

Impedance Spectroscopy as a Tool for the Detection of Occlusal Noncavitated Carious Lesions

M Melo • A Pascual • I Camps • F Ata-Ali • J Ata-Ali

Clinical Relevance

The diagnosis of caries in its early stages is important to allow minimally invasive treatments. Impedance spectroscopy may be useful for the detection of occlusal caries.

SUMMARY

A total 302 teeth (148 molars and 154 premolars) corresponding to 152 patients aged ≥ 18 years were evaluated for caries using the ICDAS (International Caries Detection and Assessment System), fluorescence (DD, DIAGNOdent) and electrical impedance (IMS, CarieScan PRO) systems. Fissurotomy and intraoral radiographs were used as the gold standard. Accordingly, 27.5% ($n=84$) of the teeth were classified as sound, while 26.9% ($n=81$) had enamel involvement and 45.6% ($n=138$) presented carious lesions reaching the dentin. Sensitivity (Se), specificity (Sp), and the area under the curve (AUC) were, respectively,

90.7%, 87.8%, and 0.954 (IMS); 92.4%, 92.7%, and 0.954 (DD); and 79.0%, 72.3%, and 0.756 (ICDAS). With regard to Se and Sp, there were significant differences between ICDAS and DD ($p<0.001$) and between ICDAS and IMS ($p=0.01$), but not between IMS and DD ($p=0.07$). In relation to AUC, there were significant differences between ICDAS and DD ($p<0.001$), and between ICDAS and IMS ($p<0.001$), but not between IMS and DD ($p>0.05$). The correlations between fissurotomy and each method were 88.7% (IMS), 89.7% (DD), and 77.1% (ICDAS). Within the limitations of this study, clinically, the electrical system is not useful for differentiating between sound teeth and truly incipient caries lesions by itself. The fluorescence or electrical systems are

María Melo, DDS, MS, PhD, Valencia University Medical and Dental School, University of Valencia, Valencia, Spain

Agustín Pascual, DDS, MS, PhD, Valencia University Medical and Dental School, University of Valencia, Valencia, Spain

Isabel Camps, DDS, Ms, PhD, Valencia University Medical and Dental School, University of Valencia, Valencia, Spain

Fadi Ata-Ali, DDS, MS, PhD, private dental practice, Valencia, Spain

*Javier Ata-Ali, DDS, MS, MPH, PhD, Universidad Europea de Valencia, Faculty of Health Sciences, Department of Dentistry, Public Dental Health Service, Conselleria de Sanitat Universal i Salut Pública, Generalitat Valenciana, Valencia, Spain

*Corresponding author: Department of the Hospital Universitario y Politécnico la Fe, Avenida Fernando Abril Martorell, 46026-Valencia (Spain); e-mail: javiataali@hotmail.com

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