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Can the use of the Nutri-Score labelling system influence the risk of cancer in the population?

<u>The theoretical preconditions which would justify this outcome do not exist.</u>

According to the WHO, an adequate intake of fruit, vegetables, and wholegrain cereal provides convincing evidence supporting the protective effect against the risk of tumours. Thus, the proposal to apply the Nutri-Score labelling system as a potentially effective tool in the context of tumour prevention should account for several considerations:

1. The Nutri-Score system results from applying a very complex algorithm based on ranges of values arbitrarily set by its creators. The consumer, who can only perceive the final result of the calculation (letter and colour), is unable to identify the nutrient/ingredient (or the sum of nutrients/ingredients) which granted the product a specific Nutri-Score classification, much less understand if and to what extent the element which is responsible for the score is relevant for cancer prevention.
2. The essential foods in cancer prevention are fresh foods (vegetables, fruit) and whole grains, rich in fibre and antioxidants: they are all non-packaged foods; therefore, they are not affected by the Nutri-Score classification. The Nutri-Score marginally recognises the presence of fruit and vegetables in packaged products: the content of fruit (and vegetables, legumes, nuts, among others) required to obtain a desirable score is very high and incompatible with many products recipes. For example, if the required 40% fruit content is reached in a fruit yoghurt in order to be positively scored by the algorithm — which is impossible for now — it would also increase the sugar content deriving from the fruit itself, which would instead increase the negative score, thus leading to an unpredictable outcome on the final score.
3. According to some data, using the Nutri-Score would reduce the consumption of fresh food, shifting consumer preferences towards purchasing packaged foods classified as "A: dark green" or "B: light green". The presence of whole

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grains in packaged foods, additionally, is entirely overlooked by the Nutri-Score classification, which does not detect the whole grain content of foods. Despite some baked goods containing very high proportions of wholemeal flour, the negative score attributed to these products by the Nutri-Score system does not allow them to obtain a higher score.

4. The Nutri-Score evaluation refers to 100 g of food and not to actual portion size: foods that obtain a positive score (A: dark green or B: light green) for 100 g, are often consumed in much larger quantities (for example, the consumption unit of a pizza with vegetables is equal to 300-400 g). This fact leads to such foods taking up a significant portion of the recommended daily intake for calories and nutrients, thus leaving less space for foods with a positive protective effect such as those mentioned above.

5. Recent data suggests that the Nutri-Score system does not favour adherence to the Mediterranean diet, which is the top-ranked diet regarding antitumoral effects.

An analysis of the available literature on the relationship between the Nutri-Score labelling system and tumours also highlights that studies that would suggest a reduction in the risk of cancers associated with consuming foods with higher Nutri-Score ratings have several significant limitations that are rarely highlighted.

These studies compare groups of subjects in the pre-Nutri Score era who randomly followed very different food patterns. They are based on consumption data reported by individuals, which were not subjected to any objective feedback.

These studies are complex in their development and implementation. By definition, they cannot demonstrate causal relationships between the parameters detected but can only demonstrate associations (they generally identify markers, not causal factors). For example, it appears logical that people with suboptimal diets also lead suboptimal lifestyles. Therefore, it is challenging to determine whether the increased risk of cancers observed in some population groups is due to the quality of their diet or the broader lifestyle of people with inadequate diets.

Often, these studies also have significant inconsistencies. For example, in the Spanish study ENRICA, those with lower diet quality consumed up to nearly 1,000 more calories but were less frequently obese than subjects on better quality diets,

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unequivocally demonstrating the existence of severe incongruences in the reported consumption data by people enrolled in the study.

Despite all of this, the differences in the incidence of tumours found in these studies are generally small or very small (on the other hand, it is known that diet correlates with the risk of tumours with strength about ten times less than that it correlates with cardiovascular risk). In Deschasaux's 2018 study, the incidence of tumours was 7% higher among subjects with poorer nutrition than among subjects with more favourable nutrition. In this study, and theoretically, an additional tumour case would be observed in 130 subjects following a poorer diet over 15 years compared to subjects with better nutrition.

Therefore, the protective effects theoretically associated with the use of the Nutri-Score labelling system would be even smaller than those observed in these studies. Thus, even assuming that a causal relationship could exist (which is not proven), several hundreds of subjects would have to drastically change their diet over decades to avoid a single case of cancer.

There is no evidence in the literature that the use of Nutri-Score labelling system would induce such wide variations in the population's food and consumption choices.

The available data indicates only tiny variations in consumer purchase statements exposed to foods with or without Nutri-Score labelling. It is unknown whether these would translate to real purchase changes. For example, in many studies the consumers made their food choices without financial limitations; this is clearly a very different context from that of the real world, let alone real changes in the consumption of various foods.

Significant limitations were observed in a study in which the overall effect of the Nutri-Score labelling system was observed on all-cause mortality. This result suggests potentially anomalous effects on this parameter which is critical in the context of population health.

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In conclusion:

1. there are no convincing scientific arguments to support the hypothesis that using a labelling system such as the Nutri-Score would reduce the incidence of tumours amongst the general population.
2. data collected in observational studies conducted by researchers promoting the Nutri-Score system, also burdened by significant methodological problems, does not convincingly support these hypotheses.
3. there is also no convincing evidence that the use of the system would induce the required changes in the quality of consumption which, according to the studies cited, would be necessary to influence the risk of cancer in the population.

In summary, the hypothesis, apparently formulated *a priori*, of the protective value of using the Nutri-Score labelling system seems to be supported by superficial information and biased data.

This outcome is opposed to the primary purpose of quality scientific research, which is to evaluate the research results carried out objectively and without prejudice.

The whole approach adopted in the present occasion by IARC to define the relationship between lifestyle, nutrition, and cancer risk also conflicts with the rigorous methodology generally adopted by the same institution, which considers the level of evidence to define the degree of strength of the recommendations.

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