A common misconception among patients is that endodontic treatment of a tooth, particularly a front tooth, is associated with discoloration. Similarly, most dentists believe that good esthetic results cannot be achieved in a discolored tooth with only conservative treatment.

Faced with the necessity of endodontically treating a front tooth, patients very often worry about esthetic problems that they are convinced will develop. What is more common, many dentists feel that it is futile, if not insufficiently remunerative, to make the efforts that would be required to restore an endodontically treated tooth to its natural color.

The modern techniques of endodontic therapy have been developed with an eye to preventing unesthetic pigmentation of the dental crown; thus, in everyday practice, one may “prevent” discoloration of the tooth. Notwithstanding all precautionary measures, however, endodontically treated teeth sometimes do undergo alterations of their color. This should not discourage the patient or the dentist.

Today, the causes of discoloration of endodontically treated teeth are well recognized, and techniques of bleaching that have proved their efficacy over the years yield optimal results if the cases have been selected appropriately and if the dentist and the patient are aware of the remote risks of dental bleaching.

CLASSIFICATION

The causes of dental discoloration may be classified as extrinsic or intrinsic.

A) Extrinsic causes include those that act on the external surface of the tooth by depositing pigmented substances on the enamel surface. Examples are wine, coffee, tea, licorice, tobacco, chocolate, and bacterial plaque. They can be easily removed by normal prophylactic measures, and prevented by motivating the patient.

B) Intrinsic causes act within the enamel and dentin by depositing or incorporating pigmented substances within these structures. They may act during the development of the tooth and therefore involve vital teeth (systemic intrinsic causes); alternatively, they can be secondary to pulp necrosis, in which case they involve endodontically treated teeth (local intrinsic causes).

The systemic causes can be classified in genetic, metabolic and medicine-related discolorations (Tab. I).

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**Table I**

EXTRINSIC CAUSES
- Wine
- Coffee
- Tea
- Licorice
- Chocolate
- Tobacco
- Bacterial Plaque

INTRINSIC CAUSES
- Local
- Systemic
  - Genetic
  - Metabolic
  - Medicine-related

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Genetic discolorations

- Erythroblastosis fetalis secondary to Rh factor incompatibility between mother and fetus. Erythrocyte degradation products can be incorporated in the forming dentin and cause pigmentation of the deciduous teeth
- Porphyria, a fairly rare condition which causes excessive production of pigment, that permeates the dentin of both deciduous and permanent teeth
- Cystic fibrosis of the pancreas
- Amelogenesis imperfecta
- Dentinogenesis imperfecta.

In contrast to the first three causes, in which a good outcome is sometimes achieved with bleaching techniques that act on the external surface of the tooth and preserve the vitality of the pulp, the discoloration is impossible to eliminate in the last two, inasmuch as it is related to developmental defects of the enamel or dentin.

Metabolic discolorations

- Calcification secondary to dental trauma (Fig. 31.1). Because of the considerable deposition of dentin in the pulp chamber, there is a loss of transparency in the tooth. Because the pulp usually retains its vitality and is not inflamed, the tooth does not require endodontic therapy. If required, bleaching of this tooth obviously leads to root canal therapy.
- Endemic fluorosis. The ingestion of water containing an excessive amount of fluoride (more than 4 parts per million) during the period of formation and calcification of the enamel (from the third month of intrauterine life to eighth year of life) causes dark stains, most often in the most superficial layers of the enamel. This is due to a defect of mineralization or hypoplasia of the enamel, which becomes porous. Once the tooth erupts, beginning with the most superficial layers of enamel, its surface gradually becomes pigmented with chemical substances deriving from the oral cavity.

Medicine-related discolorations

- Tetracycline (Fig. 31.2). The use of tetracycline during the developmental period of the tooth is associated with the incorporation of the molecules in the hydroxyapatite crystals of the mineralization front of the dentin. Tetracycline pigmentation is therefore not restricted to the enamel, as in fluoride discoloration, but primarily involves the dentin, whose matrix forms between the second trimester of intrauterine life and the eighth year of life.