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Novel Technologies in Interventional Radiology

A panel of experts at RSNA 2021 presented recent technological breakthroughs in interventional radiology. These spanned advances in hybrid imaging, therapeutic agents and devices, robotics, artificial intelligence and practical uses of ablation software.

Dr S. Nathum Goldberg of Hadassah Hebrew University Medical Center and advisor to XACT Robotics discussed image guidance and robotics innovations. For imaging guidance, these innovations involved target visualisation through hybrid imaging (ultrasound plus computed tomography) and needle planning and navigation systems to reach nearly inaccessible tumours. Robotics can enable needles to move through guided trajectories without manual manipulation, even if the target moves. In addition to ease-of-use, a common theme was procedure time saved.

Dr Bruno Calazans Odiso of The University of Texas MD Anderson Cancer Center discussed the advantages offered by blending imaging modalities. Miniaturisation has allowed blended imaging diagnostics to become feasible. In particular, they enable the combining of procedures that generally require different imaging modalities to plan and perform. Consequently, this improves the patient workflow and cost utilisation (a 30% reduction).

Dr Odiso pointed out evaluating data and providing real-time decision support is a gap that future technology can address. He described his use of algorithm support in transarterial chemoembolisation and colorectal liver metastasis ablation. Notably, the enhanced ability to visualise tumours conferred a better ability to define the ablation zone and prevent tumour regrowth. With another prediction model, he can identify for which patients the procedure will provide long-term efficacy.

Dr Lynn Martin of Stanford University gave a high-level overview of machine and deep learning as applied to interventional radiology and a basic strategy for developing algorithms to provide decision support.

Dr Rony Avritscher of The University of Texas MD Anderson Cancer Center presented research literature on novel pharmacological therapies. One exciting avenue utilised hypoxia-activated drugs to target the local tumour environment is often hypoxic. He also discussed advances in cancer treatments using interferon, TLR, PARP, and vascularisation as therapeutic. Fluorescent liquid embolics and hydrogels provide opportunities for better visualisation, occlusion, and adjuvant therapies.

Dr Sarah White of the Medical College of Wisconsin discussed recent medical device technology innovations in radiology and the future. She highlighted the following:

Available now

- Active control stent deployment permits catheters to move around the tight corners.
- Lithoplasty uses high power acoustics waves to break up calcified plaques in arteries.
- Venous stents confer crush resistance to reinforced veins.
- Algorithm control of blood loss during thrombotic extraction. Full suction occurs when in the clot, but not on approach.
- Histotripsy uses sound energy to achieve non-thermal ablation.

In the near future

- Absorbable technology that can be used in temporary implantables.

Source: RSNA

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