

The only instance of such a study in a mammal appears to be that of Jackson and Brues who examined the growth of a malignant ovarian teratoma of a mouse through 13 generations of transplants.

#### REFERENCE

JACKSON, E. B., and BRUES, A. M. (1941) *Cancer Res.*, **1**, 494.

**Dr. C. L. Oakley** showed reconstructions of slices of a teratoma of ovary of a young bitch.

**Dr. L. Foulds** referred to difficulties in the experimental analysis of mixed tumours. If transplantation succeeded it was probable that even if multiple neoplastic components were present, one would outgrow the others. Primarily simple tumours, however, were observed to become complex during the course of serial transplantation as a result of changes induced by the parenchyma in the stroma or invaded tissues. Dr. Foulds agreed with Professor Willis in placing the teratomata in a group by themselves but thought that the majority of so-called "mixed" tumours were primarily simple tumours with one neoplastic component which had become complex as a result of secondary changes in the stroma or invaded tissues. There was good experimental evidence for the sarcomatous transformation of the stroma in the course of transplantation of mammary carcinomata in mice. At one stage the tumours appeared to be mixtures of sarcoma and carcinoma but subsequently the carcinoma was eliminated and the tumour was then transplantable as a pure sarcoma.

### Some Glandular Tumours of the Dog

By E. COTCHIN, M.R.C.V.S.

(1) *The "sweat gland adenoma"*.—Visible sweating in dogs is generally confined to the pads of the feet, but this is not due to the absence of glands resembling sweat glands from the general body surface. The dog's sweat glands, unlike those of man, open, except on the pads, into hair follicles and not on to the skin surface (Speed, 1941) and do not normally produce visible sweat; they resemble the apocrine glands in structure.

A few well-defined tumours of the skin of dogs have been encountered which are thought to be of sweat gland origin. They are encapsulated, may be lobulated, and may ulcerate. They consist of epithelial cells resembling basal cells lying in spaces in a fibrous stroma and tending to form long rope-like columns and structures resembling starfish in shape. The latter, which appear to be nodes from which the cell columns radiate, are seen in some other skin tumours, and are composed of a peripheral layer of cells tending to lie at right angles to the stroma and of a central mass of spindle-shaped cells. The cell columns are from one to two cells thick, the cells lying at right angles to the length of the column, and there is no lumen. The arrangement of the cells in the columns, and the relation of the columns to the stroma, are those seen in a developing sweat gland before it has formed a lumen. The name "basal-cell carcinoma" sometimes applied to these tumours is misleading, as, despite the presence of mitoses and the apparently invasive nature of the growth of the cell columns in the stroma within the limits of the tumour capsule, they are not malignant.

(2) *The "anal adenoma"*.—This tumour was seen 30 times in a series of 550 dog tumours examined. There are several kinds of glands in the anal region of the dog—the internal anal glands at the junction of rectal mucosa and anal canal epithelium, the glands in the walls of the anal sacs, the local sebaceous and sweat glands, and finally the circumanal glands from which the anal adenoma develops. These circumanal glands are modified sebaceous glands of unknown function. They consist of solid alveolar masses, their ducts usually opening into hair follicles. The alveoli consist of small darkly-staining peripheral cells, and large cytoplasm-rich central cells; in sections, the latter often appear to be separated by canaliculi, and from their supposed method of secretion they have been called "hepatoid glands" by Schaffer (Bolk *et al.*, 1939). The circumanal glands occur only in canines. They are present

in both sexes at birth, but are best developed after puberty. They form a ring around the anus, but are most numerous above it; tumours of these glands are most often seen above the anus, but they may occur anywhere around the anus, or even at the base of the tail or the side of the prepuce. The tumours do not form metastases, but they have a vascular stroma and are liable to bleed, and their position exposes them to infection.

Tumours of the circumanal glands occur almost exclusively in males, and Smythe (1945, 1946) has introduced a method of treatment with stilbœstrol which often has satisfactory results; these are, however, sometimes only temporary. The circumanal gland tumour occurs in old dogs, and it is possible that it should not be classed as a neoplasm, but as an example of those hyperplasias of endocrine origin which occur in old dogs, such as hyperplasia of the interstitial cells of the testis or hyperplasia of the prostate.

(3) *Mammary tumours of the bitch.*—This is the commonest tumour we are asked to examine—110 of the 550 tumours mentioned were from the mammary gland. The tumours usually occur in older animals, are often well encapsulated, and may be multiple. They tend to be more frequent in the posterior pairs of mammary glands, and usually grow slowly and intermittently over months or even years.

At least one-third of the 110 tumours were of the mixed type, showing, in addition to the epithelial component, myxomatous fibrous tissue, cartilage, pseudocartilage, and sometimes bone. The cartilage and bone are apparently formed by metaplasia of the stromal connective tissue, and the pseudocartilage by the appearance of interstitial matrix between the epithelial cells. Some have claimed that the pseudocartilage is true cartilage of epithelial origin; for example, Allen (1940) found the material to have the staining and biochemical properties of cartilage, and he considers that the absence of a perichondrium around the pseudocartilage is not evidence of its non-cartilaginous nature, but is merely what would be expected if it was, in fact, of epithelial origin. The myxomatous and other changes appear to affect mainly the intralobular as opposed to the interlobular tissue, and a study of the changes in this tissue during the normal sexual cycle might provide a clue to the significance of the structure of the tumour.

