Endocrinol Diabetes Nutr. 2020;67(1):61–69

Endocrinología, Diabetes y Nutrición

www.elsevier.es/endo

SPECIAL ARTICLE

Iodine nutrition in Spain: Future requirements☆

Lluís Vila[a,b,*], Anna Lucas[b,c], Sergio Donnay[b,d], Antonio de la Vieja[b,e], Silvia Wengrovicz[b,f], Piedad Santiago[b,g], Orosia Bandrés[b,h], Inés Velasco[b,i], Eduardo Garcia-Fuentes[b,j], Susana Ares[b,k], José Carlos Moreno Navarro[b,l], Mercedes Espada[b,m], Antonio Muñoz[b,n], Juan Carlos Galofré[b,o], Manel Puig-Domingo[b,p]

[a] *Servicio de Endocrinología y Nutrición, Hospital de Sant Joan Despí Moisès Broggi, Barcelona, Spain*
[b] *Grupo Nutrición de Yodo. Área de conocimiento de la Tiroides-Sociedad Española de Endocrinología y Nutrición, Spain*
[c] *Servicio de Endocrinología y Nutrición, Hospital Germans Trias i Pujol, Badalona, Spain*
[d] *Servicio de Endocrinología y Nutrición, Fundación Hospital Alcorcón, Madrid, Spain*
[e] *Unidad de Tumores Endocrinos, 53.03.020, Instituto de Salud Carlos III-UFIEC, Madrid, Spain*
[f] *Instituto Catalán de Endocrinología, Clínica Tres Torres, Barcelona, Spain*
[g] *Servicio de Endocrinología y Nutrición, Complejo Hospitalario de Jaén, Jaén, Spain*
[h] *Sección de Endocrinología y Nutrición, Hospital Royo Villanova, Zaragoza, Spain*
[i] *Servicio de Obstetricia y Ginecología, Hospital Riotinto, Riotinto, Huelva, Spain*
[j] *Unidad de Gestión Clínica de Aparato Digestivo/Instituto de Investigación Biomédica de Málaga (IBIMA), Hospital Universitario Virgen de la Victoria/Universidad de Málaga, Málaga, Spain*
[k] *Servicio de Neonatología, Hospital Universitario La Paz, Madrid, Spain*
[l] *Laboratorio de Tiroides Molecular, INGEMM-Instituto de Medicina y Genética Molecular, Hospital Universitario de La Paz, Madrid, Spain*
[m] *Unidad de Bioquímica Clínica, Laboratorio de Salud Pública de Bilbao, Gobierno Vasco, Parque Tecnológico de Bizkaia, Derio, Spain*
[n] *Centro de Atención Primaria de la Seu d'Urgell, Lleida, Spain*
[o] *Departamento de Endocrinología Clínica, Universidad de Navarra, Pamplona, Spain*
[p] *Servicio de Endocrinología y Nutrición, Hospital Germans Trias i Pujol, Institut de Recerca Germans Trias i Pujol (IGTP), Badalona, Spain*

Received 24 December 2018; accepted 14 February 2019
Available online 10 January 2020

KEYWORDS
Iodine nutrition;
Epidemiology;
Prevention

Abstract Although iodine nutrition in Spain has improved in recent years, the problem is not completely resolved. It is necessary that health institutions establish measures to ensure an adequate iodine nutrition of the population, especially among the highest risk groups (children and adolescents, women of childbearing age, pregnant women and nursing mothers). A low salt intake should be advised, but it should be iodized. It is also imperative that food control agencies

☆ Please cite this article as: Vila L, Lucas A, Donnay S, de la Vieja A, Wengrovicz S, Santiago P, et al. La nutrición de yodo en España. Necesidades para el futuro. Endocrinol Diabetes Nutr. 2020;67:61–69.

* Corresponding author.
E-mail address: lluis.vila@csi.cat (L. Vila).

https://doi.org/10.1016/j.endien.2019.12.005

establish effective control over adequate iodization of salt. Indicators on iodine nutrition should be included in future health surveys. The EUthyroid study and the Krakow Declaration on iodine nutrition provide an opportunity to set up a pan-European plan for the prevention of iodine deficiency that should be considered and used by health authorities.

