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Targeted alpha therapy for cancer & the use of radioisotopes

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1. Targeted Alpha Therapy (TAT)

New approaches in the treatment of cancer are necessary to overcome the limited therapeutic efficacy and high costs of currently available therapeutics. Conventional therapies often have negative side effects such as nausea, vomiting, hair loss, general malaise and depression. This seriously affects the patient's overall health and quality of life. Moreover, the disease will most likely recur in time due to the survival and spreading of cancerous cells, or micro-metastases, from the original tumour to other areas in the body. Targeted Radionuclide Therapy is a new kind of cancer treatment. It combines new developments in molecular biology and in radionuclides for medical applications. Alpha-emitting radionuclides seem particularly promising to destroy cancer cells.

2. Production of Actinium-225 for TAT

Radium needles that were once implanted into tumours as a cancer treatment are now obsolete and constitute a radioactive waste problem, as their half-life is 1600 years. The reduction of radium by photonuclear transmutation by bombarding Ra-226 with high-energy photons from a medical linac to produce Ac-225 has been investigated and can then be used for 'Targeted Alpha Therapy' (TAT) of cancer. The increasing application of Ac-225 for cancer therapy indicates the potential need for its increased production and availability.

This section of the presentation investigates the production of Ac-225 in commercial quantities, which could potentially reduce obsolete radioactive material, and displace the need for expensive importation of Ac-225 in the years ahead.

Biography

Graeme Melville is a senior nuclear researcher at St George Hospital in Sydney, Australia. In the past he was a professional tennis player, NASA astrophysics researcher (Magellan Project), university lecturer and government science policy advisor. Dr Melville has worked in a senior position with the Department of Defence and published many papers in astrophysics and nuclear physics as well as being Editor-in-Chief of an international journal. He was the recipient of the 2005 'Physics in Industry Day' award and 2007 'Research Futures Forum' prize. He is currently the Chairman of the Australian Institute of Physics (NSW) and has published two books. His current research at St George Hospital in Sydney involves producing Ac-225 for 'Targeted Alpha Therapy' (TAT) - a new kind of cancer treatment.

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