National Cancer Institute

P20 (PAR13-371) Awarded Projects

CA183639-01A1
National Particle Therapy Research Center

This proposal aims to design and plan National Particle Therapy Research Center (NPTRC) at the Texas Center for Advanced Radiation Therapy (TCART), which will comprise of photon, proton, and carbon ion radiation facilities. The Specific Aims are:

1. To develop the specifications of the research beam-line and related infrastructure for the NPTRC research activities. (Pilot Project #1, focused on the design of the research capacity of NPTRC via a rigorous, scientific, comprehensive and peer-reviewed process, from the specifications of the accelerator to the housing of animals and potential requirements for support staff.)
2. To develop a Monte Carlo dose engine using novel graphics-processing unit (GPU) and cloud computing for protons and heavier charged particles. (Pilot Project #2 that will provide for a common research platform and resource for future research that requires accurate and efficient dose calculations not only at the planned NPTRC but also elsewhere.)
3. To establish the overall research directions and develop the necessary infrastructure to support and manage future research activities (Administrative Core through interactions with Pilot Project #1, the Working Groups and Advisory Panels, will build an optimal management strategy, hire or train the relevant expertise needed and define the academic and research focus of the NPTRC to compete for and secure funding required to operate the NPTRC.)

CA183639-01A1
NAPTA: Optimizing clinical trial design & delivery of particle therapy for cancer

Leading academic institutions in the U.S. in collaboration with U.S. National Laboratories and leading Particle Beam Radiotherapy (PBRT) centers in Germany and Japan have formed the North American Particle Therapy Alliance (NAPTA). The main objective of NAPTA is to build a future for ion therapy in the U.S. by integrating and developing the clinical, biological and technical knowhow necessary to build a National Center of PBRT in close collaboration with international partners. The Specific Aims of this proposal are:

1. Transform existing groups and institutions with clinical interest and/or currently performing R&D work in PBRT into a network of functional teams with a common vision for R&D and clinical studies involving PBRT. Provide the organizational structure within NAPTA to synergistically align these teams.

2. Complete a pilot research project addressing issues related to the particle range uncertainty and integrating the development of “new knowledge” in radiobiology related to how this uncertainty impacts RBE and treatment planning for assessing biological dose distributions.
3. Begin planning for the next two major phases to follow:
    - Facilitate the development of new, low-cost, compact/efficient designs for ion accelerators, ion gantries, treatment planning systems, and imaging technology in the treatment room for adaptive planning and QA/verification.
    - Enhance clinical PBRT research by developing the infrastructure for treating all patients within common protocols shared by all partner institutions and using common technology in the U.S. in synergy with similar efforts in Europe and Japan.