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TITLE

Use of quantum dot functionalized cell-penetrating peptides in cells and microparticles in a venous thrombosis model

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Venous thromboembolism (VTE), that includes deep venous thrombosis (DVT) and pulmonary embolism (PE), is a major healthcare problem causing significant morbidity and mortality. An intense inflammatory response occurs with venous thromboembolism associated with the production of procoagulant microparticles (MP). Circulating cell-derived MP contribute to coagulation and amplification of thrombosis, they are present in the blood of healthy individuals and have been shown to increase in thrombotic diseases. How MP interacts with other cells in thrombogenesis is not fully understood, and there is a lack of suitable techniques and methods to evaluate this MP-cell cross talk. Elevated platelet-derived MP, endothelial cell-derived MP, and monocyte-derived MP concentrations are documented in almost all thrombotic diseases occurring in both venous and arterial beds.

Cell-targeting peptides have been used to develop actively targeted nanocarriers, including quantum dots, for therapy and imaging. In this talk, I will present our current efforts to develop methods for the internalization of quantum dots and nanoparticles into mouse platelet, lymphocyte and platelet derived MP in a mouse DVT model. In this model, internalization is performed using the cell-penetrating carriers PEP-1 and HIV-1 TAT peptides. Developing methods for this type of intracellular and intraparticle conjugation is critical for cell and MP identification. The interaction of DVT derived MPs with quantum dots and a discussion of possible clinical applications of these techniques will also be introduced. The ultimate purpose of our work is the standardization of these cell-penetrating peptide techniques into assays with clinical or research relevance in venous thrombosis.

Biography

Dr Antonio Peramo is Research Faculty at the Department of Oral and Maxillofacial Surgery of the University of Michigan. Dr Peramo completed his doctorate in Applied Physics at the University of South Florida working in polymer physics and glycosaminoglycan biology applied to cancer. At the University of Michigan he has worked in the area of biointegrative materials and tissue engineering applications in soft tissues. Currently, he is involved in developing methods for the physical characterization and use of nanoparticles for applications in vascular biology, including the use of cell-penetrating peptide carriers for the internalization of quantum dots in cells and circulating microparticles involved in deep vein thrombosis.