

^{195m}Pt -Cisplatin

as new companion diagnostic



What is Cisplatin?

Cisplatin, a very commonly used chemotherapeutic pharmaceutical, is a product that has, since its registration in 1978, demonstrated efficacy in the treatment of ovarian, cervical, testicular, bladder and head and neck carcinomas.

The Necsa technology

Scientists at the South African Nuclear Energy Corporation SOC Ltd (Necsa) have optimised this product by synthesising Cisplatin using ^{195m}Pt . This innovation will pave the way for oncologists to tailor cancer treatment with “cold” Cisplatin (non-radioactive) for individual patients.

The need and gap

A growing tendency in medicine today is the quest for personalised therapy whereby patients’ treatments can be tailor-made to suit their genetic, physiological and anatomical makeup. Personalised medicine and the techniques that support its attainment are well-known amongst the medical academic community as well as organisations such as Necsa which are involved in drug discovery initiatives.

Despite its popularity over the past 30 years, the side-effects of Cisplatin administration can be serious if the effect of the drug conflicts with the unique physiological characteristics of the patient. It is therefore necessary to determine the dose of the drug and to customise the administration to the needs of the individual. This vital information could be obtained if minute amounts of the drug are “tagged” with a radioactive compound.

Benefits of ^{195m}Pt -Cisplatin

- Ability to monitor directly the Cis-platinum
- Individualisation of chemical dose
- Rapid determination of tumour resistance
- Improves treatment effectiveness

Preliminary funder



South African Nuclear Energy Corporation SOC Limited

The Necsca value proposition

^{195m}Pt-Cisplatin, used as a companion diagnostic, will help in the individualisation of chemical dose. This technology therefore has the potential to eliminate over- or under-dosage, as well as reducing the side effects. Improved treatment of a wide range of cancers, such as testicular, ovarian, bladder, head and neck, oesophageal, small cell and non-small cell lung, breast, cervical, stomach and prostate cancer will be possible.

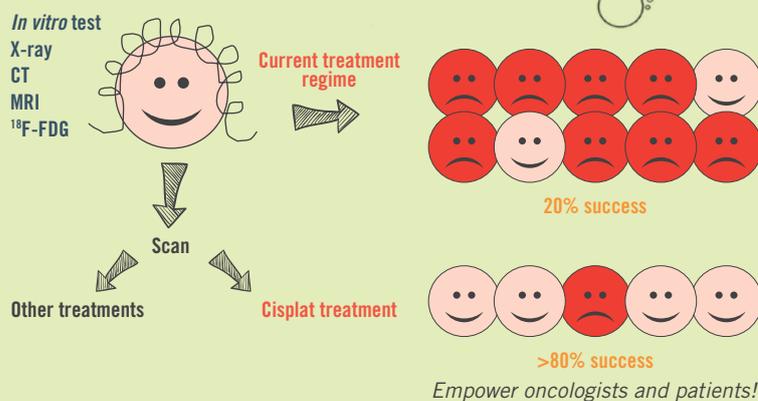
^{195m}Pt-Cisplatin will be sold to nuclear medicine practitioners and radiopharmacies, both locally and abroad. The effectiveness of this product has already been proven, and oncologists, as the principal referring specialists to nuclear medicine departments, can endorse ^{195m}Pt-Cisplatin with confidence.

How ^{195m}Pt-Cisplatin works

1. After being charged neutral overall, the ^{195m}Pt-Cisplatin crosses the tumour cell membrane.
2. Once inside the cancer cell, it is then activated by replacing one of the chloride ions with a water molecule.
3. Water itself is then easily displaced by the basic nitrogen atoms on DNA, specifically on a guanine nucleobase.
4. Once bound to DNA the second chloride ion is replaced by a guanine nitrogen atom from an adjacent DNA strand. The result is a platinum fragment, cross-linking two DNA strands within the double helix. This cross-linking prevents the cell from dividing by mitosis and so the tumour stops growing.

Making the body biochemically transparent

- Ability to directly monitor the drug, i.e. Cis-platinum
- Companion diagnostic for individualisation of chemical dose, elimination of over- or under-dosage



Technology readiness level (TRL) and intellectual property protection

- TRL 7 – The Prototype can be Demonstrated in its Relevant Environment of Use (Possibly in a Commercial Setting): The prototype is nearing completion, and fewer learnings and iterations are needed. The product has undergone Phase 0 clinical trial on humans yielding positive results.
- Patent granted
- Exclusive licensed technology from ANSTO
- Steve Biko Academic Hospital is Necsca's clinical partner on this project, and the Technology Innovation Agency (TIA) provided funding for the clinical protocol development phase I/II in December 2014



Become a partner in this technology

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About Necsca

Nuclear technology plays a fundamental role in day-to-day life. Applications such as medical isotopes, used in cancer treatment, and fluorochemicals, used in petroleum manufacturing and in items such as LCD screens and cellphones, enhance more than 10 million lives every year.

Necsca is at the forefront of nuclear energy and radiation science research and development (R&D) on the African continent. NTP Radioisotopes SOC Ltd, a Necsca subsidiary, is one of the top three producers of nuclear medicine in the world, while Pelchem SOC Ltd, another Necsca subsidiary, is the only fluorochemical production, sales and distribution company in the southern hemisphere.

The Radiochemistry Group at Necsca performs research and development in all fields of radiochemicals and radiopharmaceuticals. This includes, amongst others, the labelling of compounds for preclinical or clinical evaluation to determine the potential of these labelled compounds as diagnostic or therapeutic agents or to determine their biodistribution to assist other researchers.