

## Fact Sheet

## Oral Cancer

Oral cancer refers to cancers that develop on the tongue, oral mucosa (tissue lining the mouth and gums), and on the floor of the mouth. There are several types of oral lesions that have the potential to become cancerous. These include white lesions (leukoplakia), the most commonly diagnosed precancerous lesions in the mouth, and red, velvet-like lesions (erythroplakia). Smoking and/or the frequent consumption of alcohol typically cause these lesions, which have the potential to develop into an oral cancer. Of those that become cancerous, about 90 percent are a type of tumor called squamous cell carcinomas.

### Yesterday

- When doctors or dentists noticed a suspicious lesion in a patient's mouth they could recommend a painful biopsy and a long wait for the patient for laboratory results indicating whether the lesion was cancerous. Alternatively, they could monitor the lesion every few months to look for changes indicating cancer.
- This dilemma was largely due to the lack of needed chair-side equipment to properly visualize the lesions, many of which are small and difficult to identify.
- In addition, health professionals knew little about the specific causes of cancer. Aside from two known risk factors for oral cancer, smoking and drinking alcohol, health professionals were unclear whether cancer was a viral or a genetic disease. Cancer remained a molecular "black box" that scientists would not open and explore more fully for several decades.
- By the time they were diagnosed, oral cancers often were far advanced and deadly. Treatment options usually consisted of shrinking the tumor with radiation followed by disfiguring head and neck surgery to remove it.
- This public health tragedy resulted in increased outreach to those at greatest risk – people who regularly smoke and/or consume alcohol – to alert them about the early signs of oral cancer, and the benefits of early treatment.
- Scientists now know that oral cancers, like all forms of cancer, arise from a series of acquired mutations that disrupt specific genes that control the normal growth cycle of our cells. Building on this awareness, scientists assembled comprehensive catalogues of the genes expressed in a developing oral cancer and profiled the changes in expression patterns as the tumors progress. Similar catalogues are being assembled for the proteins made in oral cancer cells.
- The combination of scientific discovery and technological progress resulted in the development of new chair-side tools that allow health professionals to better visualize and evaluate the molecular characteristics of suspicious lesions before suggesting a biopsy.
- Treatment continues to improve. The past five decades have brought needed refinements to radiation therapy and surgical interventions, and the introduction of chemotherapy has been helpful in fighting the spread of the oral cancer to sites elsewhere in the body. For the first time, scientists also know enough about the molecular wiring of tumor cells to begin to design targeted molecular therapy to kill tumor cells with greater precision and efficiency.

### Today

- Oral cancer is the sixth most common cancer in the world. Approximately 12,000 Americans die of oral cancer each year. These deaths are particularly tragic because, in most cases, they can be prevented with early diagnosis and treatment.

## Tomorrow

- As public awareness and the tools to detect precancerous lesions in the mouth continue to improve, fewer Americans than ever will die needlessly from oral cancer. For instance, scientists are now harnessing the power of nanotechnology to engineer devices that can detect within human fluids and tissues the abnormal molecules that are indicative of a developing tumor. Other scientists are developing in-office diagnostic devices to detect proteins in saliva associated with a developing tumor.
- Treatment will improve as targeted molecular therapy becomes a reality. Research is defining the signaling pathways and networks that drive the growth of oral cancer cells. This information will result in novel anti-cancer treatments that target the particular molecular deficiencies in each individual oral cancer patient.
- Unlike tumors in the kidneys, prostate, or other internal organs, oral cancers are readily accessible. Therefore, research on these more easily studied oral cancers may allow for rapid accumulation of valuable information for developing improved cure rates for both oral and other cancers.

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