Letter to the Editor

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Definitions of periodontal disease in research: an alternative view

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We have read with interest and acknowledge the recent letter by Preshaw (2009) addressing the lack of case definitions in periodontal research. Objective case definitions are much needed in periodontal research as well as in estimating the prevalence of periodontitis and to follow changes in prevalence over time. As this appears to be a never-ending task, each discussion about the issue is welcome (Tonetti & Claffey 2005, Page & Eke 2007).

An exact definition of the disease condition becomes essential when describing the disease distribution within a particular population (Hugoson & Norderyd 2008).

Obviously, this may be a very special problem of periodontal disease criteria. In different medical disciplines, it may straightforward to differentiate he between cases and controls, for example myocardial infarction, whereas in others it is more cumbersome when using continuous variables to define cut-off figures. Even then it is possible to define thresholds if the variable is a strong predictor of clinical events, i.e. a qualitative endpoint, as early death by elevated blood pressure. In periodontology, the disease definitions rely on continuous measures of probing depth, attachment loss, bleeding on probing and so on. There is no possibility of finding a dichotomous disease definition to assign subjects unequivocally as diseased case versus healthy controls. We agree with Preshaw that all the arbitrarily chosen definitions in the periodontal research literature prevent comparability of results, meta analyses and, in some cases, provide reason for scepticism. Thus, any discussion to establish criteria

Fig. 1. Percentile chart for extent of attachment loss.

controls is welcome. Here, we present an alternative relying only on statistical reasoning without constructing arbitrary thresholds.

Methods for constructing age-related reference curves could avoid the arbitrariness from which the contemporary definitions suffer. Reference intervals, and more generally, percentile charts are very common in perinatal medicine as growth charts (Cole 1993) for length, weight, head circumference, etc. but also in other medical specialities. Different methods are available (Wright & Royston 1997). The curves are commonly used to characterize the reference population, i.e. individuals who are representative of the population. For a random variable, say attachment loss, percentiles are established of the distribution of the variable by age. An individual who is being screened for some disorder according to his or her observed attachment loss is judged in relation to the reference population (Wright & Royston 1997). Disease may be suspected if the extent or severity of attachment loss lies above the upper limit represented by a certain percentile.

For illustration purposes, here we present such a chart indicating the agerelated percentiles of clinical attachment loss (CAL) (from bottom to top) 2.5, 5, 10, 20, 25, 30, 40, 50 (the median), 60, 70, 75, 80, 90, 95, 97.5 (Figure 1). The data come from the population-based cross-sectional SHIP study comprising 4290 subjects (Hensel et al. 2003). For clarity, the individual points were omitted after being provisionally fitted by a logistic equation. In this way, a series of reference lines is established and then only the choice of a suitable threshold percentile needs consent. Then, the case definition comes from frequency the distribution rather than from the periodontal measure.

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Similar charts with the number of teeth for instance may help to define the state of oral health in a certain population.

Problems with such an approach may arise as periodontal measures are affected by characteristics of the reference population that are risk factors for the disease, viz. age, sex, smoking, diabetes, etc. It is impractical to construct percentile charts for all such subpopulations. It is common practice to restrict such influences and to build up age-related charts for the sexes and, sometimes, also for ethnicity. On the other hand, within a certain population, trends over time could be followed with high reliability.

Proper case definitions in periodontology are a challenge hitherto without a satisfying solution. Thus, we would like to encourage further discussion on this topic.

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