

nents of the bronchial wall apart from the mucous glands and cartilage) was measured in numerous bronchi from each lung. This was done by tracing each component at a suitable magnification on a Projectina microscope, and then measuring the traced area on an image analyser. The bronchi were then divided into four groups of the following external diameters: (1) 3-3.99 mm, (2) 4-4.99 mm, (3) 5-5.99 mm, (4) 6-6.99 mm. Significant differences ( $P < 0.01$ ) were found in the mean areas of the mucous glands in the control and obstructed patients in groups (3) and (4), and of the mean area of cartilage in groups (1) and (2). The latter probably indicates that dividing the bronchi into groups by size rather than generation leads to comparison of different generations of bronchi, and the implication of this on luminal size will be discussed.

#### Lung Cancer in Young Adults

A. KENNEDY (*Sheffield Royal Infirmary and University of Sheffield*)

This is an account of 36 cases in which the diagnosis of lung cancer was established histologically before the age of 40 years. The dominant feature of the pathology is that two-thirds of the tumours were oat cell carcinomas, and that all but one of the patients under 33 had oat-cell tumours. Only three patients were known to be non-smokers; four tumours arose in lung scars but no other aetiological factor was evident. Of the 10 women in the series three were pregnant at the time of appearance of the tumour or its metastases. There was a high death rate which is attributable to the large proportion of oat-cell tumours. The only long-time survivors are patients who had tumours other than of the oat-cell type and who were seen early enough for radical surgery. One of the patients had a pulmonary blastoma but she is alive 14 years after pneumonectomy and 11 years after the appearance of metastases.

#### Glandular Metaplasia and Mucin Production in Transitional Cell Carcinomas of Bladder

A. M. WARD (*Department of Pathology, University of Sheffield*)

Three hundred and forty cases of transitional cell carcinoma of bladder seen in the Urological Unit, United Sheffield Hospitals, between 1967 and 1970 are reviewed. Of these 340 cases, 25-30% show evidence of mucin production, and a similar, but not necessarily identical

percentage show some form of adenomatous metaplasia or glandular configuration. Mucin production and adenomatous metaplasia do not affect the grading of any particular tumour, and are seen with equal frequency in low, intermediate, and high grade tumours. There is no relationship to infection or prior instrumentation, and the changes have no apparent prognostic significance. Tumours showing mucin production and adenomatous metaplasia emphasize the metaplastic potential of the urothelium; they will behave biologically as transitional cell carcinomas, and should be treated as such.

#### Ultrastructural Evidence of Secretion in Hormonally Active Oat-cell Carcinomas: Origin of One Such Tumour in the Pancreas

B. CORRIN, E. D. GILBY, MARY MCMILLAN, J. PATRICK, AND H. SPENCER (*St. Thomas's and Lewisham Hospitals, London*)

An electron-microscopical study of 48 lung tumours identified characteristic cytoplasmic granules in oat-cell carcinomas and bronchial carcinoid tumours, but not in large cell anaplastic carcinomas. The granules were similar to those found in the cells of many endocrine glands. Sparse cells containing such granules were also identified in normal bronchial epithelium. These resembled intestinal Kultschitzky cells and are believed to represent the cell of origin of both the bronchial carcinoid and oat cell carcinoma (Bensch, Corrin, Pariente, and Spencer, 1968). If this is so, why do oat-cell carcinomas not arise in the gastrointestinal tract, and what is the fine structure of oat-cell carcinomas associated with inappropriate endocrine activity?

Two cases of oat-cell carcinoma associated with ectopic ACTH production are presented, one arising in the lung, the other in the pancreas. Electron microscopy of the pulmonary neoplasm showed that the cytoplasmic granules were more plentiful than in non-secretory tumours, supporting the suggestion that they represent secretory activity, even in those tumours in which hormonal activity is not clinically manifest, and that all oat-cell carcinomas may be regarded as latent endocrine neoplasms. In the second case necropsy showed that the tumour was limited to the tail of the pancreas, local lymph nodes, and the liver. Detailed examination of the lungs disclosed no new growth although histologically the tumour was a typical oat cell carcinoma. McKeown (1952) has reported two oat-cell carci-

nomas arising in the oesophagus, and it would appear that although an extrapulmonary origin is rare these tumours are not restricted to the lung.

#### References

- Bensch, K. G., Corrin, B., Pariente, R., and Spencer, H. (1968). Oat-cell carcinoma of the lung. Its origin and relationship to bronchial carcinoid. *Cancer. (Philad)*, **22**, 1163-1172.  
McKeown, Florence (1952). Oat cell carcinoma of the oesophagus. *J. Path. Bact.*, **64**, 889-891.

#### Asbestos in Tumours

C. GOLD (*M.R.C. Pneumoconiosis Unit, Penarth, Glamorgan*)

Epidemiological evidence suggests that the four main types of asbestos, although all carcinogenic in animals, do not appear to be equally implicated in the causation of human tumours. Furthermore, in the three types of asbestos-related malignant lesions there are obvious site and behavioural differences between lung carcinoma and mesotheliomas of pleura or peritoneum. Variable factors such as type and source of asbestos, fibre characteristics, site of deposition, cellular, chemical and physical reactions, and total dose of dust may be all, or in part, responsible. Thus it would seem important to establish among other things if human neoplasia are related only to certain types of asbestos or if there is a dose-response relationship.

Bronchial carcinomas tend to have a high lung asbestos content while a pleural mesothelioma lung can contain relatively little asbestos. On the other hand, in peritoneal mesotheliomas the lungs may have an intermediate value or sometimes a considerable amount of asbestos in them without having a pleural or intrapulmonary tumour. With these apparent paradoxes a correlative investigation of both the dust and the histopathological changes seem justified. This approach is illustrated by results in selected referred human lung cancers and mesotheliomas.

The simple KOH extraction method yields a concentrated dust residue suitable for quantitative and morphological study with the light microscope and useful for the identification and typing of asbestos in the electron microscope. In experimental animal work with pure exposures to the individual types of asbestos very high fibre counts can be obtained and virtually pure dust reclaimed.

#### Experimental Tumour Induction in the Rat Nervous System by N-Ethyl N-Nitrosourea

E. L. JONES, W. THOMAS SMITH, AND C. E. SEARLE (*Departments of Pathology and*