Introduction

Concept evolution

In France as well as in other countries, the aim of dietary reference values clearly evolved from the consideration of prevention of inadequacy (health protection) to the issue of health promotion. Following the sharp decline, and even the disappearance, of clinical forms of nutritional deficiencies, the aim is now to develop reference values which could avoid — or at least decrease the risk of — degenerative disorders such as cancer, cardiovascular diseases, diabetes or osteoporosis, which are drastically increasing in developed countries.

This conceptual change raises new difficulties, since much more work has to be taken into account, especially the numerous reports of intervention studies that are performed around the world. The main problem lies in the extrapolation to the French population of results obtained in countries where basal rates of some diseases are very different and where usual dietary patterns are quite different.

Such difficulties justify the development of a French reflection on the issue of dietary reference values, as far as the national context could take a great place, depending for example on regulatory corpus or dietary habits. Despite an actual convergence in the values proposed by different countries, there are still discrepancies that could induce non negligible consequences. Through these values, and the need for reaching them to encourage — or not — food fortification, dietary supplements or new health products, the relation of a population towards its perception of foods could be progressively modified.

Objective and methods of the ANCs revision

At the beginning of the work, by the end of 1996, several objectives were assigned to this revision and corresponding methodologies were developed:

– Provide a French edition readily available for anyone interested in the nutrition field.
– Properly present the basis of the reference values in order to explicit the strength of the scientific supports of the values. Beside classical analysis of scientific international literature, original works from data obtained on the French population were specifically developed for this revision.

– Ensure a better coherence between analytical approaches for nutrients and global approaches to population groups. Working groups for these two approaches were culturally different: people from basic sciences for the first type of approach and physicians for the second. Balance between various arguments was not automatically the same, especially for the issues where the margin for interpretation was quite large (case of calcium, vitamins D or E in elderly people, for example). Reaching an agreement between the two cultures on a single value was considered as the best compromise achievable in the actual state of knowledge.

– Validate methodologies and results through the filter of collective expert appraisal. Three levels of discussion and validation were used: working groups (using also external experts); the pilot committee in charge of the coherence of the global work and national committees competent in the nutrition and food area, such as the French High Council of Public Hygiene (CSHPF, Conseil supérieur d’hygiène publique de France) or the Committee on food for special dietary purposes (CEDAP, Commission d’étude des produits destinés à une alimentation particulière). More than 150 scientists have been actively involved in this revision.

– Evaluate the possibility to attain ANCs at the population level from usual foods. The methodologies used specifically for this purpose will be discussed in the last chapter.

Building ANCs

The general conceptual framework and definitions used are the following:

– **ANCs** (Apports nutritionnels conseillés for the French population) are defined as the intake allowing the physiological requirements of almost every individual of the population (97.5%) to be covered. It is given as the value of the average nutritional requirement, plus two standard deviations of 15% each, characterizing and assuming normal statistical distribution. Therefore, ANCs remain reference values for a population and are only indicative for individuals. They do not in any way imply that every individual must reach these values or that they are sufficient for every individual in any situation. Moreover, ANCs are designed only for healthy people.

– **Average nutritional requirements** are calculated as the mean requirements of a (varying) number of individuals. They are obtained from the net requirements, taking into account the average bioavailability of the nutrients in a “usual” diet.

– **Net requirement** is the amount of a given nutrient needed to satisfy various needs (maintenance, metabolic and physiological functioning of the organism), including if necessary requirements due to specific situation (growth, pregnancy, lactation).

– **Optimal requirement**: this notion goes beyond physiology and considers quality of life in the long term (“successful aging”), including risk reduction
for degenerative diseases involving nutritional factors. It is proposed that ANC s represent optimal values at a population level according to the present state of knowledge, not precluding needs of complementation or supplementation for some individuals in a specific context.

- **Safety limits** use the definition and values proposed by the French High Council for Public Hygiene (CSHPF, 1996) and correspond to the maximal amount of a given nutrient that could be consumed every day during a lifetime without identified health concern.

Specific chapters have been devoted to some population groups, to ensure a more global approach than only the nutrient-by-nutrient approach: newborns, children and adolescents, pregnant and lactating women, elderly people, sportsmen and people with intense physical activity. The most difficult issue lies in the definition of elderly people (CYNObER et al., 2000), with a practical consequence for the old studies that could be taken into account; the increase in life expectancy without disease led to consider that studies in the 1960-70 period performed on individuals aged 60-65 y could be used, since the physiological state of such individual was similar to the physiological state of people now up to 75 y. Very old people have been defined as people above 85 y, however very few scientific studies are available for this group. The second problem stems from the heterogeneity of elderly people: healthy elderly people, who are still autonomous and active; frail healthy people, for whom diseases could disrupt equilibrium and who require that careful attention be paid to dietary intakes; ill elderly people, with a loss of autonomy and generally in specific institutions, for whom dietary supplements and complements are necessary to at least maintain, if not to improve, their actual status. A better account of other factors (such as appetite, sense of smell, dentition…) could help to overcome some nutritional problems in the elderly.

Due to the economical backgrounds of professional sports, many studies have been devoted to the effects of macro or micronutrient intakes on performance. A good knowledge of muscle energy paths leads to practical consequences for nutrition of sportsmen, especially for macronutrients. With the exception of very regular and intense exercises, leisure sport practice does not justify specific ANCs for micronutrients.

For convenience and to spare place, data for these groups have been included in the chapters concerning individual nutrients.
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