

Abstract

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Fatty acid composition and preservation of the Tyrolean Iceman and other mummies.

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In anthropology, objective parameters to adequately describe storage conditions and the preservation of mummies have still to be identified. Considering that fatty acids degrade to stable products, we analyzed their profile in human mummies and in control samples by gas chromatography coupled to mass spectrometry (GC/MS). Originating from different epochs and civilizations, samples of the Tyrolean Iceman, other glacier corpses, a freeze dried mummy, corpses from a permafrost region, a corpse mummified immersed in water, and a desert mummy were evaluated.

Chemometric analysis based on the concentrations of 16 fatty acids revealed the degree of similarity between anthropologic and fresh corpse samples, which was mainly influenced by the content of palmitic acid, oleic acid, and 10-hydroxystearic acid. The presence of 10-hydroxystearic acid was associated with immersion in water, whereas dry mummification was accompanied by high contents of oleic acid. Samples of the Tyrolean Iceman clustered between fresh tissue and those of other glacier corpses indicating the good preservation of this mummy.

Thus, environmental post-mortem conditions were associated with characteristic fatty acid patterns suggesting that chemometric analysis of fatty acid contents may add to our knowledge about post-mortem storage conditions and the preservation of human corpses.