

Chinese Dietetics and Nutrigenomics, possible points of convergence.

AUTHORS AND WORKPLACE

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ABSTRACT

Chinese Dietetics versatility is a useful resource at both preventive and therapeutic levels. However, since it is founded on qualitative criteria of food, it is difficult for Western dietitians to assimilate Chinese Dietetics. Therefore, it would be useful to find common ground between both dietary theories. Recent advances in Nutrigenomics such as research on gene regulation by nutrients and discovery of new nutrient entities (i.e. xenomiRs), offer a potential molecular explanation to well established empirical concepts from Chinese Dietetics.

KEYWORDS: Dietetics - Traditional Chinese Medicine - Nutrigenomics - MicroRNAs.

INTRODUCTION

The rapid transformation of dietary habits that have occurred in the West in recent decades has meant a progressive abandonment of traditional food habits, which added to a growing supply of an each time bigger proportion of industrially processed food, has led to the gradual loss of people's natural instinct towards a correct eating. On the contrary, rather than by its healthiness, food which is part of the diet nowadays tends to be chosen by its pleasant taste or the appealing sensations advertised. To a population

largely confused about healthy eating principles we have to add the misinforming effect exerted by the periodic appearance of new dietary regimes, many of them of dubious recommendation. As a result of these circumstances, it is noticed a growing prevalence of different chronic pathologies largely related to incorrect nutritional habits. This alarming sanitary situation is artistically reflected in the Chinese aphorism that reads: “We dig our graves with our own teeth” a phrase that also illustrates, clearly, the importance Chinese Medicine confers to diet as one of its basic pillars, and at the same level as tuina, acupuncture, fitotherapy or chi-kung. Therefore, it is of interest and it is the objective of this paper to try to bring this discipline closer to Western therapists, looking for possible coincidences that may relate the fundamental principles of the millenary Chinese diet therapy to current conclusions reached by new lines of research in nutrition, many of which seem to converge in their findings with the ancient Chinese principles.

CHINESE DIETETICS

The phrase “Do not eat just for pleasure although you can find it. Eat to be stronger. Eat to preserve the life heaven has given to you” is attributed to Kōngzi - Confucius (551- 479 B.C). Also in his Analects precise references about how to eat (Lún Yû 10-8) can be found. It is towards this pursuit of health and longevity through alimentation that Chinese dietetic is oriented. Proof of this are the ancient Chinese Pharmacopoeia and Diet Therapy treaties which have reached our days, such as the text “On Valuable Prescriptions” where Sun Simiao (581-682) devotes a full chapter to diet therapy entitled “Therapy by food” or the book “Essential Dietary Rules” where the Imperial Physician and Dietician Hu Sihui includes guidelines to maintain health through a proper nutrition, or the Bencao Gangmu “Compendium of Materia Medica” written by Lî Shízhēn (1518-1593) in which Chinese fitotherapy and diet therapy are systematized. Although ancient, the ancestral principles of Chinese dietetics persist, even today, fully rooted in the Chinese culture. On the contrary, the West has forgotten a similar tradition shown in Hippocratic texts from V-IV B.C which have lost all practical effects and are only valued by historians of medicine. In this case, we are referring to Diet Treaties 17 and 18 and general pathological writing specially “On Airs, Water, and Places.”

The very old Eastern dietetics roots its basic pillars in the principle of balance between the yinyang of foods and the organism. It is a fundamentally preventive medicine. Sun Simiao, one of the greatest imperial physicians in Tang Dynasty already pointed to the use of Pharmacopeia only when Dietetics is insufficient¹, although Chinese dietetics is also a valuable resource in the treatment of diseases once they are established.

The main advantage of this old nutritional system consists of its great flexibility and adaptability so that the diet is designed in each case according to the physiological needs and the nature of each person, adapting it both to their energy state and their environment conditions by choosing those foods which promote the natural energy flow inherent to each season and to each place, compensating therefore the effects of the climate agents. Thus, each diet dynamically adapts itself to the needs of each individual according to their age, state of energy, time of the year, and even to the hours of the day.

