Preparation of a fine powder of 2-deoxy-2-[18F]fluoro-D-glucose suitable for inhalation to diagnose lung diseases by means of PET

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Fine 2-deoxy-2-[18F]fluoro-D-glucose (18FDG) powder was obtained by adding diethyl ether into a methyl alcohol solution of 18FDG and other sugar as seed. When micronized particles of sodium N-acetyl-neuraminate (Neu5Ac-Na) were used as seed crystals, particles containing 18FDG were obtained and 80% of them were smaller than 10 μm in size. More than 60% of these crystals were 4-6 μm in size. In a preclinical study of forced inhalation in a dog, the 18FDG fine powder was mainly distributed in the trachea. The radioactivity in the trachea then increased once and a gradual decrease followed. The radioactivity was transferred into the blood and radioactivity incorporation into the heart was observed. After a normal volunteer inhaled 18FDG dry powder aerosol, the radioactivity was found in the respiratory tract and the peripheral area of the lung by means of PET. Absorption and in vivo dynamics of the 18FDG were also analysed.

Key words: PET study, 18FDG dry powder aerosol, Mucociliary clearance