counting the number of diatoms under phase contrast microscope. Diatoms can be observed in most samples from drowning corpses. The percentages of positive diatom results from sphenoid sinus fluid, lung tissue, and rib/clavicle bone marrow were 84.7%, 69.2%, and 6.2%, respectively. The sensitivities of diatom analysis from the same tissues were 84.7%, 84.7%, and 6.2%; the specificities were 81%, 89%, and 100%, respectively. All non-drowning samples showed negative results in the diatom test. The environment of sea water and the seasons of winter and spring could cause the higher false positive rate of diatom analysis in lung samples. Five cases with positive diatom tests in rib/clavicle have the diatom density of lungs above 70 diatoms /per 5g lungs. The qualitative results showed *Nitzschia*, *Navicula*, *Cyclotella*, and *Thalassiosira* are most commonly genera in all samples. The results demonstrated that diatom analysis from sphenoid sinus fluid and lung tissue is valuable for drowning identification. The diatom test for suspected drowning cases is a routine screening in Taiwan. For accurate identification of the cause and the manner of death, the results of diatom test from suspected drowning have to be integrated with the investigation from the scene of death and other autopsy findings with careful consideration.

Cause of Death, Drowning, Diatom