

What is radiotherapy?

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1 Summary

Clinicians use a system that uses high-resolution X-rays to produce contrasting images of cancerous tumours and surrounding soft tissue. Physicians then can target the cancerous tumour more precisely and decreasing radiation exposure of healthy tissues [3].

Radiation therapy (radiotherapy) remains an important component of cancer treatment. In 2012 approximately 50% of all cancer patients received radiation therapy, with an additional 40% involving curative treatment [1].

2 Cell Death

Radiation-induced cell death is typically classified as interphase or proliferative death. Importantly, there is a consensus that cellular effects, including cell death, depend not only on radiation dose but cell type and a place in cell cycle [2].

2.1 Interphase death

Cells cease to divide after radiation exposure and begin to die within hours. “This is attributed to the damage of intercellular molecules and the activation of nuclease and proteolytic enzymes etc., after high doses of radiation, which leads to degradation [...]. Factors such as disruption of membrane structure and disorder of cell energy metabolism after irradiation are also important contributors to interphase death” [2].

2.2 Proliferative death

Most cells undergo proliferative death after radiation. This results from “mitotic catastrophe caused by accumulation of chromosomal aberrations and erroneous repair after radiation induces a DNA double-strand break [...] cells lose their ability to proliferate and begin to die.” [2].

3 Using Radiotherapy for Cancer

Physicians use high-energy radiation to damage genetic material (deoxyribonucleic acid, DNA) of cells and thus block their ability to divide and proliferate further [1].

4 The need for Radiotherapy

‘In England, waiting times are getting worse each month – over 1/3 of cancer patients (60,000) wait beyond the 62-day target, and 10,000 patients wait over 104 days.’

References

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