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709 **1 Evolution and Progress in Applications of Radiations in Cancer**
710 **Diagnosis and Therapy**

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719 **ABSTRACT**

720 Cancer is a ubiquitous health-problem globally caused by poor food quality, environmental
721 pollution, genetic factors, etc. Despite the manifold presumptive theories put forth for its
722 causation, there is an extreme paucity of knowledge as regards the actual etiology of cancer,
723 as well as any preventive or prophylactic therapy. The treatment options available include
724 surgery, chemotherapy and radiation therapy (both internal and external). There have been
725 technical and technological advancements in the fields of “cancer surgery” and “cancer
726 chemotherapy”, and radiotherapy in oncology is not too far behind. X-rays (from Linacs) and
727 gamma-rays (e.g., in Bhabhatron) are commonly used for radiation treatment of various types
728 of cancers. New developments include proton beam therapy (PBT) and heavy ion beam
729 therapy (IBT) (e.g., C⁺⁶ ion). These new developments of PBT and IBT offer significant
730 advantages to treat paediatric patients, and to radiate deep seated and radio-resistant tumors.
731 This manuscript gives an overview of the various radiation therapies used world-wide, cost-
732 comparison of setting up these facilities, operational and treatment costs, the advantages,
733 limitations as well as the present status of different charged particle therapy facilities
734 available world-wide.

735 **KEYWORDS:** Cancer, radiation, X-rays, gamma rays, linacs, protons, heavy ions,
736 accelerators.

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