An attempt on 14C dating of carbonate hydroxyapatite in a cremated bone

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Bones are one of the most important materials for archaeological and paleo-environmental dating because they can directly provide absolute dates themselves. Bone collagen, which contains bone protein that is less susceptible to chemical weathering, is commonly used for ¹⁴C dating, but it sometimes has lost organic protein due to post-depositional chemical alternation and diagenesis, resulting in impossibility of ¹⁴C dating. For the bones remaining no organic component, carbonate hydroxyapatite, an inorganic component, is useful for ¹⁴C-measurement. However, the inorganic component in bones can easily be altered by acidic soil, and it has been considered to be unsuitable for ¹⁴C dating. Recently, meanwhile, it is reported that ¹⁴C dating using carbonate hydroxyapatite is possible for cremation bones heated at a high temperature (＞600 °C). The objective of this study is to examine the possibility of ¹⁴C dating using carbonate hydroxyapatite in cremated bones. The samples used were cremated bones in a funerary urn, which are considered to be remains of Jokei, a Buddhist monk (AD 1155-1213). The bones had been confirmed to be burned at high temperature, judged from the IR spectra and XRD patterns. The carbonate hydroxyapatite in six bone fragments showed ¹⁴C dates of 1155-1280 cal AD, which is similar with the supposed age. The result indicates that ¹⁴C dating using carbonate hydroxyapatite is effective when the bone sample was enough heated and well-preserved after deposition.

Keywords: bone, carbonate hydroxyapatite, radiocarbon dating