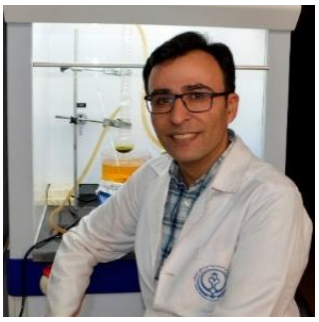


Targeted Drug Delivery Applications of Magnetic Nanoparticles

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Abstract:

A MNPs have been regarded as a novel candidate in biomedical research with special emphasis on magnetic-mediated drug delivery to the cancer tissues as a result of their small size and magnetic properties [1]. Furthermore, the surface of MNPs can be functionalized with different ligands for targeted drug delivery applications [2, 3]. In previous studies, it could be shown that this drug delivery system can cause complete tumor remission in tumor-bearing rabbits [4, 5-7]. In addition, the applied dose of the drug could be diminished to 20 % of the regular systemic dose. Tumor remission was achieved without any negative side-effects, which are common after regular cancer chemotherapy (Figure 1).

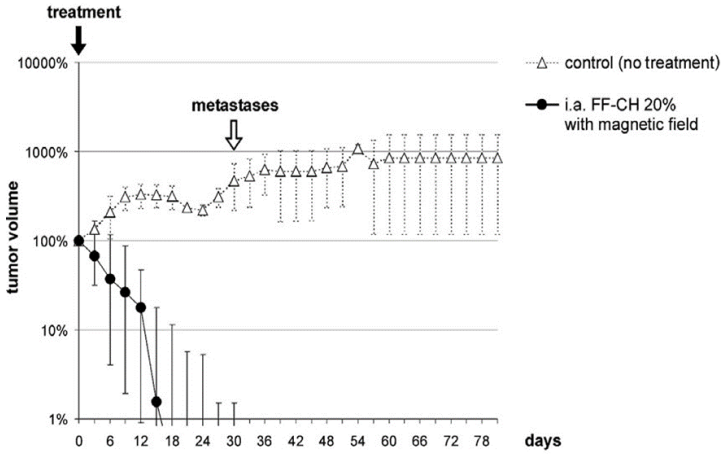


Figure 1. Chemotherapeutic treatment with magnetic drug targeting on tumour-bearing rabbits. Complete tumour remission could be achieved with only 20 % of the regular systemic dose: therapy group, n= 5; control group, n= 2 [4].

X ray-tomography pictures show the iron oxide nanoparticles after magnetic drug targeting in the vascular system of the tumour (Figure 2).

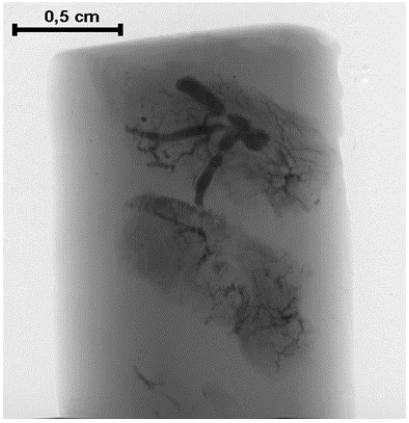


Figure 2. X-ray picture of a VX2-tumour tissue sample embedded in paraffin after magnetic drug targeting (MDT). The nanoparticles are visible in the vascular system of the tumour [8]

In our study, the corresponding histological cross sections show the nanoparticles after intra-arterial application in the vascular system of the tumor (Figure 3).

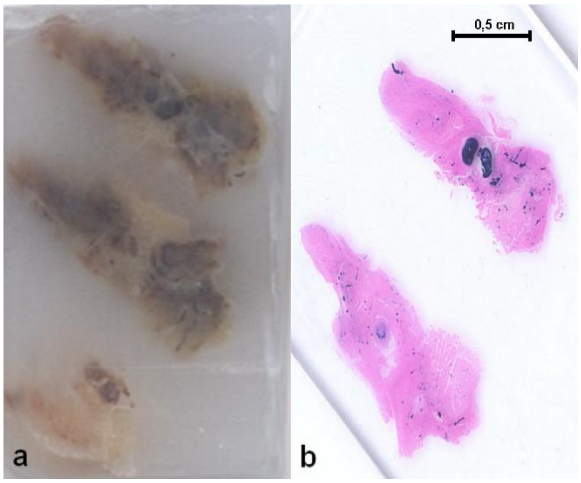


Figure 3. (a) VX2-tumour tissue after magnetic drug targeting embedded in paraffin. (b) Synoptic picture of the corresponding histological slide stained with Prussian blue. The nanoparticles are visible as blue pigment in the vessels of the tumour [8].

Biography

Farhad Ghanizadeh Gerayeli has completed his M.Sc. from School of Advanced Medical Sciences and Technologies (AMST), Shiraz University of Medical Sciences, Shiraz, Iran. He is the lab manager of AMST. He has published more than 5 papers in reputed journals.

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References:

1. Sahoo, S.K., R. Misra, and S. Parveen, Nanoparticles: a boon to drug delivery, therapeutics, diagnostics and imaging, in Nanomedicine in Cancer. 2017, Pan Stanford. p. 73-124.

2. Dilnawaz, F., et al., Dual drug loaded superparamagnetic iron oxide nanoparticles for targeted cancer therapy. Biomaterials, 2010. 31(13): p. 3694-3706.

3. Singh, A., et al., Composite polymeric magnetic nanoparticles for co-delivery of hydrophobic and hydrophilic anticancer drugs and MRI imaging for cancer therapy. ACS Applied Materials & Interfaces, 2011. 3(3): p. 842-856.

4. Alexiou, C., et al., Locoregional cancer treatment with magnetic drug targeting. Cancer research, 2000. 60(23): p. 6641-6648.

5. Alexiou, C., et al., Magnetic mitoxantrone nanoparticle detection by histology, X-ray and MRI after magnetic tumor targeting. Journal of Magnetism and Magnetic Materials, 2001. 225(1-2): p. 187-193.

6. Alexiou, C., et al., Therapeutic efficacy of ferrofluid bound anticancer agent. Magnetohydrodynamics, 2001. 37: p. 318-322.

7. Alexiou, C., et al., Targeting cancer cells: magnetic nanoparticles as drug carriers. European biophysics journal, 2006. 35(5): p. 446-450.

8. Jurgons, R., et al., Drug loaded magnetic nanoparticles for cancer therapy. Journal of Physics: Condensed Matter, 2006. 18(38): p. S2893.