PET: Past, present & future

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This presentation's intention is to be an introduction to PET, a dummy's guide to the technique and to shed some light on the history of Positron Emission Tomography. The journey starts with some fundamentals of PET and continues from the discovery of the positron to multimodality techniques.

PET entered the clinic in the mid 70's and has since then evolved from being merely a scientific tool to a clinical blockbuster, when combined with CT. Its superior sensitivity and infinite range of applications makes PET a powerful research tool as well as a clinical workhorse for the early detection of pathological changes, including malignancies, metabolism and receptor density.

Positron emitting radionuclides have been produced artificially since the early 20th century. Carl David Andersson discovered the positron and was awarded the Noble prize for it. The cyclotron was invented by Leo Szilárd and realized be Ernest Lawrence in 1932. Frederic Joliot and Iréne Curie produced nitrogen-13 by alpha irradiation of boron in 1934. Gordon Brownell and co-workers made the first clinical positron imaging device in 1953. First FDG synthesis was published by Tatsuo Ido and co-workers in 1978, but it wasn't until 1986 with Kurt Hamacher's new synthetic route that FDG started to conquer the world. The combined PET CT scanner was invented by Pete Townsend and Ron Nutt in 2000. The development of charged particle accelerators, targets for radionuclide production, separation and radiochemistry will be presented.

The most widespread and used tracer, Fludeoxyglucose (FDG), will serve as a tour guide for the historic journey with its development and applications.