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Abstract for an Invited Paper
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The Evolution of External Beam Radiation Therapy (EBRT) from a Technological Perspective.

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Since the discovery of x-rays by Roentgen in 1895 ionizing radiations have been used as a treatment for cancer. Such treatments have been based on either implantation of radioactive materials at the site of disease or by aiming external radiation beams at the diseased site. This later method is referred to as *teletherapy* because the beams originate from a location outside of the body distant from the disease site itself. A brief review of the basic radiation biology will be given to illustrate the rationale for therapeutic use of ionizing radiations and the effects of beam energy and beam type—particulate or photon. The remainder of the presentation will focus on the technological *teletherapy* developments supported by the required physical properties of the beams and their associated characteristics that make them suitable for patient treatments. Chronological highlights will include the following sources or devices: superficial x-rays, orthovoltage x-rays, megavoltage x-rays and Cobalt 60 photons, electron beams, neutron beams, negative pi mesons, protons, and heavy ions. The presentation will illustrate how the physical beam properties have been incorporated into modern radiation treatment devices, many of which are equipped with radiation imaging capability. Such devices include: linacs equipped with multileaf collimators for beam shaping and intensity modulation, the Gamma Knife for precise and accurate irradiation of brain tumors or arterial-venous malformations (AVM), the robotic arm based Cyber Knife, and the Helical Tomotherapy unit.