

History

RADIO-IODINE HALTS ONE TYPE OF CANCER

Active chemical brings about history-making recovery of patient dying from thyroid tu

man shown in the contrasting por-
right as a Brooklyn shoe salesman
Bernard Brunstein who is destined
one use of the most famous patients
and history. Brunstein in the first per-
sone to be cured (prior to a cure un-
blished by medical tests on a living
of metastatic cancer, a form of the
in which the malignancy spreads
in the body from an original tumor.
cancer has always been 100% fat-
Brunstein's tumors were destroyed
20% almost miraculously way by the
of four doses of radioactive iodine.
Brunstein was admitted to New



BERNARD BRUNSTEIN IN 1942 (LEFT); AS HE LOOKS TODAY

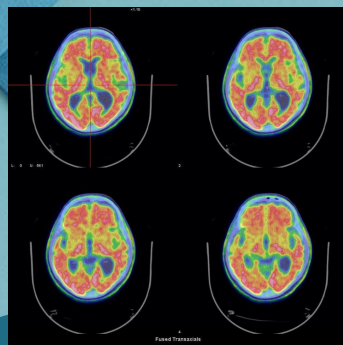
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had never been effectively used as a
ment for cancer, but Brunstein ag-
try it in the hope that it might be
did. Three months after he drank a
glassful of the tasteless, colorless
but least began to allow down and
ed to patient's right. Geiger counters
over the tumor area revealed that
was a heavy concentration of iodine
in these areas. After three additional
the tumor slowly began to diminish

PET

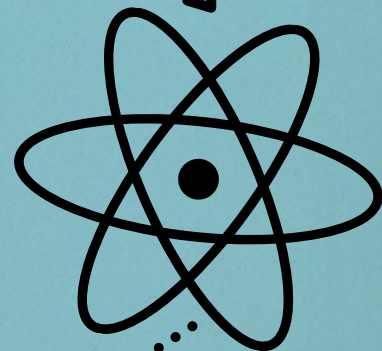
Nuclear Physics in Medicine

Jasper - Tibe- Jens - Giulia - Anna - Elisa

Hadron Therapy



PET's applications to the medicine



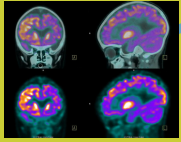
PET

Position Emission Topography

Many tools are used for medical diagnostics and cancer therapy which are direct applications of the principles of physics

Recently radiotracers permit the determination of the contours of a solid tumour thanks to the PET

Is a type of nuclear medicine procedure that measures metabolic activity of the cells of body tissues



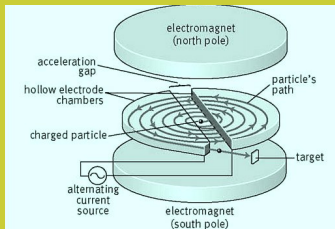
The principle on which PET is based is the positron, an antiparticle of the electron

PET works by using a machine with a large hole called "scanning device"

the scan uses a special dye containing fine radioactive traces, that must be prepared using a specific device called cyclotron



The first cyclotron was developed in 1930 by Lawrence, and it was called "proton merry-go-round"



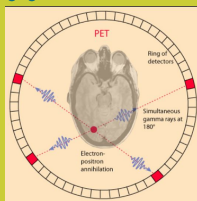
The working principle of the cyclotron is based on the Lorentz force, so there is a magnetic field B on the surface: $F=qvB$

The trajectory is perpendicular to the magnetic field and to the velocity: $r=mv/qB$

The particle follows the trajectory from inside to outside and once it reaches the edge, it is extracted from the cyclotron and sent against the target.

After that it is measured out and injected into the patient's bloodstream, that will adsorb the tracer; then radioactive atom loses its radioactivity giving off a subatomic particle called a positron

When PET detects the two gamma rays on opposite sides the ring, one can calculate where the tracers in the patient's body must be and they can reveal body activities in three dimensions



Applications to medicine

PET can detect functional changes of organs and apparatuses

PET is very important also in Neurology and Cardiology: it is used to diagnose Alzheimer's disease and related disorders to detect brain by hypometabolism

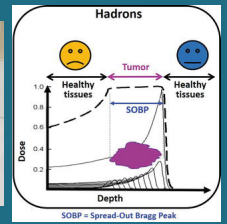
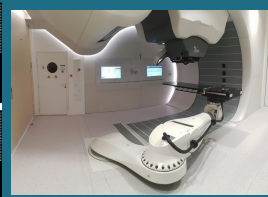
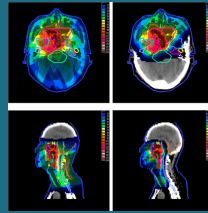


PET also allows evaluation of myocardial viability; it is also useful for the study of heart metabolism and coronary flow



Hadron Therapy

It's used for treatment of early and cancer tumours: this therapy uses nuclear parts like protons, neutrons and light ions



In conventional radiation therapy, beams of X rays (high energy photons) are produced by accelerated electrons and then delivered to the patient to destroy tumour cells

these particles can penetrate the tissues with little diffusion and deposit the maximum energy just before stopping

There is a connection with the first discovery of the atomic nucleus by Rutherford in the early 20th century



History

It's not clear the year in which nuclear physics was born, maybe in 1934 maybe in 1946



RADIO-IODINE HALTS ONE TYPE OF CANCER

Radioactive chemical brings about history-making recovery of patient dying from thyroid tumors

The man shown in the contrasting portrait on right is a Brooklyn shoe salesman named Bernard Deussen who is destined to become one of the great names in medical history. Deussen is the first person known to be cured of cancer as a result of a procedure established by medical men on a living patient of metastatic cancer: a form of the disease in which the malignancy spreads through the body from an original source. It is cancer cancer has always been 100% fatal. But Deussen's tumors were destroyed in a single, simple procedure: they were the

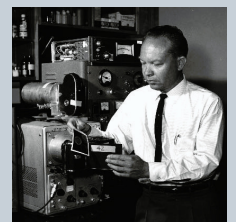


iodine is chemically identical with ordinary iodine; it gives off a powerful radiation that can kill any tissue that absorbs it in sufficient concentration. The chemical had never been effectively used as a treatment for cancer, but Deussen agreed to try it in the hope that it might help. It did. Three months after he died his first glassful of the substance, colorless liquid, his hand began to show signs and he started to put on weight. Geiger counters placed over the tumor sites revealed that there was a heavy concentration of radio-iodine in the tumor sites.

Sam Seidlin was the first man who described nuclear physics in a scientifically "Journal of the American medical association"

his study showed that radioactive iodine can be used to treat a patient in advance with thyroid cancer

Benedict Cassen developed the first rectilinear scanner and Hal Anger's scintillation camera.



Nuclear medicine was now fully integrated into the medical world; from that moment its effectiveness grows more and more every year