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Smoking and radioactive hazard



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HISTORY

Most people know that cigarette smoke and tobacco contain many toxic substances including tar, arsenic, nicotine and cyanide.

But tobacco also contains radioactive materials: polonium-210 and lead210. Together, the toxic and radioactive substances in cigarettes harm smokers.



HISTORY

During the 1960s, the major tobacco manufacturers determined that PO-210 was a constituent of tobacco and tobacco smoke.

By 1968, **Philip Morris** had verified that the levels of PO-210 in its cigarette brands were similar to what had been reported in the literature at the time (0.33–0.36 picocuries per gram [pCi/g] of tobacco materials contained in a cigarette)



PO-210 is thought to deposit in the bronchial segmental bifurcations, resulting in substantial doses of high-energy alpha radiation in the pulmonary sites where bronchogenic carcinomas frequently arise.



Other radioactive problems

Tobacco farmers use **fertilizer** to help their crops grow. These fertilizers contain a naturally-occurring radionuclide, radium. Radium radioactively decays to release radon gas, which then rises from the soil around the plants. As the plant grows, the radon from fertilizer, along with naturally-occurring radon in surrounding soil and rocks, cling to the sticky hairs on the bottom of tobacco leaves, called trichomes. **Radon** later decays into the radioactive elements **lead-210** and **polonium-210**. Rain does not wash them away.



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WHAT IS POLONIUM 210?

Polonium-210 (Po-210) is a radioactive material a product of the radioactive decay of uranium-238, which decays to radon-222 and then to polonium.

Polonium 210 has a half-life of 138 days.



What is polonium 210

Polonium-210 (^{210}Po , Po-210, historically radium F) is an isotope of polonium. It undergoes **alpha decay** to stable ^{206}Pb with a half-life of 138 days, the longest half-life of all naturally occurring polonium isotopes.

^{210}Po is 250,000 times more toxic than hydrogen cyanide by weight.



What is polonium 210

Philip Morris appeared to have the most success with cellulose acetate filters in 1976. The company observed that the filter removed 40% to 50% of PO-210 from smoke.



WHAT WE CAN DO?

1- STOP SMOKING

2- NOT USE FERTILIZER

3- WHASHING LEAF

4- FILTERS



SMOKING and CXR!!?

Smokers of 1.5 packs of cigarettes a day are exposed to as much radiation as they would receive from 300 to 350 chest X-rays a year.



SMOKING RADIATION and LUNG CANCER

In different studies rate of cancer from radiation about 2to5% of all lung cancers.



SMOKING RADIATION and LUNG CANCER

Polonium radiation in the bronchial epithelium depends not only on the **particle concentration** of these areas, but also on the time of their permanence. Half-life of polonium is 138.38 days and of lead 22 years, which decays afterwards into polonium. There is a significant cancer risk due to chronic exposure to low levels of insoluble alpha-emitting particles



SMOKING RADIATION and LUNG CANCER

Deposits of ^{210}Pb and alpha particle-emitting ^{210}Po form in the lungs of smokers, generating **localized radiation** doses far greater than the radiation exposures humans experience from natural sources. This radiation exposure, delivered to sensitive tissues for long periods of time, may induce cancer both alone and synergistically with nonradioactive carcinogens.



SMOKING RADIATION and LUNG CANCER

The alpha-radioactive polonium 210 (Po-210) is one of the most powerful carcinogenic agents of tobacco smoke and is responsible for the histotype shift of lung cancer from squamous cell type to adenocarcinoma.



SMOKING RADIATION and LUNG CANCER

It is necessary that the medical and scientific world becomes aware and conscious of this problem, creating systematic educational programs of tobaccology in the universities.

Likewise, governments should force manufacturers to introduce cigarettes with low Po-210 concentration and place a clear indication about this on the packet in order to reduce smokers' risk.



FINALLY

since people fear everything that is radioactive, perhaps it would be useful to create an adequate information campaign so as to enable and accelerate smokers' motivational pathways and increase the efficacy of anti-smoking programs.



Thank you for your attention