This versatility makes the energetic dietary into a preventive and therapeutic resource of inestimable value capable of being applied to any of the diverse existing culinary cultures. However, while its implantation in the East is old, in the West therapists who implement their treatments with proper dietetic guidelines tailored to each patient are scarce compared with those who apply other techniques of Chinese medicine with higher extension and acceptance. This lack of assimilation of the nutritional knowledge distinctive of Eastern tradition may be partly attributed to its methodological divergence from the comparatively recent Western dietotherapy. While in the West nutritional therapy designs its diets based on a quantitative criterion of food based on its caloric supply and its macronutrients and micronutrients ratio, Chinese dietetics distinguish itself from the Western one by applying a qualitative criterion: a balanced diet is not necessarily one that contents the right amount of calories and nutrients, but that one that helps to keep the yinyang balance of the organism providing those foods whose energy qualities are the appropriate ones. In order to achieve this it is necessary to know the properties of each food as well as those of their combinations, also taking into account the seasons of the year, the cooking method used and the geographical location.

¹ Flaws, Bob. 2002

COMPARATIVE APPROACHES: NUTRIGENOMICS AND CHINESE DIETETICS

The complexity of the principles on which Chinese dietetics is based, has to be added to the existing distance between its way of expressing concepts and the analytical ways of Western thought. On the other hand, the indications that traditional Chinese dietetic systems have, could very well contribute to guide researches currently under way in the nutrition field. This could be the case in recent researches carried out about the effects exerted on the organism by the microRNAs present in food, named xenomiRs, which recently have shown themselves as a new nutritional compound with metabolic implications similar to those observed by Chinese dietetics.

MicroRNAs are small fragments of 20-30 pairs of nitrogenated basis (Carthew and Sontheiheimer, 2009) present in (all) organisms from viruses and bacteria to plants, fungus, and animals.² They circulate through micro vesicles in the serum and plasma of human beings and animals³ and modulate various critical metabolic processes⁴ including cell differentiation, maintenance of tissue identity⁵, cell proliferation, apoptosis, intracellular communication⁶, and immune response against viruses and bacteria.⁷ Thus, the deregulation of microRNAs has been related to the development of various types of cancer⁸, metabolic diseases both cerebral⁹ and infectious. The most interesting question raised by the study of microRNAs is whether the microRNAs present in food, or xenomiRs, can fully access to the interior of the organism affecting the genetic and metabolic regulation.

² Carthew RW y Sontheiheimer EJ, 2009; Lee HC et al, 2010; Janga SC and Vallabhaneni S, 2011.

³ Chen X et al, 2008; Mitchell PS et al, 2008; Arroyo JD et al, 2011; Turchinovich A et al, 2011; Turchinovich A et al, 2012; Zhang Y et al, 2010.

⁴ Bartel DP, 2004.

⁵ Bartel DP, 2004; He L y Hannon GJ, 2004.

⁶ Valadi H et al, 2007; Zhang Y et al, 2010; Witwer KW et al, 2013.

⁷ Ding SW y Voynet O, 2007.

⁸ Suh SO et al, 2011; Lujambio A et al, 2007; Lujambio A y Esteller M, 2009; Li Y et al, 2012.

⁹ Weiland M et al, 2012; Calin GA, 2006, Esquela-Kerscher A y Slack FJ, 2006.

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PROMISING RESULTS OBSERVED

According to its qualitative characteristics, Chinese diet therapy classifies food into different categories which are linked among themselves when it comes to recommend a specific diet. The main classification is established based on the more yin or more yang nature of the food, but this categorization is associated with others based on the four energies, the five elements or the five flavors and the movement of the qi that food arouses in the organism.

Huang Di Nei Jing Ling Shu says: “Toxic drugs¹⁰ fight the pathogenic factors, the five cereals nourish the body, the five fruits help the body, meat from the five animals benefits the body, and the five vegetables complement the body. When eaten together, they fill the vital substances¹¹” (Ling Su 56) because each flavor that gets into the body joins its viscera selectively, thus increasing the qi, normal product from the transformation process of food, but too much of the same thing is cause of disease¹²(Ling Shu 63)

The five flavors plus the four energies (cold, cool, warm, and hot) are the basis of culinary combinations and of Chinese Pharmatherapy as well. The flavors make the qualities of the essences which compose a being or a food.

