



Artículo especial

A personal view of nutrition in Spain

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Abstract

This paper stems from the special lecture given by the author at 20th International Congress of Nutrition, held from 16 to 20 September 2013 in Granada (Spain), following for his appointment as “Living Legend” of the International Union of nutritional sciences (IUNS), in recognition of his outstanding contribution to research and development in nutritional science. The development of nutrition in Spain from the 1960s to the present, which the author had the opportunity to experience first hand, is described. The contribution covers an extensive period in the history of this science, and highlights the advances made in our knowledge of nutrition and several of the misunderstandings that existed and still exist in this science: 1) The Anglo-Saxon dietary pattern and the high incidence of death from myocardial infarction, and the subsequent recognition of the Mediterranean diet as a model of a varied and balanced and healthy eating. 2) The relationship between cardiovascular disease and the consumption of oily fish. Since the discovery of the synthesis of prostaglandins makes it clear that fish fat is heart-healthy. 3) The epidemic of prosperity, overweight and obesity and the appearance of miracle diets. However, there are not miracles, the only solution being a healthy lifestyle and a balanced hypocaloric diet. 4) In the field of nutrition, diet and health, the harmful effect of: “In my opinion”, a single allusion that undermines all science. The author also acknowledges all the researchers whose efforts, tenacity and enthusiasm have contributed to the advances made in nutrition science in Spain.

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Key words: *History of nutrition. Spain. Personal vision. Spanish nutrition researchers.*

UNA VISIÓN PERSONAL DE LA NUTRICIÓN EN ESPAÑA

Resumen

Este trabajo deriva de la Ponencia presentada por el autor al 20th International Congress of Nutrition, celebrado del 16 al 20 de septiembre de 2013 en Granada (España), y que fue consecuencia de su nombramiento como “Living Legend” of the Internacional Union of Nutritional Sciences (IUNS), en reconocimiento a su excepcional contribución a la investigación y al desarrollo de las ciencias de la nutrición. Se describe el desarrollo de la nutrición en España desde los años 60 hasta la actualidad, desarrollo que el autor a tenido la oportunidad de vivir en primera persona. Se incluye un amplio periodo de la historia de esta ciencia, medio siglo, donde se destacan los avances en el conocimiento de la nutrición y varios de los de los grandes desencuentros de esta ciencia: 1) La recomendación del modelo dietético anglosajón y la aparición de la máxima incidencia de muerte por infarto de miocardio, y el posterior reconocimiento de la Dieta mediterránea como modelo de alimentación variada y equilibrada y saludable. 2) La relación entre la enfermedad cardiovascular y el consumo de pescado azul. A partir del descubrimiento de la síntesis de las prostaglandinas se establece con claridad que la grasa de pescado es cardiosaludable. 3) La epidemia de la prosperidad, el sobrepeso y la obesidad. Para combatir este problema aparecen las dietas milagrosas y no hay milagros, la única solución: hábitos de vida saludables y dieta equilibrada hipocalórica. 4) En el terreno de la nutrición, dietética y salud, el efecto perjudicial del: “Yo opino”. Con esta simple alusión se desautoriza a toda la ciencia. El autor también muestra su agradecimiento a todos aquellos investigadores que con su esfuerzo, tesón e ilusión han contribuido a los avances de las ciencias de la nutrición en España.

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Palabras clave: *Historia de la nutrición. España. Visión personal. Investigadores españoles en nutrición.*

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When Professor Angel Gil informed me that the Scientific and Organising Committee of the 20th International Congress of Nutrition (IUNS) decided to honour me with the title of “Living Legend” I felt overcome with the emotion and satisfaction that my colleagues and friends had singled me out for this distinction. I thank you all from the bottom of my heart.

Before continuing, I should like to thank the chairman, Professor Ibrahim Elmadfa and Professor Ángel Gil for their kind presentation.

For some time now I have been wondering about what the my talk should be about, and I finally decided on recounting a personal view and short of the history of Nutrition in Spain.

On several occasions I have mentioned the envy I feel towards Professors Varela and Grande –not for their considerable knowledge, nor for their many other qualities, both human and scientific (evident to all who know them)– but because they are able to talk about Nutrition in the first person, having been, along with many other friends and colleagues, protagonists in the birth of modern nutrition on the world stage.

