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Tumor regression after intravenous administration of novel tumor-targeted nanomedicines

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The possibility of using genes as medicines to treat cancer is limited by the lack of safe and efficacious delivery systems able to deliver therapeutic genes selectively to tumors by intravenous administration without secondary effects to healthy tissues. In order to remediate this problem, we investigate if the conjugation of the generation 3 diaminobutyric polypropylenimine dendrimer to transferrin and lactoferrin, whose receptors are overexpressed on numerous cancers, could result in a selective gene delivery to tumors after intravenous administration, leading to an increased therapeutic efficacy. The intravenous administration of transferrin-bearing and lactoferrin-bearing polypropylenimine dendriplexes resulted in gene expression mainly in the tumors. Consequently, the intravenous administration of the transferrin-bearing delivery system complexed to a therapeutic DNA encoding tumor necrosis factor (TNF) α led to 90% tumor suppression over one month on A431 epidermoid tumors. It also resulted in tumor suppression for 60% of PC-3 and 50% of DU145 prostate tumors. Furthermore, the intravenous administration of the lactoferrin-bearing targeted dendriplexes encoding TNF α led to the complete suppression of 60% of A431 tumors and up to 50% of B16-F10 skin tumors over one month. Transferrin- and lactoferrin-bearing polypropylenimine dendrimer are therefore highly promising delivery systems for cancer therapy.

Biography

Christine Dufès is a Senior Lecturer at Strathclyde Institute of Pharmacy and Biomedical Sciences (SIPBS), University of Strathclyde, Glasgow, United Kingdom. She completed her Doctorate in Pharmacy and a PhD at University of Poitiers (France). After four years as a Post-doctoral Researcher at Cancer Research UK Beatson Laboratories in Glasgow, she was appointed as a Lecturer at SIPBS in 2006. She completed her fellowship of Higher Education Academy in 2007 and became a Senior Lecturer in 2012. Her research interests include "The targeted delivery of drugs and therapeutic genes to tumors and cerebral diseases". She has been awarded Biochemical Journal Young Investigator Award (2009) and Tom Gibson Memorial Award (2012) for her research, in addition to the Best Overall Strathclyde Teaching Excellence Award 2013 for her teaching. She serves the editorial boards for 17 journals.

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