This article describes a system developed recently by a panel of experts in cariology, the International Caries Detection and Assessment System (ICDAS), and suggests a simplified version combined with a treatment protocol drawn up by the GC-MI-Advisory Board. ICDAS is a system based entirely on visual criteria confirmed to be closely related to the histological depth of lesions. It was developed to help in different aspects of cariology: epidemiology/public health, clinical research and clinical practice. However, the system appears to be difficult to use in general dentistry/everyday practice, because the double code is not very easy to handle. The GC-MI-Advisory Board proposes a system derived from ICDAS, simplified for easier application in everyday practice for the detection and classification of occlusal carious lesions.

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Over the last ten years, cariology has seen the development of Minimal Intervention based on controlling risk factors and using the least invasive treatment possible. Detection of caries lesions is a subject of great interest to cariologists, involving the detection tools enable to detect the earliest stages of demineralization and defining new systems for lesion coding and classification that include these initial stages. This is because the use of non-invasive or minimal treatment depends on early detection of lesions.

For very many years, Black’s classification (1908) of caries lesions was the most widely used. Today, this topographical classification (by site of lesions initiation) is recognised to be obsolete, because it considered cavities only, and moreover was associated with a treatment guide based on the preparation of standard cavities, which extended to sound hard tissue. Since GV Black’s classification, several other systems have appeared keeping pace with improving knowledge of the carious process: the C1-C4 classification by Pitts and Longbottom, the Si-Sta system described by Lasfargues et al., the International Caries Detection and Assessment System (ICDAS), the Universal Visual Scoring System (UniVISS) developed by Kühnisch et al. This article describes a system developed recently by a panel of experts, the International Caries Detection and Assessment System (ICDAS), and suggests a simplified version combined with a treatment protocol drawn up by the GC-MI-Advisory Board (Figure 1).

The International Caries Detection and Assessment System ICDAS – General Principle

ICDAS is a system based entirely on visual criteria – colour changes and presence of cavities. After prophylactic cleaning, the teeth are observed one surface at a time, without drying. If no sign of carious lesion has been detected, the teeth are dried with an air spray for about 5 seconds to allow detection of any first signs of enamel demineralization. The visual criteria used in ICDAS have been confirmed to be closely related to the histological depth of lesions.

ICDAS offers a double coded system for each surface observed. The first number indicates whether the surface has a restoration, and if it does, the type of material used. For example, “0” means a sound surface with no restoration or sealant, “1” is a surface with a partial sealant. A code also exists for missing teeth and non-observable surfaces.

A second code indicates the carious state of the surface examined. Scores range from 0 to 6 depending on severity. The surface is examined in two stages: wet, then after prolonged air drying (for approximately 5 seconds). The carious state is given by the following codes:

- **0**: Sound tooth surface
  - **1**: First visual change in enamel
    - Visible only after prolonged drying for 5 seconds or
    - Confined to the pit and fissure area
  - **2**: Distinct visual change in the enamel on wet surface
  - **3**: Localized enamel breakdown with no visible dentin
  - **4**: Underlying dark shadow from dentin visible through the enamel
  - **5**: Distinct cavity with visible dentin
  - **6**: Extensive cavity with exposed dentin
The original ICDAS document has three main chapters describing: 1) the coding of coronal caries pits and fissures, smooth mesial and distal surfaces, free smooth surfaces (with no adjacent tooth contact); 2) code for caries associated with restorations and sealants or CARS; 3) codes for root caries.

It is interesting to note that the information from probing is included in this system, but the probe used should be ball ended, not sharp. Traditional probing by trying to put the instrument point into pits and fissures gives no specific or useful information about the presence of a carious lesion, but may in fact cause enamel loss. Therefore ICDAS recommends using a ball ended probe run gently along the surface, which allows detection of a lack of continuity.

**Simplified ICDAS proposed by the GC-MI-Advisory Board**

ICDAS was developed to help in different aspects of cariology: epidemiology/public health, clinical research and clinical practice. However, the system appears to be difficult to use in general dentistry/everyday practice, because the double code is not very easy to handle. In addition, the different advanced stages of substance loss/cavity do not necessarily correspond to very different management strategies, because once there is substance loss, a treatment to restore surface integrity is required. Obviously, many alternatives are possible: minimally invasive restoration (preparations limited to lesion excavation, ultraconservative preparation of slot or tunnel type), placing inlays/onlays when substance loss is large and when restorative direct restorations are no longer indicated.

The GC-MI-Advisory Board proposes a system derived from ICDAS, simplified for easier application in everyday practice. Figure 2 summarises the system.

Stage "0" is a sound surface needing no particular treatment except follow-up with preventive care if the patient has been placed at a high caries risk level. Stage "1" corresponds to carious enamel discoloration or opacity; no trace of demineralisation is visible when the surface is wet but becomes apparent after prolonged air drying (for approximately 5 seconds). This stage indicates demineralisation limited to the outer half of the enamel. In this case, remineralization therapy must be introduced, with topical application of fluorides (high-fluoride toothpaste, mouthwash, gel or varnish) or CPP-ACP (Tooth mousse™, MI Paste Plus™ combining CPP-ACP and fluoride).

Stage "2" is used when opacity is visible even before drying the surface, but with no cavity. This stage corresponds to caries progressing in the inner half of the enamel, or even in the outer third of the dentin. When risk factors are under control and the patient accepts regular follow-up, these lesions can be treated by sealants without dentin excavation or cavity preparation (same operating protocol as preventive sealants).

Stages "3" and "4" indicate more advanced stages affecting the middle and inner third of the dentin. They are used when the dentin is distinctly exposed or grey/brown dentin is visible through the enamel still present. This type of lesion needs restoration after excavation of the infected dentin. Depending on the extent of substance loss, reconstitution work can be carried out using direct or indirect restoration techniques.

**Conclusion**

The GC-MI-Advisory Board system for the detection and classification of carious lesions is a simplified version of ICDAS. It is easy to use in daily practice for detecting and classifying occlusal carious lesions. The system cannot be used for early proximal lesions since direct visual examination is, in essence, impossible. Therefore visual examination alone cannot determine the presence of all carious lesions. Specific cariology radiography is also needed (bitewing x-rays) which will be the subject of the next article on Minimal Intervention in Cariology.
MI Treatment Plan – Flow Chart

Figure 1. Decision tree showing the treatment plan for Minimal Intervention in Cariology in four stages as proposed by the GC-MI-Advisory Board.

Figure 2. Simplified table of the GC-MI-Advisory Board coding and classification. The system is based on the International Caries Detection and Assessment System (ICDAS).