

Ionisation of Carbon ions in therapy: According to these papers (<https://accelconf.web.cern.ch/accelconf/r08/papers/THBAU01.pdf>, http://jrr.oxfordjournals.org/content/48/Suppl_A/A43.full.pdf) carbon ions are stripped of 6 electrons making them C⁺⁶ before accelerating them in a synchrotron and sending them to the patient.

Ionisation of Lead ions at CERN: all electrons are stripped to make it a bare lead nucleus (see <http://home.web.cern.ch/about/accelerators/linear-accelerator-3>). While stripping an electron off a positively charged ions gets harder, the larger the positive charge, having a fully ionised Lead nucleus is easier to accelerate.

Radioisotopes production, energy of

ISOLDE: <http://home.web.cern.ch/about/experiments/isolde>. Main point to take away, low energy production of radioisotope nuclei. They can be accelerated to slightly higher energies.

Quantity of radioisotope used in PET: Each glucose molecule is labelled with the radioisotope. Quantity also depends on the type of radioisotope used. Here is a wikipedia page for FDG (the radioisotope we discussed about). You will find quantities in the applications section at the bottom: <http://en.wikipedia.org/wiki/Fludeoxyglucose>

Half-lives: [carbon-11](#) (~20 min), [nitrogen-13](#) (~10 min), [oxygen-15](#) (~2 min), [fluorine-18](#) (~110 min), or [rubidium-82](#)(~1.27 min)

Bullet profile - comparison with hadron beam profile: Below is an image of what a bullet that penetrates into tissue does. A bullet penetrates the body and goes through tissue. The analogy of bullets energy profile and hadron beam profile ends there. While with hadrons, some dose (~20%) is deposited at entry and most of the dose is dumped at the end of the trajectory - the Bragg peak, thereby most of the damage is done at the Bragg peak. With bullets, the penetration causes structural damage all through. The energy of the bullet actually reduces as it goes deeper.

