**Diet and Associated Risk Factors in High-Risk Groups in Industrialized and Non-Industrialized Countries**

**Introduction**

The group acknowledged that the term ‘high-risk’ is often defined in terms of past caries experience. However, a prospective analysis, in which risk prediction for future caries incidence should be determined, was more appropriate.

**Definition**

‘High-risk’ groups included people most likely to develop caries over a given period of time, at a level considered to be high for that society. There was a consensus among the group concerning the importance of identifying these high-risk groups.

**Predictors**

Dental caries is a multifactorial disease. One or more predictors cannot usually explain more than half of the variation in observed caries increment. False positives and negatives typically amount to 60-70%. The group decided to propose possible predictors and to consider what further research might be necessary to obtain further information.

Predictor assessment has been complicated by problems of measurement (how, how often, when?) and variations in the methods of analysis of data. Criteria describing specific predictors vary between countries. Variations in methods of analysis may also vary between some countries or between industrialized and non-industrialized countries, since the balance of influencing variables can vary between countries. It is unlikely that a substantial proportion of the total can be predicted using a simple research design. The probability of high risk is a function of oral microflora, dietary factors, nutritional factors, fluorides, oral hygiene, genetics, salivary and other factors, i.e.

\[ P \{\text{high risk}\} = X_1 + X_2 + X_3 + \ldots \]

Predictors of high caries risk may constitute causative risk factors or associated risk indicators. The former would include diet and microflora, the latter so-ciodemographic variables. The importance of using multi-variate analysis cannot be overstated. Computer software is now available to facilitate this. As components of a study design, a number of the following risk assessment should be considered together:

**Diet**

Important components of diet assessment should include the type(s) of carbohydrate consumed, their frequency and pattern or mode of consumption. Notes should be taken of particular habits characteristic of the population (such as bottle feeding or pa-nela sucking in Colombia), which may affect patterns of caries attack.

With regard to reported dietary data, there is always a problem of validity. However, the group felt that recent past studies (usually involving older children 10-14 years) were adequate; but that despite sophisticated methodology adopted, correlation levels with foods/drinks consumed were relatively low.
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However, this was not unexpected due to the intervention of other factors (e.g. fluoride) and the low caries increment. Similar studies in less industrialized countries, where there are fewer confounding variables, and a possibly higher caries rate, might find high correlations. There is a need for dietary studies involving other age groups – younger children and adults. More detailed information should be available concerning changes in diet over time for populations and for groups. Consumption per capita data do not provide details on consumption for specific age or subgroups. It would be most helpful if this information was nationally available.

The group were concerned that the literature available on diet and dental caries, particularly for non-industrialized countries, is very scarce.

Nutrition

There is some evidence that nutrition has a role to play as a modifying factor, both pre- and posteruptively. Studies showing this relationship have been largely confined to caries in the deciduous dentition.

An assessment of parameters of nutritional status should be considered. Systemic illness (including malnutrition, allergies, diarrhoea, immunodeficiency) can affect the individual’s growth and cause enamel hypoplasia. An assessment of macro-elements (fats, proteins, carbohydrates), micro-elements (calcium, phosphates, vitamins) and trace elements might also be considered.

Saliva

Assessment criteria may include flow rates, buffering capacity, immunological and antimicrobial factors (IgA, etc.), microflora, and levels of fluoride in plaque and saliva.

Oral Hygiene

How significant is oral hygiene for caries prediction? At the practical level, it is important to know whether we should encourage the use of chewing sticks or other traditional oral hygiene methods in less technologically developed countries as caries-preventive procedures.

Genetics

Some aspects of genetics, including the effect of tooth morphology and dental arch configuration, should be considered.

Social Indicators

These can vary between countries, and between industrialized and non-industrialized countries. In general they may reflect ‘attitudes’ and ‘behaviour’ differences between groups. If ‘social’ differences are observed, the rationale for these differences should be determined, if possible. These indicators provide ‘markers’ for targeting subgroups and planning health education programmes. Some social indicators have proved to be quite powerful high-caries risk predictors. Demographic data are often combined with social indicators. Differences in age, sex or geographical location can, however, be more directly related to the causation of disease, rather than simply reflecting attitudes and behaviour.

In some industrial countries, national policies for general health are being introduced to encourage a change of diet (i.e. to reduce refined carbohydrates, salt and fat, and increase complex carbohydrates). This represents a change, if anything, for the better for dental health in the industrialized part of the world. In non-industrialized countries any change is likely to be for the worse, since refined carbohydrates in many communities represent an essential source of
energy. In this situation, every effort is needed to introduce fluoride where appropriate. This must be a priority, as a reduction in the consumption of refined carbohydrates (sugars) is not realistic at present. In the long term sugar consumption in non-industrialized countries should be controlled or, preferably, reduced. However, there is a clear need to develop policies aimed at providing sufficient foods, which fulfil dietary guidelines similar to those present in some industrialized countries today.