

others present epithelial hyperplasia as their most prominent morphological feature, being identified thereby as precancerous; while a third group is definitely neoplastic. Whereas a reasonable amount of information has existed for some time concerning the histologic structure of the tumorous formations, little was known for many years in regard to the other two types of lesions mentioned. It is only in recent years, through several observations of Rössle and Teutschlaender and the work of Gay and Ferguson, that histological data became available concerning some of the moderately early changes occurring in the submucosa and mucosa of the bladder of the dye workers. The two last-mentioned authors rendered the following description of these lesions, from which they drew certain conclusions in regard to the formative mechanism of aniline tumors.

The terminal capillaries in the mucosa become dilated and surrounded by lymphocytes. The vessels resemble miniature varices and are composed of thin-walled spaces, lined with endothelium but lacking in smooth muscle. Somewhere in the vicinity there is usually a vessel showing concentric proliferation of the endothelium. The lumen of such a vessel consequently is narrowed or occluded, and this plausibly explains the dilatation of its afferent capillaries. Increased intracapillary pressure plus continued action of the toxic agent may then result in further endothelial proliferation with the formation of new vascular spaces. The occluding mass of endothelium is gradually replaced with connective tissue, which becomes hyalinized. A natural result of the congestion is exudation. Edema and a few cells from the blood are frequently to be seen in the surrounding tissue. The presence of numerous lymphocytes and occasional eosinophils in the subepithelial tissue suggests chronic irritation. In the early lesions the epithelium and connective tissue are inactive. Ferguson assumed that the next step is fibrosis and the growth of new capillaries beneath the basement membrane of the mucosa, followed by rapid multiplication of the basal epithelial cells of the mucosa. The hyperplasia of these cells plus the activity of the submucosa causes the mucosa to become raised and at a later stage to form papillary projections, subsequent to which the neoplastic basal cells break through the superficial layers with resultant formation of a typical papillary carcinoma. Gay, on the other hand, noted that the vascular lesion may disappear and the area remain normal or there may appear at this site later on an epithelial tumor. The latter event is characterized microscopically by a variety of changes. The cells may become vacuolated. Small cysts are formed, and there may be cystitis cystica. Often the epithelium is atrophied locally. The earliest neoplastic lesion consists of a proliferation of the basement layer of the epithelium in the form of a simple projection of the vesical epithelium with a mass of blood vessels extending into it from its base. In other instances the proliferation shows a downgrowth, which may extend under the adjacent normal epithelium.

The histological structure of the aniline tumors is stated to be identical