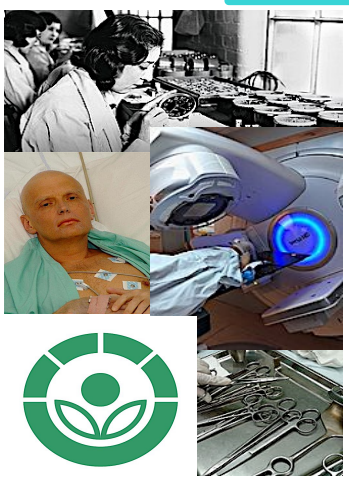
Irradiation or radioactive contamination?



The positive uses and the negative effects of radiation are often confused and make people fearful. In fact, if we actually list all of the positive ways we use irradiation, including medical treatment, sterilising surgical equipment, and increasing the shelf-life of fruit and vegetables, it would show that the negative effects of radioactive contamination are few and far between.

Exposure measured in mSv

10,000 Fatal within weeks
6,000 Typical dosage recorded in those Chernobyl workers who died within a month
5,000 Single dose which would kill half of those exposed to it within a month
1,000 Single dose which could cause radiation sickness, nausea, but not death
400 Max radiation levels recorded at Fukushima plant 14 March, per hour
350 Exposure of Chernobyl residents who were relocated
100 Recommended limit for radiation workers every five years
10 Dose in full-body CT scan
9 Airline crew NYC -Tokyo polar route, annual
2 Natural radiation we're all exposed to, per year
1.02 Radiation per hour detected Fukushimia site, 12 March
0.4 Mammogram breast x-ray
0.1 Chest x-ray
0.01 Dental x-ray

SOURCE: WNA, RADIOLOGYINFO.ORG, REUTERS

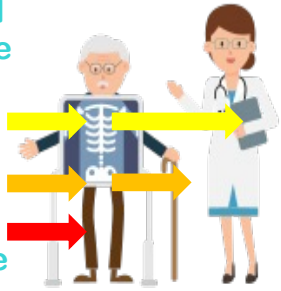
Irradiation is when something has been exposed to radiation. However, radioactive contamination is when an object has taken in some of an unwanted radioactive source. Levels of exposure and contamination are measured in mSv = millisieverts.

Radiation safety measures:-

- Use; time, distance and shielding.
- Wear a dosimeter.
- Avoid contact with contamination.
- Wear protective clothing.
- Wash thoroughly after coming into any contact with any radioactivity.

<u>OUTSIDE</u> the body β and γ are more likely to cause harm as α radiation is blocked by the skin.

<u>INSIDE</u> the body an α source causes the most damage because it is the most ionising.



Why do we irradiate food?

Irradiation of food has been used around the world since the 1950s and is safe. The reasons why food is irradiated are to:-

- Kill bacteria
- Extend shelf life
- Remove insects

Irradiation of food as a method of preserving may lead to some loss of vitamins.

Radioactive contamination	Irradiation
Nuclear material on person.	Nuclear material not on person.
Longer term radiation exposure.	(Usually) short term exposure.
Safety precaution is to wear radiation suit and wash after exposure.	Safety precaution is to maintain distance and only expose to low dose.

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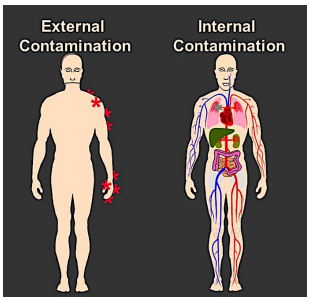
Radiation and contamination

1. What does direct damage by ionising radiation do to the body?

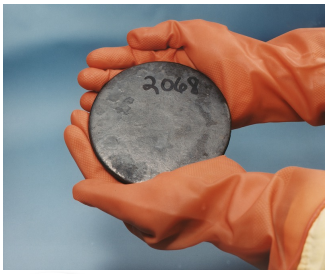


2. Explain the difference between irradiation and radioactive contamination.

3. Following the Chernobyl explosion, some milk supplies were found to be radioactive.

<u>iodine-131 half-life = 8 days</u>

If one litre of milk contaminated with iodine-131 – gives a count rate of 400 counts/second, how long will it take for the count rate to fall to 25 counts/second?
Show clearly how you work out your answer.



4. Why does a teacher wear polythene gloves when handling radioactive material?

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Define & describe

5. Contamination will lead to _____ exposure to radiation compared to irradiation. This is because unlike irradiation, contamination means _____ sources are left on the skin or clothing and can remain unseen. That's why it is important to _____ thoroughly if a person comes into contact with radioactive material. This also explain why we would use _____ to sterilise fruit and vegetables, as exposure to radiation will not itself cause the food to become radioactive.

wash increased radioactive irradiation

6. Give a full description of the irradiation type and reason for doing it:-

Irradiation type	Description of irradiation process and explanation
Irradiating fruit and vegetables	
Sterilising surgical instruments	
Treating cancer	

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