An attempt has been made to assess the nature of 69 tumours from their histological structure: 29 were thought to be certainly benign, and 9 probably so; 10 were thought to be malignant, and 10 probably so; the nature of 11 was doubtful. These figures are probably misleading as to the actual proportion of benign to malignant cases that might be encountered in practice, partly because clinically quite benign tumours may show a disordered histological structure suggesting malignancy. Dobberstein and Matthias (1942) consider that not more than 10% of the mammary tumours of the bitch are truly malignant as shown by the production of metastases, and they show that many of the descriptions of malignant tumours in the literature were based on insufficient evidence of malignancy or of mammary origin.

With regard to the possible ætiology of the mammary tumours of the bitch, they seem to be commoner in those bitches that have bred infrequently or not at all—this recalls the incidence of “pyometra” in the bitch, which is possibly due to a hormone imbalance provoked or accentuated by repeated pseudo-pregnancies. It is possible that retention of milk may account for the more common occurrence of the tumours in the posterior glands, as they are larger and have larger teats and may not be so thoroughly milked out by the pups even when true pregnancy has occurred. Huggins and Moulder (1944) found that the mammary glands of the bitch undergo regional involution, some degree of functional activity often being retained longer in the posterior than in the anterior glands.

One case of what appeared to be a typical mixed mammary tumour was seen in a male dog, and others have been recorded.

## REFERENCES

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**Miss J. O. Joshua:** Clinically the anal tumours described by Mr. Cotchin are invariably benign: they occur in a variety of forms, from single circumscribed masses to diffuse involvement of the entire anal rim. This rather supports the suggestion that the condition is a hyperplasia and not neoplasia, as also does the fact that, prior to the introduction of stilbœstrol therapy, treatment of these tumours by simple expression of the contents followed by cauterization of the cavity was successful. An interesting point in connexion with stilbœstrol treatment is that in addition to regression of the tumours there is almost invariably improvement in the general health of the dog, in spite of the fact that the owner has not as a rule complained of general symptoms shown by the dog prior to the initiation of treatment.

The condition occurs in dogs over middle age, in most cases household pets which have had little or no sexual activity; one case had occurred in a popular stud dog which had been over-worked during his breeding life; both might, however, be attributed to hormonal disturbance.

With regard to mammary neoplasms in bitches, these again usually occur in bitches which have not bred, in fact I can recall only one case of mammary neoplasia in a bitch which has been regularly bred. The phase of most rapid growth of these neoplasms nearly always coincides with the period of pseudo-lactation following œstrus. Frequently small nodules of tumour tissue have been present for a long period before active enlargement occurs. It is inadvisable to undertake surgical interference during the period of pseudo-pregnancy.

In the small percentage of cases in which there are malignant changes metastasis has often occurred not via the lymph nodes, but direct to the lungs, where multiple highly malignant tumours have developed resulting in rapid death of the patient.

**Mrs. M. Mandeville and Professor A. Haddow** read a paper on "Melanoma Occurring in the Viviparous Fish *Heterandria formosa*, and associated with Sex Reversal".

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## DISCUSSION ON THE SPAN OF LIFE

**Sir Edward J. Salisbury:** The problem of the span of life is of both economic importance and great scientific significance. But in this connexion the question immediately arises: Why do organisms die? For those who think of a plant merely as a mechanism concerned with the business of living the analogy with a machine that gradually becomes less efficient with age and is liable to succumb to a variety of causes that add to the strain upon the mechanism is familiar. If the immediate cause of the death of a tree be its uprooting in a storm or its destruction by diseases or pests, it is nevertheless a fact that the saplings commonly survive these trials whereas the old trees perish. If accidents be the immediate cause, impaired vitality is the more remote one.

If we employ the usual, and may I add rather equivocal, meaning which attaches to the phrase "span of life" it is true to say that the maximum longevity of certain plants far exceeds that of the longest lived animals. For example, the Mexican Swamp Cypress that attains perhaps two millenia, or the famous Sequoia Gigantea of California that perhaps attain to over four millenia, are of a different order of life span to that of a fish, such as the famous Pike of Kaiserslautern, which is alleged to have attained an age of 267 years, or of an elephant, or even a tortoise which may attain to over 200 years. But, in fact, we are in reality comparing different things because the tissues of the old animal occupy the same position in space as those of the young, a condition essential to a mobile organism that would be handicapped by an ever-increasing bulk, whereas in the plant there is no such in situ renewal but a juxtaposition of juvenile tissue. Though span of life in a higher animal means something different from that of a higher plant, it will I think be true to say that the distinction is a concomitant of the high degree of differentiation of advanced members of the two kingdoms, the sedentary and mobile habits impose a different type of longevity on each.