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Your ref.:   Our ref.:   Date: December 4, 2012

Re: Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ (2012). Prevalence of periodontitis in adults in the United States: 2009 and 2010. *J Dent Res* 91:914-920.

TO THE EDITOR

Dear Professor Giannobile,

As are others in charge of teaching graduate and undergraduate students, I am right now amending lectures on periodontal epidemiology after the results of the 2009-2010 NHANES had been published (Eke *et al.* 2012a). For the first time, full-mouth recording was done at six sites per tooth and periodontitis case definitions were based on both periodontal probing depth and attachment loss (Page and Eke 2007, Eke *et al.* 2012b), which was actually overdue. However, before rather remarkable observations [which sparked a commentary, or Perspective, by Dr. Panos Papapanou (2012) with the provocative subtitle "Forget what you were told"] can properly be digested, I would like to point to a glitch and possibly an error [which had occurred already in Eke *et al.* (2010)] in the respective Material and Methods section of the paper by Eke *et al.* (2012a). They write,

"All periodontal examinations were conducted in a mobile examination center (MEC) by dental hygienists registered in at least one U.S. state. Gingival recession [= the distance between the free gingival margin (FGM) and the cemento-enamel junction (CEJ)] and pocket depth (PD) (= the distance from FGM to the bottom of the sulcus or periodontal pocket) were measured at 6 sites per tooth (mesio-, mid-, and disto-buccal; mesio-, mid-, and disto-lingual) for all teeth, excluding third molars. For measurements at each site, a periodontal probe (Hu-Friedy PVP 2TM, Chicago, IL, USA) with 2-, 4-, 6-, 8-, 10-, and 12-mm graduations was positioned parallel to the long axis of the tooth at each site. Data were recorded directly into an NHANES oral health data management program that **instantly calculated attachment loss (AL) as the difference between probing depth and recession**. Bleeding from probing and the presence of dental furcations were not assessed." (Emphasis added.)

First, gingival recession should be added to periodontal probing depth, not subtracted, in order to calculate clinical attachment loss. Second, in any case of no recession (from Latin *recessus*, "retreat") periodontal probing depth <u>must not</u> just be defined as attachment loss. Albandar *et al.* (1999), when describing how data were recorded in NHANES III, had provided a correct, albeit overly complicated, definition of attachment loss. They wrote,

"The distance from the cemento-enamel junction (CEJ) to the free gingival margin (FGM) and the distance from the FGM to the bottom of the pocket/sulcus were assessed at the mesio-buccal and mid-buccal surfaces. The measurements were made in millimeters and were rounded to the lowest whole millimeter. The assessment was made by using the NIDR periodontal probe. The probing depth was defined as the FGM/sulcus measurement. **The CEJ/FGM distance was given a negative sign if the gingival margin was located on the root.** Attachment loss was defined as the distance from CEJ to the bottom of the pocket/sulcus and was calculated as the difference between CEJ/FGM and FGM/sulcus distances (or the sum of the 2 distances if FGM was on the root)."

Teaching in particular undergraduates about how probing parameters periodontal probing depth, attachment level, and recession are measured is quite an effort but usually straightforward. In order to avoid undue exaggeration of prevalence, extent and severity of periodontitis both in the population and in patients attending a common office and to be able to assess treatment outcomes, metric periodontal probing parameters have to be properly defined. I would therefore appreciate if authors could comment on the apparent redefinition of attachment loss in their paper.

When analyzing the Figure in the paper by Eke *et al.* (2012a), what immediately hits the eye is that there seems to be higher prevalence of attachment loss at different thresholds (a) than of pocket depth at respective thresholds (b) in all age groups. Such a pattern may actually be a result of how attachment loss had erroneously been redefined, most probably due to convenience. Just as a trivial example, a 4 mm probing depth without recession may be associated with either 0, 1, 2, 3, or 4 mm attachment loss, but the NHANES oral health data management program would have "instantly calculated" 4 mm.

Based on the new case definition using attachment loss in addition to probing depth, prevalence of all periodontitis in the adult population of 30 years and older in the U.S. has now been estimated to exceed 47%, after 35% found in NHANES III during 1988-1994. This much higher prevalence may be due to the redefinition of attachment loss, too. Moreover, as to Eke *et al.* (2012a), mild periodontitis has a rather low prevalence in all age groups while moderate periodontitis is widespread (Figure c). The picture was different in NHANES III when severe periodontitis occurred with lowest, moderate periodontitis with intermediate and mild periodontitis with highest prevalence, a pattern which, I suppose, applies to many other widespread chronic diseases. The strange new pattern might indeed be explained partly by the redefinition of attachment loss as well, ultimately leading to a different distribution of cases.

So, right now I find it difficult to "forget what I was told", the new data possibly being an exaggeration of the situation. As fact of the matter, partial recording in previous surveys did underestimate prevalence, extent and severity of periodontitis (Eke *et al.* 2010), and attempts to adjust for bias caused by the NHANES III examination protocol have resulted already in an estimate quite similar to current results (Albandar 2011), although most of the cases would still fall into the mild category. Nevertheless, a constructive suggestion would be to compare the new 2009-2010 data with those of 1988-1994 by using the previous case definition (solely based on probing depth) by Albandar *et al.* (1999).

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Yours sincerely,

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