The theory of the five elements is reflected at food level in the five flavors¹³ (sour, bitter, sweet, hot, and salty) because each of them has the properties able to specifically influence in their corresponding viscera-organ (zang-fu) and subsidiary meridians. Thus, acid corresponds to wood and favors the liver and the gallbladder, bitter to the fire (heart-small intestine), sweet to earth (spleen-pancreas and stomach), hot to metal (lungs-large intestine) and salty to water (kidney and bladder) (Su Wen 23-150-2) Regarding this classification it has to be taken into account that the term “flavor” refers to the nature of the food and not necessary to its palatability. In practice, a healthy regime will provide a balanced equilibrium of the five flavors, whereas the excessive consumption of a certain flavor will turn out harmful for its specific zang-fu as well as for its tissues and associated meridians, and for the energetic flow in the body.

¹⁰ Toxic not in its absolute meaning but as something harmful but whose use should not be banned since they can play the role of beneficial stimulants and they are part of the composition of numerous therapeutic indications.

¹¹ *Ling Shu 56*. Versión de Milsky, C & Andrés, G. Édition La Tisserande. Paris 2009: 313

¹² *Ibid 63* : 335

¹³ Rochat de la Vallée, E & Père Larre, C. *Su Wen. Les 11 Premoers Traités*. Maisonneuve, 1993 : 308

This qualitative Chinese concept of the action of foods which seems completely oblivious to the quantitative principles of the classic western dietetics could begin to establish inclusive connections in the principles belonging to a young science, the Nutrigenomic, branch of the Genetic Epidemiology that integrates Genetic and Nutrition.¹⁴ Neither genetics on their own, nor the study of environmental factors applied to nutrition by themselves, can explain the causes and development of chronic diseases¹⁵ that is why Nutrigenomics seeks to facilitate a genetic and molecular comprehension of how nutrients influence the balance between health and sickness, altering the expression and/or the structure of the genetic expression. This new science, which focuses its studies in the molecular mechanisms underlying in different genetic responses of each individual to diet factors, can be summarized in the following points: diet components act on the human genome whether direct or indirectly altering the expression or structure of genes ; under certain circumstances and in certain individuals, diet can be a serious risk factor of suffering disease; some diet regulated genes are involved in the onset, incidence, progress and severity of chronic diseases; to what extent diet influence in the health-sickness balance depends on the genetic information of each individual; the diet intervention based on the knowledge of nutritional requirements, nutritional state and genotype could be used to prevent, mitigate or cure chronic diseases.¹⁶

In the field of Nutrigenomic, it has been proved that beyond their nutritional roles, nutrients are capable of modifying the genetic expression and the function of target cells therefore affecting multiple fundamental biologic processes. An example of this effect caused by micronutrients is the implication of Vitamin A in the regulation, by adaptive thermogenesis, of levels of body fat by means of UCPs proteins activation.¹⁷ Likewise, this effect of direct genetic regulation has been observed in macronutrients, especially in lipids which are involved, for instance, in the regulation of a lipid profile based on the amount of fat ingested¹⁸ or the type of fat¹⁹ present in diet .

In this regard, given the existence of interaction of the macronutrients and micronutrients with specific actions on the genetic regulation as well as on the

¹⁴ Ordovás JM et al, 2004

¹⁵ Sing CF et al, 2003

¹⁶ Kaput J et al, 2004.

¹⁷ Bonet ML et al, 2003

¹⁸ Ordovas JM et al, 2002

¹⁹ Warodomwicht D et al, 2009

endogenous production of microRNAs²⁰ it could be said that the specific proportion/ratio in macronutrients, vitamins and minerals of each food would give a plausible explanation of its specific quality of action in the field of Chinese pentacoordination zang-fu.

However, in Chinese diet therapy, in addition to the five flavors, a sixth flavor is recognized, the insipid or Dan which does not correspond to any element or zang-fu. The insipid is rather a lightness that can/may indicate a sublimation of the five flavors.²¹ In this context and following the Chinese thought, the concept of insipidness lacks antinomy, basic yinyang complementation, because insipid contains the other five flavors. It is the fullness, the neutral and undifferentiated background of things, that is to say: the center.²² It is in this concept where Chinese dietetics seems to find its parallelism with the most recent and revolutionary discovery carried out in Nutrigenomic field: the effect of exogenous microRNAs or xenomiRs in the genetic expression of living beings/creatures.

