**Pitfalls & Artefacts 3 (Dosimetry) - Interactive**
**Monday, October 15, 08:00-09:30**

**Session Title**
**Advantages and Limitations of Voxelized Dosimetry for Intra-Arterial Liver Therapy**

**Chairpersons**
Mark Konijnenberg (Rotterdam)
Carlo Chiesa (Milan)

**Programme**

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| 08:00 - 08:30 | Stephan Walrand (Brussels): Visualisation of the Activity in the Liver After Radioembolisation: Is it Noise or a Real Indication of the Arterial Distribution? |
| 08:30 - 09:00 | Michael Ljungberg (Lund): Voxelized Dosimetry Options from Mean Dose to Voxel Dose Distributions and Beyond or Room for Improvement in Image Reconstruction? |
| 09:00 - 09:30 | Marnix Lam (Utrecht): Voxel-Based Dosimetry Treatment Planning for Intra-Arterial Liver Cancer Therapy - What are the Options? |

**Educational Objectives**
1. Learn the small-scale activity distribution and dosimetry models for intra-arterial radionuclide therapy and how to recognize its imagery.
2. Realize the instrumental limits in the use of voxelized dosimetry, being able to identify imaging and reconstruction artefacts from pathologic features.
3. Knowledge of the options to perform dosimetry guided treatment planning for intra-arterial liver cancer therapy with $^{90}$Y or $^{166}$Ho, with dose-volume constraints for liver and tumour.

**Summary**
Traditionally therapy planning for radioembolisation procedures with $^{90}$Y or $^{166}$Ho microspheres proceeds through evaluation of mean absorbed doses projected to whole liver or liver segments. These dosimetry projections are based on pre-therapy scout scans after $^{99m}$Tc MAA or low activity $^{166}$Ho microspheres intra-arterial administration, indicating possible extra-hepatic shunting and targeted therapy volumes. Post-therapy verification of activity delivery by PET or bremsstrahlung SPECT for $^{90}$Y and SPECT or MRI for $^{166}$Ho open the field of performing 3D-dosimetry. Iso-dose curves and dose volume histograms possibly can deliver valuable information on safety and efficacy of intra-arterial liver therapies. Sub-voxel features can be incorporated in the dose distribution and some of its features can already be derived in the pre-therapeutic scans. Artefacts in the activity map, however, can easily arise in the image reconstruction process and should be properly addressed. The field of therapy planning in the target region is becoming more and more an option. Tumour absorbed dose optimization together with dose-volume constraints for healthy liver exposure slowly brings this type of therapy within the realm of truly dosimetry guided treatment planning.

**Key Words**
Radioembolisation, Y-90 microspheres, Ho-166 microspheres, dosimetry, image reconstruction, treatment planning