

## **SPUTUM SCREENING FOR LUNG CANCER ON RADON EXPOSED URANIUM MINERS: A COMPARISON OF SEMI-AUTOMATED SPUTUM CYTOMETRY AND CONVENTIONAL CYTOLOGY**

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**Introduction:** Preparing for a prospective study on early detection of lung cancer, the correlation between the outcome of semi-automated sputum cytometry (ASC) and conventional cytology (CY) was examined in former uranium miners with pneumoconiosis.

**Material and methods:** In 1517 uranium miners sputum was collected either spontaneously or induced by inhalation of 3% saline aerosol and collected in Saccomanno fixative with addition of 0.1% dithiothreitol. After centrifugation, the cell pellet was resuspended, smeared on glass slides and stained with thionin. Image cytometry was performed with an automated image cytometer, the Cyto-Savant. Results of ASC and CY were compared to the final diagnosis.

**Results:** Induced and spontaneous sputum collection in subgroups of 500 patients each resulted in  $7.4 \pm 4.2$  ml (median 6 ml) after saline induction compared to  $10.8 \pm 4.9$  ml (median 10 ml) after spontaneous sputum. 120 of 1517 sputum specimens were classified as suspicious (grade II) and another 18 as highly suspicious (grade III) by ASC. Euploidy Index (EI) as a parameter of DNA distribution of normal and suspicious epithelial cells on average was  $0.389 \pm 0.244$  in grade III ASC. Within this group, 9 samples were classified by CY as tumour cell positive, 7 as severe, and 1 each as mild or moderate dysplasia. In the group with grade II ASC (EI  $0.135 \pm 0.035$ ), 7 were tumour cell positive, 27 classified as severe dysplasia or CIS, 20 as moderate and 19 as mild dysplasia. 27 contained metaplasias and 18 were normal or inflammatory. 1358 samples were classified as benign (grade I) by ASC. EI of samples from grade I was significantly smaller ( $0.064 \pm 0.014$ ,  $P < 0.0005$ ) compared to grade II and III groups. Only 5 samples were classified by CY as severe dysplasia, 6 as moderate and 34 as mild dysplasia, 173 as metaplasia, the others were normal or inflammatory. 21 samples were inadequate for ASC and CY. At present 23 tumors were found in final diagnosis. Taking EI at a threshold value of 0.10 a sensitivity of 87% at a specificity of 92% was found for ASC, while CY with severe dysplasia as the detection threshold had a sensitivity of 83% at 97% specificity.

**Conclusions:** Along with modern radiological procedures and molecular genetic markers, ASC and CY should be included in a controlled prospective randomized study on early detection of lung cancer on the high risk group of former uranium miners.