Examination of Tool Marks on Bone Preserved in Microbicidal Solutions[1]

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The purpose of this study was to identify an effective microbicidal solution for the storage of bone sections with tool marks. Various implements can leave tool marks on bone in dismemberment cases and the long-term storage of bones is prone to shrinkage that may distort the tool marks. In this study, porcine bone was used as a human simulant for the tool marks. Micrographs were made of the tool marks on the bone sections before storage in microbicidal solutions. One bone section was fixed in 10% formalin for 12 days and then transferred to ethyl alcohol. The other bone sections were stored individually in the following solutions: buffered 10% formalin, 5% acidic acid, 70% isopropyl alcohol, 93% ethyl alcohol, 5% iodide solution, 10% iodide solution, 6% sodium hypochlorite, 10% sodium chloride with iodine, 10% sodium chloride with no iodine, 20% sodium chloride with iodine, 20% sodium chloride with no iodine, 26.4% sodium chloride with iodine and 26.4% sodium chloride with no iodine.

After being stored for 6 months, the tool marks were examined and micrographs taken for comparison. The micrographs were evaluated using a scale of +1 to +3 depending on the quality of striations. A +1 evaluation indicated poor quality or no striations present, +2 indicated some striations but not enough for a positive identification and +3 evaluation indicated there were sufficient striations for a match. Of 14 tool mark samples, 2 (14%) yielded +1 data and 12 (86%) had +3 tool marks. In conclusion, after a 6-month period of storage, 5 of the 14 solutions tested were evaluated as effective microbicidal solutions. The solutions evaluated as ineffective included: 6 solutions with filamentous fungi and bacteria, 1 solution with crystals on bone and 2 solutions due to the quality of the tool mark striations.

[1] Abstract for paper presented at the 11th Indo-Pacific Congress on Legal Medicine and Forensic Sciences, Kuala Lumpur, Malaysia, 2013