Nanothecnologies

Magnetic Nanoparticles For Cancer Therapy: Collection And Elimination Of Circulating Tumor Cells

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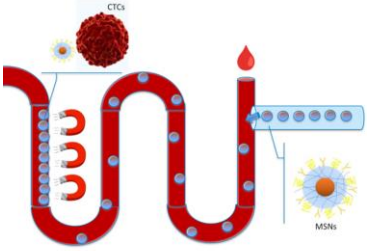
CONTEXT

There is a growing recognition that circulating tumour cells (CTCs) play a crucial role in the development of metastases. Since more than 90% of cancer deaths are due to metastases, targeting and eliminating CTCs is a promising area of research that aims to reduce cancer morbidity and mortality, preventing metastasis very early. Recent advances in the detection, enrichment and enumeration of CTCs have been made for diagnosis purposes, mainly in the microfluidics and nanotechnology areas. These techniques are often constrained by the low number of CTCs detected and collected since a low blood volume is extracted for these analyses. The current project aims to develop magnetic silica-coated nanoparticles (MSNs) to be used in a new magnetic device to improve CTC's capturing efficiency with a simple, inexpensive design and the ability to handle large blood volumes without needing blood separation techniques.

PROGRESS TO DATE

- The MSNs were fully characterized, and their production method was optimized.
- The chemical functionalization of MSNs was optimized for three antibodies (epithelial, mesenchymal and stemness markers).
- The magnetic microtube device was optimized with well-established parameters (ex., microtube diameter and length…).
- The majority of MSNs were retained in the device.
- 46.6% of the CTCs suspended in the cell culture medium were captured by the magnetic device

CTCs CATCHING DEVICE



FUTURE ACHIEVEMENTS

The magnetic device will soon test MSNs functionalized with the three antibodies to improve CTC's capturing efficiency.
In vitro cell studies will be concluded with whole blood tests.
CTCs retention and elimination percentage achieved by this technique will be evaluated *in vivo* (mice model)

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