

diameter was calculated after Davies' formula by measuring time required for sedimentation and number of aerosol was estimated by counting radioactivity.

Regarding number distribution of  $^{99m}\text{Tc}$ -albumin aerosol, mode diameter ( $d_{\text{mod}}$ ) was  $0.85\mu$  with a half-width value ( $\lambda$ ) of  $0.22\mu$  and median diameter ( $d_{\text{mod}}$ ) was  $0.198\mu$  with geometric standard deviation ( $\sigma_g$ ) of 1.63. Regarding count distribution,  $d_{\text{mod}}$  was  $1.9\mu$  with  $\lambda'$  of  $2.2\mu$  and  $d_{\text{mod}}$   $4.2\mu$  with  $\delta g$  of 3.81.  $^{99m}\text{Tc}$ -albumin microsphere of predetermined size was used to validate the size measurement of  $^{99m}\text{Tc}$ -albumin aerosol with a favorable agreement.

In order to simulate the human trachea, the main and lobar bronchi, glass or vinyl tubes of 15, 10

and 6 mm in diameter, straight or curved in shape, and/or with partial obstruction, were used to determine the mode of aerosol deposition. Imaging was made with a scintillation camera. Aerosol deposition was uniform in straight tubes, increased at the site of curvature, or marked forming a tail distal to narrowing of the lumen. When a mass was placed in the lumen to make it partially obstructed, a round spot was seen proximally and a tail-like deposition pattern distally. A slight increase in radioactivity was seen at the site of bifurcation which was simulated after the carina.

Further basic studies are currently under way in the direction of quantitative analysis of aerosol deposition and deposition patterns in different flow rates or in different experimental models.

### **Auscultation and Radioaerosol Scintigraphy. Their Complementary Nature**

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A rhonchus, adventitious lung sound which arises in the bronchopulmonary tree, is an important auscultatory finding which suggests partial obstruction of the airways. However, the accurate site of stenosis can not be determined by auscultation alone. On the other hand, radioaerosol scintigraphy has proven to be a valuable adjunct to demonstrate partial as well as complete obstruction of the airways. The purpose of the investigation was to substantiate a rhonchus with radioaerosol scintigraphy, demonstrating the site of stenosis.

With bronchial carcinoma or tuberculous stricture whose major bronchus was partially

obstructed, a clear hot spot of aerosol was observed in the aerosol scintigram at the obstructed site. The origin of rhonchi which were prominent in the diseased lung could be localized accurately by the spot.

With bronchial asthma, multiple hot spots were recognized in the hilar area of both lungs. Rhonchi were diffusely audible in both lungs. These rhonchi and hot spots disappeared during a period of attack free.

In summary, auscultation and radioaerosol scintigraphy have a complementary feature, a combined use of which should facilitate a diagnosis of bronchial obstruction.