

For the performance of this test the bones are cleaned from any adherent tissues, then boiled with water to which a little sodium bicarbonate is added, rinsed with water and dried in a hot air oven. Standard photographic films in their original packet are then strapped over the bones with the film surface directed against the bone with adhesive. Metal paper clips or pieces of lead foil are interposed between the bone and the film surface of the packet. Through this procedure the alpha-rays are screened out and only the beta- and gamma-rays are permitted to act. The exposure time is long (between 15 and 25 days). When the film is developed radioactive bone produces a diffuse and focal fogging, indicating the distribution of the radioactive substances in the bone on the film, that shows the sharply outlined shadows of the interposed paper clips, which stand out as if they were photographed with roentgen-rays. The irregular distribution of the radioactive substances in a particular bone proves that calculations of the total content of radioactive substances present in a bone or in the entire skeleton are unreliable and misleading, when based upon the examination of a small portion of a single bone.

In a modification of this method, cleaned and dried bones or bone ash are placed directly on the surface of a superspeed or process Eastman film and kept there in absolute darkness under observation for 7 to 10 days when bones are tested, or for 30 days when ash is examined. The longer exposure of the ash is due to the fact that incineration deemanates the ashed material temporarily. The developed films show the characteristic irregular fogging or the definite alpha-ray pencilling, thus visualizing the deposits in their irregular distribution and concentration. An overexposure results in a diffuse fogging which obscures the distributory details.

Lacassagne, Lattés, and Lavedan have adapted this qualitative test to the examination of paraffin sections of bone tissue (autohistoradiography). The exposure time for such sections is from 15 to 20 days. The uneven distribution of the deposits of radioactive material in the bones and their peculiar concentration in the outer portions of the cortex can be shown by this method, which permits a comparison of the autohistoradiographs with corresponding, stained sections of the tissue prepared from the same block.

For quantitative measurements of the radioactivity of the various organs, the organic material has to be ashed. The alpha radiation emitted by the ash can be determined with an alpha-ray electroscope. For the determination of the gamma-rays the ash is mixed with barium chloride and hydrochloric acid and made into a paste. This paste is boiled first with hydrochloric acid, then with distilled water, and finally filtered, while still hot, through a hard filter paper. The precipitate on the paper is allowed to dry and is then incinerated together with the paper. The ash obtained and containing radiothorium is tubed and sealed and its radioactivity is determined with a gamma-ray electrometer. The filtrate is treated with sulfuric acid and allowed to stand until a precipitate is formed. The material is then boiled and filtered while hot so