Forty-five years have passed since Professor Varela suggested I help in practical teaching in our beloved (*BELOVID*) Faculty of Pharmacy at the University of Granada in 1968.

In those days Nutrition in Spain was little more than Bromatology, the study of food and, more importantly, the analysis of its nutrient composition. This is not unimportant since, without this precise and valuable information, we would not have advanced beyond the first step on the ladder we have since climbed –the ladder of the Nutritional Science.

The main effort of beginners and future nutritionists in those days was to develop and improve analytical techniques to make them as precise as possible, within their limitations, like the Kjeldahl or Soxhelet methods for determining protein and fat, respectively, soon to be complemented by gas chromatography for the determination of fatty acids. In this respect Dr. Alvaro Zugaza of Antibioticos, S.A. helped us considerably, and I still have some of his formulas for calculating the theoretical plates of a chromatography column.

Soon after this, D. Gregorio got from the Ministry of Science and Education, a Bekman Unichrom semiautomatic amino acid analyser, which was able of carrying out more than two analyses per day of amino acids if you visited the laboratory between midnight and 2 o'clock, and even three amino acid analyses if you slept in the lab.

All these systems and other provided valuable information on total macro (and some micro) nutrients present in foods, and on the changes that took place after certain industrial and culinary manipulation.

In this way, it was possible to evaluate the influence of heat processes –boiling, frying, roasting, etc.– on the macro and micronutrient composition of foods. The influence of other technological processes such as freezing, storage and refrigeration, could be followed,

along with other questions, like nutrient loss, which were already beginning to have a certain resonance, as revealed by the study of Maillard reactions. It should be emphasised that not only the negative aspects were being evaluated, but also other aspects of great importance, such as changes in the colour, flavour and taste of many foods submitted to industrial and home cooking processes, as manifested in the studies of Professor Varela and his group¹⁻³.

Additional information of enormous value was the study of the bioavailability of nutrients. This is not a question of how much or how many nutrients there are in a food, but of their availability and how much or how many can be used by the person who consumes this food. For that appear *in vivo* and *in vitro* methods for measuring the nutrient bioavailability.

In vivo methods for determining the digestive and metabolic quality of food already existed. Some of these methods were introduced into Spain by Professor Varela after his stay in Germany at Doctor Clara Shiller's laboratory. These permitted determinations of: Apparent and True Digestibility Coefficients (ADC and TDC) and other indices not only for protein also fat, mineral and so on).

These techniques are very complex and require quite sophisticated installations, apart from animal maintenance and management facilities, control of the food intake and separation of faeces and urine for the corresponding analyses, etc. Determining the above index for one food sample would involve more than a month's work.

For this reason and to obtain rapid methods for measuring the nutritive quality of foods through the evaluation of nutrients, Doctor Carpenter perfected the technique for determining available lysine in a complex and complicated method, fine-tuned in our group by Doctor Vidal (Conchita). This technique had and still has great importance for monitoring the influence of technological treatments applied in the preparation of foods on nutrient availability, especially in cases involving heat^{1,3}.

Other methods appeared for determining the bioavailability of different nutrients by enzymatic hydrolysis and the measurement of “*in vitro*” absorption of the nutrients in the intestine everted sac of different animals or by *in situ* perfusion in anaesthetized animals, or by dialysis with semi permeable cellulose membranes⁴, etc. In this respect, Professor Ponz of the University of Pamplona played a crucial role.

Around the 1970s the study of digestive, pancreatic, biliary and salival secreting was consolidated. These techniques were important in themselves from a physiological point of view, but an invaluable complement for understanding the regulation of the processes involved in the digestion, absorption and metabolic fate of absorbed nutrients. Here, we must mention the outstanding efforts of our colleague, friend and master, Professor Murillo and the outstanding group he formed and SUPERVISED, Professors: María, Alejandro,

Margarita, Toñi, Maria José, Maruqui, Ginés, Luisi, Mariano, Emilio, Miguel, Frandy and other⁵⁻⁸.