In 2012, Zhang L et al. discovered that the microRNAs in plants were transferred to blood and tissues through ingest and that once inside the organism they performed the same functions as endogenous microRNAs, regulating the genetic expression and therefore, the cellular function of specific target organs. This same process also occurs in the case of xenomiRs coming from animal alimentary sources, but the great similarity of these animal xenomiRs with those in human organism makes them much more difficult to detect and study.²³

And that is the reason why xenomiRs can be considered as a new micronutrient, at the same level as vitamins and minerals²⁴ playing an active role in genetic modulation. Given that human diet is extremely varied and includes different proportions of multiple species of plants and animals²⁵ according to each geographic area, and since plants encode hundreds of thousands of xenomiRs, science is currently working to determine how many of these xenomiRs have a potential as a regulator of the genetic expression. Likewise, it could also be deduced that this specific effect on the modulation of the metabolism inherent to xenomiRs, would also allow integration with the Chinese

²⁰ Ross SA and Davis CD, 2011; Ryu MS et al, 2011; Davis CD and Ross SA, 2008

²¹ Rochat de la Vallée E, *Les 101 Notions-Clés de la Médecine Chinoise*. Guy Trédaniel Éditeur 2009 :212

²² Jullien F, 1998

²³ Zhang HS et al, 2012

²⁴ Zhang L et al, 2012

²⁵ Rajagopalan R et al, 2006

traditional classification of foods according to the movement of the qi they arise in the body.

On the other hand, it has been observed that the processing and cooking, as it occurs with other micronutrients, may affect the amount of xenomiRs present in plants²⁶ and also it is currently being studied which culinary techniques in each case affect which xenomiRs and to what extent. It is interesting to note how, in a similar way, in Chinese diet therapy apart from each food qualities, the cooking method is also taken into account²⁷ (Rochat de la Vallée & Père Larre, 1993) the same occurs with the changes in flavor and nature that take place during preparation, given that each culinary technique may have an influence on the qi of the food thus making it vary its nature to the point of conditioning a different therapeutic or preventive use, which will depend on the season of the year or the energetic state of each person.

Generally, Chinese dietetics, both with preventive and therapeutic purposes, tend to use combinations of foods, which according to their properties give rise to various types of combinations classified according to the “ 7 consequences” theory, including from the insulated use of food to synergistic combinations. Combinations of: Interpotenciation type (xiang xu) between foods of the same nature which reach a mutual reinforcement of their effects, Interassistance (xiang xi) when adding an auxiliary food that reinforces the main food effect or, on the contrary antagonistic combinations such as Inhibition (xiang wei) where a food decreases the effect of another one or Incompatibility (xiang fan) or those combinations banned because of their possible harmful effects. It would be advisable to carefully analyze those combination between foods described since ancient times in the East when facing the design of future researches on predictable interactions that xenomiRs from different food may have in their effects.

CONCLUSIONS

It is very important to point out and highlight the solidity and full validity of ancestral Chinese knowledge which, when analyzed from an analytical point of view, reveals the

²⁶ Zhang L et al, 2012; Chen X et al, 2010.

²⁷ Rochat de la Vallée, E.& Père Larre, C. *Su Wen Les 11 premiers Traités*. Maisonneuve 1993 :134

successful proof of its empiric knowledge thus finding its scientific foundation so necessary to Western thought.

In the same way that the recent discovery of the functioning of the xenomiRs in food contributes to provide a molecular explanation to empiric aspects of Chinese dietetics, it can also be deducted that traditional indications from Chinese dietetics could be useful when planning future researches in Nutrigenomic field. So, in this way, the confluence between the explanations inherent to ancestral Chinese dietetics and modern Nutrigenomics contribute to a more accurate comprehension in the West of the principles of Chinese dietetics, away from the biomedical way of thinking.

Ultimately, both sides of thought finally lead to the same reflection: the ecosystem we live in is interconnected and species are not isolated, rather they are interrelated to each other. There is a communication among all living organisms and between organisms and their habitat and this is a fact that must lead the principles in dietetics.

This possible confluence between the millennial Chinese dietetics and new researches in Nutrigenomics field is forcing a major digging into the possible convergence between the two systems, in order to provide a molecular basis to empiric Chinese theories as well as to give direction to future researches in Nutrigenomic field from the claims of Chinese dietetics, essentially based on the longstanding conviction that man-microcosm reproduces the macrocosm.

CONFLICT OF INTERESTS

The authors claim not to have any conflict of interest.

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