CARDIOVASCULAR RADIATION THERAPY

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PREPARED BY
RON WAKSMA, MD
BALRAM BHARGAVA, MD

RENAISSANCE WASHINGTON, DC HOTEL
WASHINGTON, DC

PRESENTED BY
Cardiovascular Research Institute
Cardiovascular Brachytherapy Institute
Washington Cancer Institute
Washington Hospital Center

SYLLABUS
Abstract #35

Automated Synthesis of Highly Concentrated Re-188-MAG3 for Intracoronary Radiation Therapy

Asan Medical Center, University of Ulsan, Seoul, KOREA; Oak Ridge National Laboratory, Oak Ridge, TN.

Purpose: Intracoronary radiation using a balloon catheter filled with liquid Re 188 MAG3 has advantages of uniform dose distribution, versatile application, and low radiation dose in case of balloon rupture. We developed an automated synthesis system to obtain highly concentrated Re-188-MAG3 with minimum radiation exposure to personnel involved in the synthesis.

Methods: The automated system consisted of pneumatic syringe pumps, reaction vessels, an evaporation set with heating pads, and a purification and formulation set including Sep-Pak cartridges. Reaction solution was moved by pneumatic syringe pump. Reaction vessel and evaporation set were in the shape of cylinder to minimize loss of radioactivity and maximize heating efficiency. Concentration and purification of Re-188-MAG3 were performed using Sep-Pak cartridges.

Results: We have performed 50 trials of Re-188-MAG3 synthesis. Re-188-MAG3 was synthesized with radiochemical yield of 80 - 85%, and radiochemical purity of 95 - 99%. Total synthesis time was 40 +/- 10 min, which depended on initial Re-188 perrhenate volumes. We obtained highly concentrated Re-188-MAG3 (14 to 17 GBq/2 ml) regardless of initial Re-188 perrhenate volumes. Total treatment time to deliver 15 Gy at 1.0 mm from the balloon surface ranged from 1.5 - 4.5 min.

Conclusions: We developed an automated Re-188-MAG3 synthesis system which is capable of routine production of highly concentrated Re-188-MAG3 in a reproducible and efficient manner.