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Short Communication

Nutritional Tables to Improve Mood Disorders

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Chrononutrition is a field of Chronobiology that establishes the principle of consuming foodstuffs at times of the day when they are more useful for health, improving, therefore, biological rhythms and physical performance [1]. Every trial carried out by our research group in this field has shown that some nutrients may influence some circadian functions, but they may also be positive for health in ageing and some neurological disorders [2].

But not only ageing or neurological diseases make us suffer from chronodisruption. In fact, mainly, there are two causes of chronodisruption, they are chronic changes in timing of light and behavioral activity (physical activity, rotating shift work, meal times, etc.) [3]. When the sleep/wake circadian rhythm shows chronodisruption symptoms and becomes uncoupled with the endogenous timing system, normal day/night variations in many hormones and neurotransmitters are altered and may have adverse health consequences [4]. Our research group, in this communication, aims to provide some nutritional tables to be taken into account for mood disorders due to the strong and growing community interest in the effects of nutrition and dietary factors on mental health.

Triptophan-enriched diets may achieve beneficial effects on serotonin or melatonin levels with their consequent positive influence on health [5]. In this way, our research group has searched scientific databases to elaborate tables of foods whose composition shows high levels of tryptophan, serotonin, or melatonin. To carry out this objective we looked for tryptophan content food in USDA database, related to indoleamines riched food we used the descriptors “serotonin” and “melatonin” in PubMed, Science Direct and Google Scholar scientific databases.

We recommend tables showed in this letter for the design of diets to improve sleep disorders, those neurological diseases related with impairments in indolamine levels, or psychological disorders like anxiety or depression.

Moreover, to design a triptophan-enriched diet it is important to take into account that meals must have at least some glycaemic effect in the blood. Tryptophan ingested with glucides is better transported into the blood. This is provoked by insulin secretion which induces the entry of Large Neutral Amino Acids (LNAA: leucine, isoleucine, tyrosine, phenylalaline and valine) into muscle cells [6]. This fact is particularly relevant due to tryptophan being transported bound to albumin, such as LNAA; in this way a glycaemic meal with high levels of tryptophan should be better at increasing serotonin and melatonin levels in blood (Tables 1-3).

Table 1: Food with high levels of tryptophan amino acid. Sources: United State Department of Agriculture (USDA), USDA Nutrient Database for standard reference and [7].

Food	*Tryptophan content*
Seeds:	
Winged beans	0.762 g/100gr
Soybeans	0.591 g/100 g
Roasted pumpkin	0.569 g/100 g
Sesame	0.371 g/100g
Walnuts	0.32 g/100g
Parsley	0.475 g/100g
Cheese:	
Mozzarella	0.571 g/100g
Chedar	0.558 g/100g
Parmesan	0.482 g/100g
Edam	0.352 g/100g
Gouda	0.352 g/100g
Cod	0.704 g/100g
Tuna	0.34 g/100g
Elk	0.545 g/100g
Pork:	
Bacon	0.464 g/100g
Loin	0.386 g/100g
Ham	0.374 g/100g
Sirloin	0.37 g/100g
Chops	0.369 g/100g
Liver	0.366 g/100g
Rabbit:	
Wild	0.436 g/100g
Domesticated	0.401 g/100g
Goat	0.403 g/100g
Beef:	
Round	0.402 g/100g
Liver	0.368 g/100g
Porterhouse steak	0.355 g/100g
Chicken	0.386 g/100g
Wild boar	0.38 g/100g
Veal:	
Liver	0.361 g/100g
Quail breast	0.354 g/100g
Horse	0.349 g/100g
Spiny lobster	0.368 g/100g
Cuttlefish	0.364 g/100g
Octopus	0.33 g/100g
Cherry:	
Navalinda	82.65 ± 4.29 ppm
Van	68.58 ± 3.28 ppm
Pico limón	62.69 ± 5.61 ppm
Bourlat	61.36 ± 5.81 ppm
Ambrunés	57.24 ± 7.11 ppm
Pico Negro	37.76 ± 2.43 ppm
Pico colorado	36.53 ± 9.84 ppm

For several decades pharmacology has been very important to treat mood disorders, but in the last years non-pharmacological

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Table 2: Food with indoleamine serotonin high levels. Sources: references [8,9].

Food	*Serotonin content*
Tomato	221.9 µg/g
Cherry tomato	156.1 µg/g
Chinese cabbage	110.9 ± 22.5 µg/g
Spinach	34.4 ± 2.4 µg/g
Plantain	30 ± 7.5 µg/g
Cherry: Navalinda Pico colorado Burlat Pico Negro	 30.7 ng/100g 36.6 ng/100g 12.6 ng/100g 2.8 ng/100g
Hot pepper	17.9 µg/g
Chicory	8.5 ± 3.2 µg/g
Green onion	8 ± 0.8 µg/g
Kiwi fruit	5.9 ± 0.9 µg/g
Plums	4.7 ± 0.8 µg/g
Strawberry	3.77 ± 0.66 µg/g
Lettuce	3.3 ± 0.6 µg/g
Paprika	1.8 µg/g
Egg plant	1.5 – 12 µg/g
Wild maracuja	1.4 - 3.5 µg/g
Papaya	1.1 - 2.1 µg/g
Avocados: Haas Fuerte Booth	 1.6 ± 0.40 µg/g 1.5 ± 0.21 µg/g 0.2 ± 0.004 µg/g
Pineapple	1.5 µg/g
Grapefruit	0.9 µg/g
Honeydew melón	0.6 µg/g
Olives	0.2 µg/g

Table 3: Food with indole melatonin high levels. Sources: references [10,11].

Food	*Melatonin content*
White mustard	189 ng/g
Black mustard	129 ng/g
Almond	39 ng/g
Fennel	28 ng/g
Cherry	15-18 ng/g
Green cardamom	15 ng/g
Anise	7 ng/g
Oat	1.8 ng/g
Indian corn	1.3 ng/g
Rice	1 ng/g
Radish	0.6 ng/g
Tomato	0.5 ng/g
Banana	0.5 ng/g
Ginger	0.5 ng/g
Cabbage	107.4 ± 7.3 pg/g
Carrot	55.3 ± 11.9 pg/g
Pineapple	36.2 ± 8.4 pg/g
Onion	31.5 ± 4.8 pg/g
Cucumber	24.6 ± 3.5 pg/g
Kiwi fruit	24.4 ± 1.7 pg/g
Strawberry	12.4 ± 3.1 pg/g
Asparagus	9.5 ± 3.2 pg/g

approaches have been considered to improve these impairments and successful results have been reported in literature [12]. This focused review offers new nutritional tables with potential effects on mood and behavior as previous research have shown both in animals and humans with respect to indolamines and its precursor essential amino acid tryptophan.

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