



FIG. 10.7 Schematic view of the infusion of Y-90 glass microspheres into tumors in the liver. Bottom inset shows YAS microspheres along with a human hair and inset at the top shows a liver with multiple tumors (light spots).

For the development of the first bioactive glass-based seeds applied in brachytherapy, a biodegradable glass would be proper because the ^{125}I seeds are temporary and a second surgery is needed to remove them (Aspasio et al., 2016a). In 2003, Roberto et al. reported the bioactive glass manufactured by sol-gel processing, with the radioisotope ^{153}Sm incorporated in the $\text{SiO}_2\text{-CaO}$ system to replace ^{125}I seeds used in prostate cancer treatment by brachytherapy (Roberto and Magalhães, 2003). The objective was to obtain glasses containing the ^{153}Sm radioisotope after neutron activation. ^{153}Sm was chosen because this element has a short half-life of 46.27 hours, which will impart more energy on the tumor in a short time, compared with 54.9 days of ^{125}I . The higher porosity and surface area associated with the typical structure of the glass produced by sol-gel, together with the varying material composition, allows researchers to obtain materials with different solubility and therefore different degradation rates and absorption in vivo. Their results showed that an Sm concentration between 4.5 and 11.5 wt%, or between 1.5 and 4.5 wt% for the enriched one, in the glass structure would be required to present activity similar to the ^{125}I seeds.