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seminar

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*Host: Dr. Dorleta Jiménez de Aberasturi*

# Exploring the Clinical Potential of SERS-based Raman Imaging to Improve Cancer Outcomes: Regulatory Concerns and Alternative Solutions

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Raman imaging with surface enhanced Raman scattering (SERS) nanoparticles has gained interest in the molecular imaging community due to its ultra-high sensitivity properties as well as its unique multiplexing capabilities. Nanoparticles have great potential as diagnostic contrast agents for cancer detection. Compared to their small molecule counterparts they can offer increased sensitivity due to their loading capacity and increased tumor binding efficiency due to the multiple targeting ligands displayed on their surface. Several groups have demonstrated the potential of this optical imaging technique with active tumor targeting SERS nanoparticles. Ongoing attempts towards developing new nano-based contrast agents have faced major problems in gaining regulatory approval due to their potential systemic toxicity and prolonged accumulation in vital organs. My lab has investigated the biodistribution of gold-silica Raman nanoparticles after various routes of administration (intravenous, intrarectal, and oral delivery) in living mice to assess toxicity. Some researchers choose to administer these nanoparticles topically to epithelial targets in order to mitigate the potential systemic administration toxicity issues. This approach is highly advantageous when coupled with endoscopic or intra-operative techniques as it resolves the low depth of penetration constraint often associated with optical imaging strategies and can provide important molecular information to clinicians during clinical procedures like endoscopic examination or surgical tumor resection. The focus of this talk will cover our preclinical evaluation of SERS nanoparticles as we assess their tumor targeting potential, biodistribution, and systemic toxicity post administration. I will also discuss my own experience in filing an application to the FDA as we attempt to clinically translate our SERS-based Raman imaging approach and new strategies we are taking to accelerate the clinical utilization of SERS nanoparticles to improve patient outcome