

***Liyana Hewage N.S.***

## **HISTOPATHOLOGY OF ORAL SQUAMOUS CELL CARCINOMA (OSCC)**

***Tutor: PhD, Associate professor Tishchenko G.V.***

*Department of Pathological Anatomy.*

*Gomel State Medical University, Gomel*

Oral squamous cell carcinoma (OSCC) is the most common malignant tumor of the oral cavity, arising from the stratified squamous epithelium and accounting for the majority of oral cancers worldwide. It develops through a multistep process that includes epithelial dysplasia, carcinoma in situ, and eventual invasion into the underlying connective tissue. Despite advances in research, OSCC remains a significant health concern due to its aggressive biological behavior and complex pathogenesis. The development of OSCC is strongly associated with environmental and lifestyle related carcinogens, particularly tobacco and alcohol, as well as infection with high-risk human papillomavirus. At the molecular level, genetic alterations such as mutations in TP53, inactivation of p16, and dysregulation of signaling pathways including EGFR and PI3K/AKT play a crucial role in tumor initiation and progression.

Histopathological examination remains the gold standard for the diagnosis of OSCC, as it provides essential information regarding tumor morphology, differentiation, and invasive properties. A defining diagnostic feature is the invasion of dysplastic squamous epithelial cells through the basement membrane into the connective tissue stroma. Microscopically, OSCC is characterized by irregular islands, nests, or cords of malignant epithelial cells infiltrating the surrounding stroma in a disorganized pattern. The degree of differentiation varies, with well differentiated tumors showing prominent keratinization, including keratin pearl formation and intercellular bridges, while poorly differentiated tumors exhibit minimal squamous differentiation and increased cellular atypia.

The cytological features of OSCC include cellular and nuclear pleomorphism, hyperchromatism, an increased nuclear to cytoplasmic ratio, and numerous atypical mitotic figures, reflecting high proliferative activity. Individual cell keratinization may also be observed. The surrounding connective tissue stroma often demonstrates a desmoplastic response, characterized by dense fibrous tissue formation, along with a chronic inflammatory infiltrate predominantly composed of lymphocytes. Additional histopathological parameters such as depth and pattern of invasion, as well as perineural and vascular invasion, are important indicators of tumor aggressiveness and prognosis.

Immunohistochemical analysis is an essential adjunct in the evaluation of oral squamous cell carcinoma (OSCC), providing molecular level insights that complement routine histopathology. It involves the use of specific antibodies to detect protein expression within tumor cells, thereby helping to characterize tumor origin, proliferation, and biological behavior. Commonly used markers include Ki-67, which indicates proliferative activity; p53, reflecting tumor suppressor gene alterations; and cytokeratins, which confirm epithelial differentiation. Additionally, markers such as p16 are useful in identifying HPV associated OSCC, while E-cadherin and vimentin help assess tumor invasion and epithelial mesenchymal transition. These immunohistochemical findings aid in evaluating tumor aggressiveness, predicting prognosis, and sometimes guiding therapeutic decisions. Thus, when combined with histopathological features, IHC enhances diagnostic accuracy and provides a more comprehensive understanding of OSCC progression.

In conclusion, oral squamous cell carcinoma is a significant malignancy characterized by progressive epithelial transformation and invasive growth driven by molecular alterations. Histopathological examination remains essential for definitive diagnosis, with key features including epithelial dysplasia, invasion beyond the basement membrane, keratinization, and cytological atypia. The degree of tumor differentiation and pattern of invasion provide important insight into its biological behavior and prognosis. Overall, understanding these histopathological characteristics is crucial for accurate diagnosis and evaluation of OSCC.