



Dr. Caspar Bumm

## Periodontal Grading – comparison of direct and indirect evidence of progression

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### Objective

According to the current Classification of Periodontal and Peri-Implant Diseases and Conditions periodontal grading might be obtained using either longitudinal data (direct evidence of progression) or the ratio between the maximum bone loss and the patient age (indirect evidence of progression). The aim of this retrospective study was to compare direct and indirect evidence and analyse their consistency in grading periodontitis.

### Materials and Methods

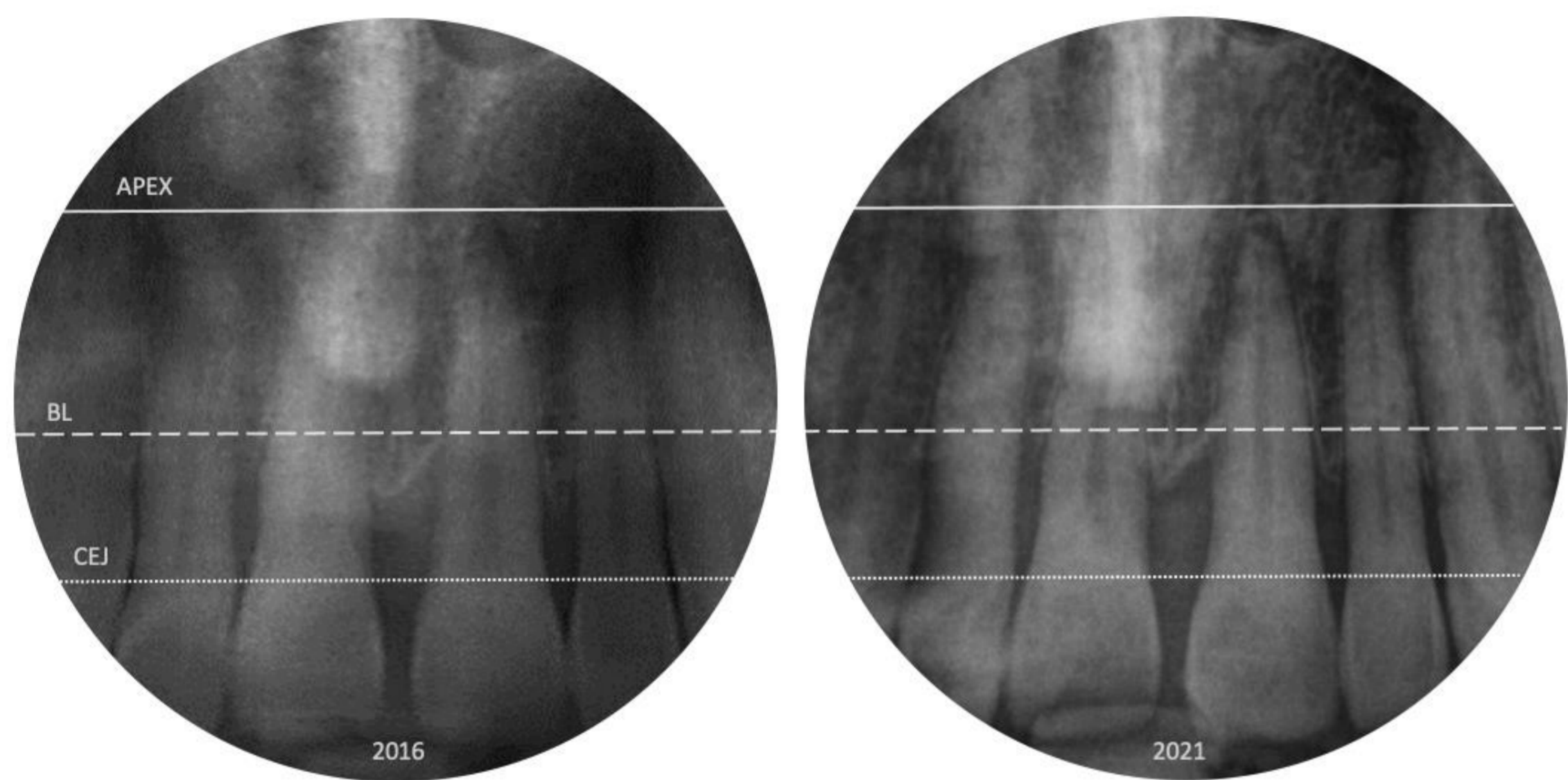


Figure 1 – Radiographic measurement of bone loss over 5 years in a 62-year old patient initially classified Grade B using indirect evidence  
CEJ, cemento-enamel-junction; BL, bone level

Panoramic radiographs of a total of 135 patients who underwent active periodontal therapy were included and retrospectively analysed by two independent examiners. Relative percentage of radiographic bone loss (RBL) was assessed at the most severely affected tooth measuring the distance from cemento enamel junction (CEJ) to bone level (BL) and CEJ to apex (CEJ-BL/CEJ-apex). Indirect evidence of progression was determined using the %RBL/age index. Direct evidence of progression was assessed using longitudinal data in terms of a second radiograph that has been made at least 5 years after completion of active periodontal therapy. Grade modifiers were applied according to the classification.

