Validation of the hierarchical classification of food by the SENS* nutrient profiling system using nutritionally adequate diets designed with individual diet modelling.

*Système d’Étiquetage Nutritionnel Simplifié [Simplified nutritional labelling system]
Matthieu Maillot1, Nicole Darmon2
1 MS-Nutrition, Marseille; 2 UMR NORT INRA/INSERM/AMU, Marseille

INTRODUCTION

Nutrient profiling systems are expected to classify individual foods according to their contribution to healthy and nutritionally adequate diets. The SENS is a 4-classes nutrient profiling system proposed as a basis for a simplified labelling system. It is derived from the SAIN, LIM system initially developed by the French Food Standard Agency.

OBJECTIVE

Validating the SENS nutrient profiling system by examining its ability to classify foods in a hierarchical order, according to the foods’ contribution to nutritionally adequate diets.

MATERIALS AND METHODS

Classification of foods according to the SENS nutrient profiling system

- The 1192 foods of the French food composition database were assigned into the 4 classes defined by the SENS (Figure 1).
- Foods were distributed into 4 classes, from the most (Class-1) to the least (Class-4) favourable profile.

Modelling nutritionally adequate individual diets

- For each of the 1719 observed diet, an optimized diet (i.e. iso-energetic, nutritionally adequate and as close as possible from the subject’s observed food choices) was designed with individual diet modelling.
- Each optimized diet fulfilled the WHO recommendations for proteins, total carbohydrates, free sugars (<10% of total energy), total lipids, saturated fatty acids (SFA), <10% of total energy), cholesterol and essential fatty acids, the Nordic recommendation for sodium, and the French recommendations for fibers, 10 vitamins, 9 minerals (Table 1).

Results

Classification of foods by the SENS system: analysis of the hierarchy

- The contribution of foods from the four SENS classes to total energy was assessed before and after the optimisation process, for each individual diet.
- Hierarchy was tested with the hypothesis that Class-1 should increase, Class-2 increase or stagnate, and classes 3 and 4 decrease (more strongly for Class-4).

Percentage of diets complying with the hypotheses of energy optimisation-induced increase for classes 1 and 2 and decrease for classes 3 and 4.

The optimization-induced increase of energy from Class-1 and Class-2 was verified for 96% and 73%, respectively, of the adult sample; The optimization-induced decrease of energy from Class-3 and Class-4 was confirmed for 63% and 94%, respectively.

CONCLUSION

- The shift in food intakes needed to reach nutritional adequacy -substantial increase, moderate increase, moderate decrease and important decrease of foods from classes 1, 2, 3 and 4 respectively - followed a hierarchical progression according to the four SENS classes.
- The SENS nutrient profiling system is a relevant tool to classify foods in a hierarchical way according to their contribution to nutritionally adequate diets, suggesting that it could be useful in the context of simplified nutritional labelling in Europe.

Contacts: matthieu.maillot@ms-nutrition.com and nicole.darmon@univ-amu.fr