At this time, using surgery, a system of canulas which entered and re-entered given points of the animal intestine permitted the detailed *in vivo* study of the processes of nutrient digestion and absorption in different parts of the gastrointestinal tract. This provided important information on the physiological mechanisms involved in the digestive process in the stomach and small and large intestines, for example. Dr. Armstrong of Newcastle University was really behind these new techniques, which we had the opportunity to incorporate in our group and Spain in general, through Professors Juan Gálvez Morros, Vicente González and myself –all thanks to the good contacts of Prof. Varela.

This revolution in the field of nutritional studies in Spain crystallised in the introduction into Spain, and more specifically, in the Zaidín Experimental Station in Granada, of respiratory chambers for use with large animals. This project absorbed the energies of many people, especially in the group supervised by Professor Boza and, later by Dr. José Aguilera (who doesn't remember the permanent smile of the ineffable Juristo).

In this same period, thanks to one of the many ingenious ideas that Prof. Varela had, were begun nutrition studies in fish that were pioneers in Spain and almost in Europe, since the only studies that were performed feeding and growth related, with my collaboration prompted this line and continue, although at present there are many groups working and researching in this field, Professors: Manuel de la Higuera, Manuel García-Gallego, Gabriel Cardenete, Ismael Camacho, Ana Sanz and others⁹⁻¹¹.

But the questions now for the fish chronobiology group are: What to feed, When, How, and How much to feed and the answers are: Diet, Feeding rhythms, Feeding systems and Self-feeding device. The main topics are: Feeding, reproduction, early development, locomotor activity, light effects, circadian rhythms, thermo cycles and fish welfare all then by the supervision of the following professors and researchers: Juan Antonio Madrid, Javier Sánchez Vázquez, Javier Martínez, José Ángel, Vera, Luisa, Fernando, Ander, Natalia, Ana and others¹²⁻¹⁶.

Special mention should be made of the advances made in our country from the 1950s onwards in the field of clinical nutrition, considered as an important, indeed essential, tool for recovering the patient's health.

Enrique Rojas, Miguel Ángel Gasull, Ana Sastre and J. M. Culebras, among others, helped establish the basis of enteral and, especially, parenteral nutrition, making rapid advances both as regards the models and techniques of administration and the suitability of the formulas to administer. At the same time, there were important advances made in the design and distribution of food, almost reaching *a la carte* status.

At that time there was a great change in our group since Professor Varela took up a position in Madrid and our friend Professor Murillo, who had succeeded him,

died in a domestic accident, having made such huge efforts to forward the concept of nutrition. This event still remains painful for me and many others –suffice to say, that there will always be a *before* and an *after* in our professional careers and personal feelings.

It was in such circumstances that Professor José Mataix arrived in Granada from León as head of department, fully conscious of the important role that the School of Nutrition could play in Spain. This was an important decision on Pepe. He created the Institute of Nutrition and Food Technology “José Mataix”, still the guiding light and reference for nutrition in this country. Pepe was, is, and will certainly remain an important player in the field¹⁷.

Infant nutrition merits special attention because this field has undergone special development in Spain, both at social and research levels. The advances made in the study of the new born/lactating children and children in other stages of their development owe a great debt to Professor Angel Ballabriga, a brilliant and pioneering paediatrician¹⁸.

Many universities, hospitals and research centres have contributed to the important advances made in the design and manufacture of foods for lactating and post-lactating children –both healthy and those less fortunate. The resulting milks, baby foods and beikosts bear this out¹⁹⁻²⁰.

At this point I should like to mention the important role in the development of nutritional science played by the manufacturing companies such as: Puleva, Hero, Ordesa, Abbott, Alter, Nestlé, Danone, to name but a few.

The nostalgia related with the origins of modern nutritional science in Spain has led me to think of the places and, inevitable, the people I associated with the same –Granada, Santiago, Madrid, Zaragoza, Pamplona, Barcelona, Murcia; Juan Luque, Gloria, Pepe Aguilera, Tojo, Charro, Olga, Alfredo, Luis, Ascensión, Angelina, ...