### Results

Table 1. Patient characteristics

Variable	All
N	135
Female sex, n (%)	75 (55)
Age, years	59±11
Smoker, n (%)	29 (21)
Smoker <10 cigarettes/day, n (%)	6 (4)
Smoker ≥10 cigarettes/day, n (%)	23 (17)

Results are provided as mean±SD

Table 2. Clinical parameters of periodontitis at baseline

Variable	n	All	Grade A	Grade B	Grade C	p value
PD, mm	135	2.5 [2.0;3.0]	2.4 [2.0;2.9]	2.4 [2.0;2.9]	2.9 [2.3;3.4]	0.003 <sup>a,c</sup>
BOP, %	135	28±22	28±20	26±23	30±22	0.789
TL, n	131	3 [1;7]	2 [1;6]	4 [1;7]	3 [1;8]	0.395
PI, %	135	42±26	45±26	38±28	44±22	0.374
RBL, %	135	50±16	53±17	48±16	49±17	0.384

Results are provided as mean±SD or median [q1–q3], unless otherwise stated

Grading is assessed through direct evidence of progression

<sup>a</sup>Grade A vs. Grade C < 0.05; <sup>c</sup>Grade B vs. Grade C < 0.05

PD, probing depth; mm, millimeter; BOP, bleeding on probing; TL, tooth loss; PI plaque index; RBL, radiographic bone loss

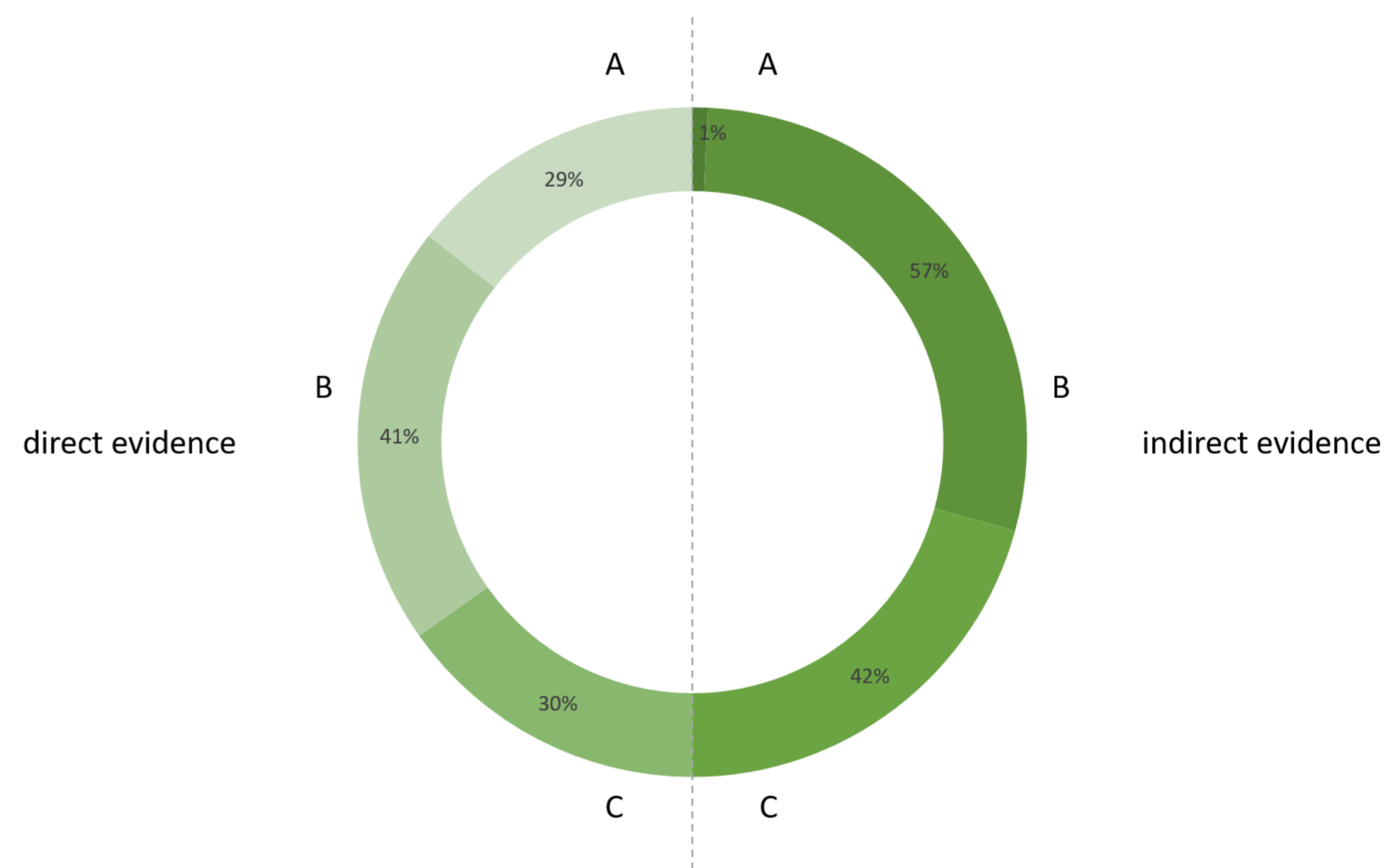


Figure 2 – Comparison between direct and indirect grading

Statistical analysis revealed differences assessing the rate of progression using direct and indirect evidence in 53% of patients (n=72). The actual rate of progression as determined by longitudinal data was underestimated in 13% (n=17), overestimated in 41% (n=55) and correctly estimated in 47% (n=63) by indirect evidence. Comparison of direct and indirect evidence showed no agreement (κ-coefficient=0.14). Apart from PD, baseline parameters did not significantly correlate with the actual rate of progression (Table 2).

### Conclusion

The present data indicate that indirect evidence in grading periodontal progression prior to active periodontal therapy may lead to significant inaccuracies compared to direct evidence using longitudinal radiographic findings. Over- and underestimation of actual progression rates most likely occur due to limitations inherent in indirect evidence regarding the cumulative nature of periodontal attachment loss. Whether adjustments of grading after active periodontal therapy in combination with clinical parameters may overcome these inaccuracies and the possible influence on cost-effectiveness warrants further investigation.