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## ACTION OF OXYGEN ON CHRONICALLY INFLAMED GINGIVAL TISSUE

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OXYGEN was introduced in the treatment of gingival inflammation by W. F. Dunlop, who used a specially medicated oxygen which was carried from the oxygen tank through a pressure reducing valve to the gingival tissues. With approximately from 20 to 30 pounds of pressure, the gas was carried through a cannula into the gingival pocket and thence penetrated the sub-epithelial connective tissue. Oxygen bubbles were observed in the pericapillary lymph and tissue spaces, some distance from the place of application. At different times, this method of oxygen application has been widely used, and many clinicians and research men have found it valuable in the treatment of periodontal conditions.

Oxygen in the form of hydrogen peroxide is widely used as a mouthwash in different forms of gingivitis and is generally favored in ulcerative gingivitis (trench mouth; Vincent's infection). When peroxide comes in contact

with tissues, oxygen is liberated owing to the action of an enzyme catalase, which is present in all tissue fluids.

Recently, a new method of application was reported whereby action of the oxygen was prolonged. Here, zinc peroxide is used, a white powder, slowly liberating oxygen as it comes in contact with water or tissue fluids.

All previous authors have attributed the favorable action of oxygen on chronically inflamed gingival tissues to the fact that, in chronically inflamed tissue, there is impaired circulation and a lack of oxygen. It was presumed that the artificial introduction of oxygen causes hyperemia and promotes the circulation, thereby furthering oxidation.

The aim of the present investigation is to ascertain the action of oxygen and to determine the tissue changes which occur after its application.

### METHOD OF OXYGEN APPLICATION

To investigate the action of oxygen on chronically inflamed gingival tissues, concentrated hydrogen peroxide, 30 per cent superoxol (Merck), was used.

From the Foundation for Dental Research of the Chicago College of Dental Surgery, Loyola University.

Whereas, in Dunlop's method, the oxygen is derived from an oxygen tank as molecular oxygen, the oxygen developed from hydrogen peroxide is a nascent atomic oxygen. The first attempts at using superoxol were made with great care, owing to the warning on the label of the bottle: "Attacks the skin." However, it was soon found that the application of superoxol to the gingivae caused considerably less discomfort than its application to the skin. An unpleasant burning sensation of the skin is experienced, whereas there is only a slight burning sensation of the gingiva.

The pH concentration of superoxol is 1.5 to 2.5 in individual bottles, this considerable acidity being necessary to stabilize the solution. In some cases, slight necrosis of the tip of the gingival papillae was observed, and this was attributed to the acidity. Subsequently, a 5 per cent solution of sodium bicarbonate was used to neutralize the acidity of superoxol. One drop of the 5 per cent sodium bicarbonate solution added to from 5 to 10 drops of superoxol changed the pH concentration of superoxol to between 5 and 6. This neutralized superoxol remains usable for at least thirty minutes, after that becoming decomposed. It should always be mixed just before use. No harmful effect of any kind was observed after repeated use of neutralized superoxol.

Cotton fibers were saturated with neutralized superoxol and, with the aid of a spatula, were carried into the gingival pocket. Owing to the presence of the enzyme catalase in the saliva and pocket content, oxygen develops instantly from the superoxol with considerable foaming. The superoxol is applied for from ten to twenty seconds. The cotton is then removed and the mouth rinsed with a stream of water. Superoxol is applied several times at each sitting, the cotton being left in the gingival pocket for a few seconds each time.

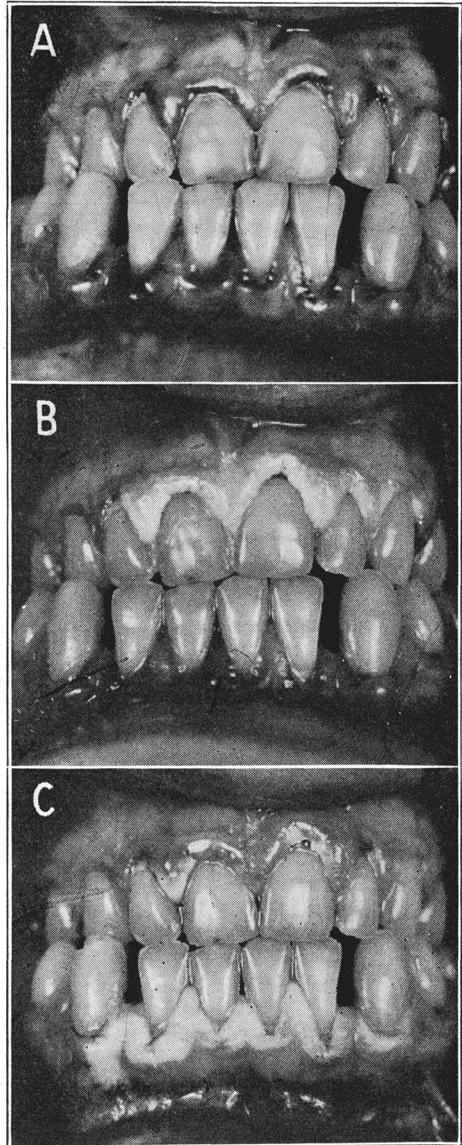


Fig. 1.—Chronic gingivitis. A, before treatment. B, immediately after application of superoxol on upper gingivae; showing blanching of tissues. C, blanching of gingivae in lower jaw after application of superoxol. Blanching has subsided in the upper jaw.

#### IMMEDIATE ACTION OF SUPEROXOL

The gingiva becomes blanched in one or more applications. The blanching appears abruptly if the gingiva is swollen,

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