# STRESZCZENIE W JĘZYKU ANGIELSKIM

One of the most relevant differences between traditional methodology of dental caries treatment and contemporary approach based on the conception of MID (minimal intervention dentistry) is the moment when invasive treatment is initiated. Modern diagnostic equipment is supposed to enable early detection of carious lesions and help dentists to reach therapeutic decisions.

The aim of the thesis was to assess diagnostic parameters of the clinical classification ICDAS II, DIAGNOdent Pen, CarieScan Pro and VistaCam iX ( Proof tip) and to compare their effectiveness in detection of carious lesions. What is more, it was aimed at determining optimum cutoff values for every device based on the obtained own results verified in the examination with the application of CBCT (Cone Beam Computed Tomography) and micro-computed tomography.

The examination was conducted in 160 permanent molar teeth (n=142) and premolar teeth (n=18). Incorporation of the occlusal surface into the examination was determined by the following features: lack of dental caries, visible opacity or white/brown discoloration untypical of healthy enamel. Criteria which eliminated teeth from the examination were as follows: occurance of sealants, dental fillings, hipomineralization and cavities. First, all examined surfaces were qualified in accordace with ICDAS II scale, based on visual-tactile examination, to one of 4 groups. Occlusal surfaces of immobile teeth were photographed with digital camera. Subsequently, on each of them there was chosen one part causing the biggest diagnostic difficulties and marked on digital photographies by the graphic programme. All teeth were assessed with 3 diagnostic devices: DIAGNOdent Pen, CarieScan Pro and VistaCam iX (Proof tip). The examinations were conducted twice, independently by two examiners, after their prior calibration. Verification method for the assessment of the real scope of lesions was micro-computed tomography (48 teeth) and CBCT - Cone Beam Computed Tomography (160 teeth). Threshold of dental caries on the obtained photographies was evaluated by 2 doctors (after their calibration), not having taken part in the prior diagnostic examinations. The received outcomes were statistically analysed using IBM SPSS Statistics 20.0 software. There were determined diagnostic parameters of the evaluated methods such as: sensitivity, specificity, accuracy, PPV, NPV. In case of electronic devices parameters were referred to the guidelines provided by producers. There were as well evaluated intra-examiner reproductibility and inter-examiner reproductibility, values of the areas under ROC curves (AUC) and optimum cutoff values for devices under examination. There were determined parameters for enamel and dentin threshold.

On the grounds of the results obtained from the evaluation of 160 teeth there was proved that the highest sensitivity of detecting enamel lesions was typical of ICDAS II scale (0,91 and 0,85), VistaCam iX (0,90 and 0,88) and CarieScan Pro (0,88 and 0,88). For DIAGNOdent Pen there was noted the lowest sensitivity (0,59 and 0,70) and the highest specificity (0,55 and 0,88). Among the assessed diagnostic devices the highest diagnostic effectiveness for the given threshold was observed in VistaCam iX (AUC - 0,74 and 0,83). Optimum cutoff values of DIAGNOdent Pen for detecting enamel lesions, depending on the verification method, amounted to >21,13 and >5,88. Concerning VistaCam iX and CarieScan Pro the values were respectively: >1,29 and >1,26 and >33,13 and >9,00. The highest sensitivity of detecting dentin lesions was typical of ICDAS II scale (0,52 and 0,75), and DIAGNOdent Pen (0,48 and 0,44) of the diagnostic devices. VistaCam iX characterized with the lowest values of the parameter (0,13 and 0,19). All methods featured with high specificity of detecting dentin lesions, with the highest values of the parameter observed in VistaCam iX (0,97 and 0,97) and CarieScan Pro (0,97 and 0,99). Areas under ROC curves (AUC) of all the assessed devices for dentin threshold were considerably higher than 0,5, however the highest diagnostic effectiveness was typical of VistaCam iX (AUC - 0,79 and 0,90). Optimum cutoff values for detecting dentin lesions amounted to: DIAGNOdent Pen >24,75 and >19,5, VistaCam iX >1,51 and >1,44, CarieScan Pro >44,38 and >44,63. All methods were distinguished by high repeatability and unambiguity of the results.

On the grounds of the conducted examinations the following conclusions were drawn:

1. Classification ICDAS II is an effective method for detection of early carious lesions, marked by higher sensitivity compared to electronic devices.

2. All the assessed diagnostic methods were marked by high intra-examiner reproductibility and inter-examiner reproductibility of the examination results.

3. Applying guidelines indicated by producers of the devices, the highest values of diagnostic parameters for enamel threshold are typical of VistaCam iX, while for dentin threshold they are typical of DIAGNOdent Pen.

4. Applying optimum cutoff values, the best diagnostic parameters and the highest effectiveness of diagnosis both for enamel and dentin threshold are typical of VistaCam iX.

5. For the improvement of diagnostic effectiveness of the assessed methods there should be taken into account the modification of cutoff values recommended by producers.