Ketie Saralidze et al., J Material Sci Eng 2012, 1:3
http://dx.doi.org/10.4172/2169-0022.S1.005

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International Conference and Expo on
Materials Science & Engineering

October 22-24, 2012 DoubleTree by Hilton Chicago-North Shore, USA

Radiopaque polymeric microspheres for clinical applications

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Polymeric microspheres are used for a wide range of clinical treatments. These spheres are being used as fillers for augmentation of soft tissue and as bulking agents. Furthermore polymeric microspheres are part of the powder fraction of acrylic bone cements. Additionally they are used for embolization therapy, in which microspheres are injected into the feeding artery of a tumor to achieve shrinkage and cell death. A major disadvantage of currently used polymeric microspheres is that these are radiolucent, i.e. they can not be observed using standard X-ray equipment. The incorporation of covalently bound iodine in the polymer, by using the monomer 4-IEMA (2-[4-iodobenzoyloxy]-ethyl methacrylate), renders our polymeric microspheres radiopaque, i.e. X-ray visible.

We synthesized a wide range of radiopaque microspheres to potentially improve the clinical outcome of the treatments described above. For the use of microspheres as embolization particles we further produced a range of micro- and macro-porous polymeric microspheres. These are used for Trans-Arterial Chemical Embolization (TACE) and release drugs in situ inside the tumor. The porous microspheres were loaded with the drug doxorubicin which is commonly used as an anti-cancer drug. In this way a dual-action treatment is achieved: blocking blood-flow and release of a cytostatic drug, potentially resulting in decrease of tumor volume.

Our intrinsically radiopaque porous microspheres demonstrate increased drug-loading capacity and more controlled drug release. Application of a temperature sensitive coating (35° C) ensures exclusive drug release after injection into the patient. Additionally, when refrigerated, doxorubicin remains active within the microspheres for several months.

Biography

Ketie Saralidze studied organic chemistry at Tbilisi State University (TSU; Republic of Georgia) and Zuyd University, Heerlen (the Netherlands). She completed her PhD in 2008 at the department of Biomaterials Science, Maastricht University. This project called “Biointerfaces” was in collaboration with the university of technology in Aachen (RWTH; Germany). During her PhD she concentrated on the improvement and application of intrinsically X-ray visible polymers for clinical practice. At this moment she is still in Maastricht, working on clinical application of radiopaque microspheres for embolization therapy and as bulking agents.

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