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Retrospective measurement of U-236 in human lungs

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Human lung ashes were collected in Vienna, Austria, during the early sixties of the last century in order to determine short-lived fission products from the nuclear test explosions by gamma-spectrometry (1). Later on in part of these samples also plutonium was determined by alpha-spectrometry (2).

Last year we started to investigate some of the remaining samples with regard to ^{236}U (half-life 2.3·10⁷ years) which is produced via $^{238}\text{U}(n,3n)$ by fast neutrons and by thermal neutron capture on ^{235}U ; the cross section for the latter reaction is about 1/6 of the ^{235}U fission cross section.

The ash-samples were dissolved in half-concentrated nitric acid, a certain amount of ^{233}U was added as a spike and uranium was then separated by anion exchange (UTEVA) and co-precipitated with $\text{Fe}(\text{OH})_3$. After calcination the samples were measured by accelerator mass spectrometry (AMS) at the VERA laboratory. The derived $^{236}\text{U}/^{238}\text{U}$ isotopic values were in the range of 10⁻⁸, as expected for global-fallout samples, corresponding to 107 atoms ^{236}U per g of lung-ash. Although the values for individual samples from the same year scatter rather strongly, the calculated mean values clearly display the well-known bomb-peak. The new results will be discussed in connection with the old published data as well as with unpublished ^{137}Cs data.

1) Schönfeld, T., Liebscher, K., Karl, F., Friedmann, Ch., Radiation fission products in lungs. Nature No. 4707 (January 16, 1960), 192-193.

2) Irlweck, K., Friedmann, Ch., Schönfeld, T., Plutonium in the lung of Austrian residents. Health Physics 39 (1980) 95-99.

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