specific drugs. This could have a significant impact on drug development and potentially lead to treatments that are tailored for individual patients.

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A.K. Chen, None; **A. Tsourkas**, None.

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Hematopoietic Stem Cells and its Lineage as Gene Delivery Vehicle and Cellular Probes in Subcutaneous Tumor Models

Ali M. Rad, *ASM Iskander, Robert A. Knight, Mohammad Reza Siadat, Branislava Janic, Ali S. Arbab, Hamid Soltanian-Zadeh, Henry Ford Health System, USA. Contact e-mail: alirad@rad.hfh.edu*

Despite of enormous progress in gene therapy for breast cancer, optimum systemic delivery vehicle for gene product to the target tissue is still unresolved. Previously we have shown the migration and accumulation of systemically administered endothelial progenitor cells (EPCs) and dendritic cells (DCs) to the sites of tumor. To date, no report has documented the use of these cell lines as gene delivery vehicles. Three million human breast cancer (MDA-MB-231) cells were subcutaneously implanted in the right flank of nude mice. EPCs were isolated from fresh human cord blood. Dendritic cells were differentiated from the cord blood CD34+ or CD14+ cells. Both, EPCs and DCs were genetically transformed to carry human sodium iodide symporter (hNIS) gene using adenoviral vectors and magnetically labeled with ferumoxides-protamine sulfate (FePro) complexes. Magnetically labeled genetically transformed cells were administered intravenously in tumor bearing mice when tumors grew to 0.5 cm in sizes. Magnetic resonance imaging (MRI) and single photon emission computed tomography (SPECT) images were acquired 3 and 7 days after cell injection, with a 7 Tesla animal MRI system and a custom built micro-SPECT using Tc-99m, respectively. Expression of hNIS in accumulated cells was determined by staining with anti-hNIS antibody. Our study showed not only the accumulation of intravenously administered EPCs and DCs in implanted breast cancer but also the expression of hNIS gene at the site of tumor. Tc-99m activity ratio (tumor/non-tumor) was significantly different between animals that received non-transfected and transfected cells for both EPCs and DCs ($P<0.001$). Our study indicates that genetically transformed, magnetically labeled DCs or EPCs can be used both as delivery vehicles and as cellular probes for detecting *in vivo* migration and homing of cells by MRI. Both EPCs and DCs can potentially be used as gene carrier system for the treatment of tumor or other diseases.

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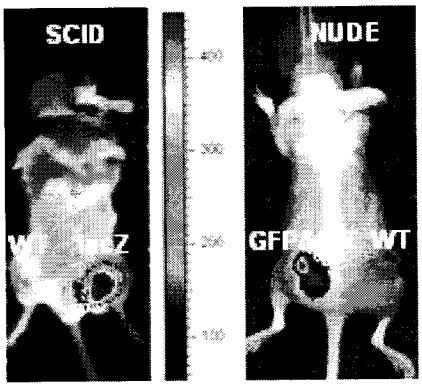
Detection of β-galactosidase in Human Breast Cancer MCF7 xenograft *in vivo* using Galacto-Light Plus™ chemoluminescent imaging

Li Liu, *Angelina Contero, Ralph P. Mason, UT southwestern Medical Center, USA. Contact e-mail: li.liu@utsouthwestern.edu*

Background: The reporter gene LacZ encoding β-galactosidase is frequently used to determine the efficiency of gene transfer and gene therapy. However, widespread implementation is hampered by difficulties in assessing the success of transfection in the target tissue and the longevity of expression. Thus, there is increasing interest in the development of non-invasive *in vivo* reporter techniques to assay lacZ gene expression *in vivo*. ^{1}H and ^{19}F NMR have been presented together with radionuclide and fluorescent imaging approaches. Optical imaging is potentially facile, cheap and facilitates high throughput in mice. We have now tested Galacto-Light Plus™ as a reporter substrate. *In vitro* deglycosylation releases a reactive oxitene, which spontaneously decomposes emitting light. We now demonstrate that this approach is feasible *in vivo*. Methods: MCF7 wild type cells were stably transfected with phCMV/lacZ. Both WT and transfectants were evaluated with Galacto-Light Plus™ (Tropix) substrate in culture and implanted as tumors SC in female SCID or nude mice. When tumors reached about 5 mm diameter 50 ul of Galacto-Light Plus™ were injected intra tumorally and the anesthetized mice observed using a Xenogen Lumina, Berthold Nightowl, or homebuilt bioluminescent imaging system. Images were acquired 5 mins after injection. Results: As expected, in culture WT cells gave no detectable light emission, but intense signal was detectable in β-gal expressing cells. *In vivo* strong signal was detectable from lacZ tumors. This was enhanced further enhanced if a lysis buffer was included in the injection. Selective detection was confirmed post mortem in excised tissues. Conclusion: Galacto-Light Plus™ can be used to detect β-galactosidase activity in tumors *in vivo* reporter. Further investigations are required to evaluate optimal doses and routes of administration.



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Spliceosome-Mediated Trans-Splicing for Pre-mRNA Imaging in Living Subjects

Zachary F. Walls[1], *M. Puttaraju*[2], *Sanjiv S. Gambhir*[3], [1]*UCLA, USA;* [2]*Intronn, Inc., USA;* [3]*Stanford, USA. Contact e-mail: zwalls@stanford.edu*

The putative generalizability and ease of production of molecular imaging probes targeted against mRNA are desirable for many applications. This study proposes a novel class of probes that seeks to overcome the obstacles of sensitivity and delivery normally associated with radiolabeled antisense oligonucleotides. Pre-trans-splicing molecules (PTMs) can specifically trans-splice a reporter gene into a target gene of interest by capitalizing on the cell's intrinsic spliceosomal activity. Mammalian cells typically use spliceosomes to remove introns and join exons together from a single endogenous pre-mRNA (cis-splicing). However, spliceosomes are also capable of splicing together two different pre-mRNAs, even if one or both of them are exogenous genes. The PTMs described here can be delivered to cells using existing gene delivery techniques and provide several amplificatory mechanisms that can enhance