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METHOD OF DETECTING CARIOUS TISSUE

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This invention relates to a method of detecting carious tissue and dental calculus.

In the preparation of teeth prior to filling, and in similar dental operations, it is highly important that all of the carious dentinal tissue be removed and that a minimum of sound dentinal tissue be removed. Since there can be little difference visually, between carious and sound tissue, it is often difficult to make certain that all carious tissue is removed without the removal of an excessive amount of sound tissue. Similarly, it is advantageous in cleaning teeth that calculus be disclosed.

The present invention relates to a disclosing agent which makes a vivid contrast either in ordinary visual light or in ultraviolet light between sound dentin tissue and carious dentin tissue and also discloses the presence of calculus.

In accordance with the present invention, it has been found that 9-aminoacridine and its hydrochloride are unique agents for disclosing the presence of dental caries and calculus.

In utilizing the compounds of this invention, it is only necessary to apply a small amount to the area in question. The 9-aminoacridine or its hydrochloride stains differentially and has a distinctive dark brown color in the presence of carious tissue or calculus but has a light yellow color on sound tissue in either visual or ultraviolet light. Therefore, it is quite easy to distinguish between sound tissue and carious tissue or calculus.

In accordance with a preferred method of carrying out the invention, it is only necessary to prepare an aqueous solution of the 9-aminoacridine hydrochloride, preferably utilizing de-ionized water. Solutions containing 9-aminoacridine hydrochloride and water in ratios of from 1:100 to 1:20,000 can be employed. However, it is generally preferred to prepare a relatively concentrated solution containing about one part of the 9-aminoacridine hydrochloride to 500 parts by weight of water.

Various other compositions can be utilized in carrying out the invention. Thus, the base 9-aminoacridine itself can be dissolved in a 50–50 alcohol-water mixture and used instead of the hydrochloride. The compounds can also be incorporated in gels such as aqueous gels containing from 0.25% to 2.5% of methyl cellulose or vegetable gums, or can be incorporated in lozenges, chewing gums, aerosols or similar compositions.

Although the 9-aminoacridine hydrochloride may be employed by itself as an aqueous solution, it is desirable in many instances to add additional agents such as non-ionic or cationic surfactants to increase its wetting ability or preservatives to increase the storage stability of solutions after opening. Suitable wetting agents include benzalkonium chloride and polysorbate 80, U.S.P. (Tween 80), while suitable preservatives include benzalkonium chloride, phenyl mercuric acetate, phenyl mercuric nitrate, chlorobutanol, esters of parahydroxy benzoic acid, and

the like. Generally speaking, it is preferred to package the solutions in a single usage container. In such instances, it is unnecessary to employ a preservative.

Preferably, the solution is employed at a pH of from 5 to 7 since at a higher pH the material tends to precipitate out of solution, while at a lower pH there is a traumatic effect on dental tissue.

The following is a preferred composition:

0.2% by weight 9-aminoacridine hydrochloride;
0.1% benzalkonium chloride; and
99.7% de-ionized water.

It is ordinarily not necessary to render such a solution isotonic, but if this is desired, adjustment should be made with non-ionizable materials such as glycerol, sorbitol, urea or the like.

The material of the present invention is compatible with local anesthetics.

The exact mechanism by which the present invention works is not understood. Many materials possess fluorescent properties yet have no value as disclosing agents.

I claim:

1. The method of disclosing carious dentinal tissue and calculus comprising applying to a suspected area a small amount of a member selected from the group consisting of 9-aminoacridine hydrochloride and 9-aminoacridine.

2. The method of claim 1 wherein an aqueous solution is utilized containing from 1:100 to 1:20,000 parts of 9-aminoacridine hydrochloride, the balance being water.

3. The method of claim 1 wherein a solution is utilized containing about 1 part of 9-aminoacridine hydrochloride to 500 parts water.

References Cited by the Examiner

UNITED STATES PATENTS

2,151,495	3/1939	Bender	167—93

References Cited by the Applicant

UNITED STATES PATENTS

1,629,873	5/1927	Jensch.
1,760,781	5/1930	Schulemann et al.
1,766,403	6/1930	Schulemann et al.
1,889,704	11/1932	Schulemann et al.
2,092,131	9/1937	Mietzsch et al.
2,113,357	4/1938	Mietzsch et al.
2,121,207	6/1938	Mietzsch et al.
2,124,590	7/1938	Reed.
2,155,501	4/1939	Maiser.
2,334,348	11/1943	Miglarese.
2,488,904	11/1949	Falk.
2,531,010	11/1950	Surrey.
2,718,487	9/1955	Marx.
3,019,227	1/1962	Erner.
3,067,137	12/1962	Schmulling.
3,122,553	2/1964	Seneca.
3,149,068	9/1964	Biederman et al.

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