But not all was a bed of roses! The period to which I refer also witnessed the first great contradictions related with nutrition. I am going to detail the *first* of these refers to the best diet models. The diet of the richest countries produces the tallest individuals. But precisely the result of the seven countries study, the most developed countries also have the highest rates of death through myocardial infarction, while the “poor” south of Europe bordering the Mediterranean have a much lower incidence. This led to the greatest invention of all time –the Mediterranean diet– what a pity that Doctors Ancel and Margaret Keys did not patent the idea! This is a balanced, varied diet that has been seen to provide many advantages to those who follow it²¹⁻²².

The *second problem* is cardiovascular disease and the consumption of blue fish. Patients have always been recommended to lower their consumption of cholesterol and fat (especially saturated fat) and to eat white fish, chicken, etc. With the discovery of prostaglandins synthesis it was established that fish fat

is healthy for the heart and that blue fish should be included in the diet.

When it was concluded that plasma cholesterol basically comes from saturated fatty acids reaching the liver, the cholesterol contained in the diet loses importance. The use of the term “Mediterranean diet” has led to our country to be at the bottom of the league table for cardiovascular diseases and death from myocardial infarction. But this time, being last is good.

The works of Professor Varela and, especially, of Professor Olga Moreiras have been fundamental in the field of health and its relation with nutrition and eating habits (the Mediterranean Diet, again)²³⁻²⁵.

Thirdly problem: the epidemic of prosperity, overweight and obesity especially in developing countries. More than half of the Spanish population is overweight and around 16% suffer obesity²⁶.

We are evolutionarily designed to live a life of austerity and to consume a small amount of food, while expending great energetic effort. However, in this age of plenty, we live with an abundance of everything and make little physical effort. We therefore get fat. To solve this problem quickly come along many miraculous diets we all know so well –but only one balanced diet, with low calories is the physiological option.

Changes in the feeding pattern and the subsequent unbalance in the caloric profile of the diet may have had great importance in the occurrence of obesity^{27,28}.

But if nutrients do not reach the internal medium in given proportions it will be difficult, and in some cases impossible, to obtain energy from them. If we do not use them, they will be stored and the only way our organism knows how to do this is in the form of triglycerides, that is accumulating fat in adipose tissue.

We should remember that when glycaemia is compromised, it is impossible to use fatty acids as energy substrate, and they produce hyperlipemia. This is what is happening as we lower the proportion of carbohydrates intake and increase the proportion of lipids.

Fourth problem: and I don't know if “*In my opinion*” is one of the most harmful for nutrition, diet and health. Actually everything is subject to opinion and everything has the same value. But this should NOT be the case. What is explained and justified experimentally cannot and should not be compared with what is merely opinion, marketing or the product of a sleepless night²⁹.

At present, research into the different areas of nutrition is setting new courses³⁰⁻³³. If in the past (albeit recent past), enzymes and hormones were centre stage, it is now the turn of molecular biology, but the future, present just now are - Nutrigenomics, Transcriptomics, Proteomics and Metabolomics, etc. are the centre of research³⁴.

Things have certainly changed in these last 30 years, during which time, as founder, teacher and friend of the Nutrition Group of the University of Murcia, I have come to realize the satisfaction that hard work brings. But nothing would have been possible without the

efforts of my colleagues in the group: Paquita, Marta, Charly, Elvira, M^a José, José Angel, and of course of my closed friend Fermín Sánchez de Medina, Angelina Reche and Angel Gil, and also a group of student. These are just some of the people who have helped me to learn and given me the gift of enjoying and friendship.

The main topics of our group are: Evaluation of nutritional status in different groups of population³³⁻³⁷; Nutritive quality of foods^{38,39}; Functional foods⁴⁰; The nutrition of elderly people⁴¹⁻⁴³; Oxidative stress and ageing⁴⁴; Baby foods⁴⁵; Lipid metabolism early in life⁴⁶⁻⁴⁸; Physical activity in teenagers⁴⁹; Physiological bases, prevention and treatment of overweight and obesity⁵⁰.

In this personal reflection, many names should have appeared that have not done so –some who are alive, some who are not, some I know, others whom I know only by their reputation. And others I have forgotten. To all these persons, thank you.

This short paper article I dedicate to my past maestros and my present friends –among whom I include all of you. Thank you very much.

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