PALABRAS CLAVE
Nutrición de yodo;
Epidemiología;
Prevención

La nutrición de yodo en España. Necesidades para el futuro

Resumen Aunque la nutrición de yodo en España ha mejorado en los últimos años, el problema no está resuelto del todo. Es preciso que las Instituciones sanitarias establezcan medidas para garantizar que la nutrición de yodo de toda la población sea la adecuada, especialmente entre los colectivos de mayor riesgo (niños y adolescentes, mujeres en edad fértil, mujeres embarazadas y madres lactantes). Debe aconsejarse un bajo consumo de sal, pero que esta sea yodada. También es imprescindible que las agencias de control alimentario establezcan un control efectivo sobre una adecuada yodación de la sal. En las futuras encuestas de salud debería incluirse indicadores sobre la nutrición de yodo. El estudio EUthyroid y la Declaración de Cracovia sobre la nutrición de yodo brindan una oportunidad para establecer un plan paneuropeo para la prevención de la deficiencia de yodo que debería ser considerada y aprovechada por las autoridades sanitarias.

Introduction

Iodine deficiency (ID) is one of the most easily preventable public health problems affecting the largest number of people in the world.[1] The World Health Organization (WHO) estimates that a population has adequate iodine nutrition when the median urinary iodine levels range from 100 to 199 μg/l, although such values may vary depending on age and pregnancy and lactation status (Table 1).[2] The key function of iodine is participation in the synthesis of thyroid hormones,[3] which are essential for both pre- and postnatal brain development and for the lifelong metabolism of all cells.[4] Recent studies show that iodine is also involved as an antioxidant agent protecting against bacterial and viral infections.[5] This further increases the importance of adequate nutrition regarding this element. The range of ID disorders (IDDs) is very wide, and the severity of such conditions is related to the magnitude of the deficiency.[6] Adequate iodine nutritional status is more critical during pregnancy and lactation because both thyroid hormones and iodine pass to the fetus from the mother, and iodine intake therefore should be increased in these situations. Iodine deficiency in these cases can lead to more harmful and irreversible effects, such as impaired brain function and development of the fetus and/or child,[7,8] even in moderate to mild ID, where a decrease has been found of some points of the intellectual quotient (IQ).[9] An impaired hearing threshold[10] or decrease in fertility[11] are also some of the abnormalities that may be associated with ID. The WHO reports that ID is the leading cause of preventable mental impairment. The key to the prevention of ID is ensuring that the population consumes an adequate amount of iodine in a sustained and continuous manner (Table 2).[12–14] Among the various iodization systems that are available, the WHO recommends salt iodization because salt is the food that can most easily reach the entire population. Salt iodization prophylaxis is effective, safe, and cost-effective.[15]

Although it would appear to be an easy matter to administer an adequate amount of iodine to the population through the use of iodized salt (IS), at the start of this century over half of the European population still resided in countries with ID.[16] Currently, the data registered on the official website of the ''Iodine Global Network''[17] (Table 3) show a significant advance in iodine nutrition only in the school population. Just three countries, out of the 29 countries in which studies have been made, present ID according to the reference described by the WHO (median urinary iodine level < 100 μg/l).[2] Of the 11 countries with available information regarding the adult population, 6 are deficient and 3 are borderline, with median urinary iodine levels of close to 100 μg/l. Nineteen of the 24 countries with data on the pregnant population present ID. In Spain, iodine nutrition in these population groups follows a pattern similar to that reported (see below), and it is certainly alarming that the population most sensitive to ID – pregnant women – is the population mostly found to be in this situation.

The WHO and the International Council for the Control of Iodine Deficiency Disorders (ICCIDD) consider that a country may have an adequate iodine supply when more than 90% of all families[1] consume IS. This supply may take place through compulsory or voluntary IS consumption. In the latter case, campaigns should be carried out to promote its use. The controversy that has emerged between the promotion of IS and arterial hypertension is resolved if ''low salt intake'' but ''with iodine'' is recommended. There are currently 15 countries in Europe where IS consumption is mandatory

Table 1 Epidemiological criteria for assessing iodine nutrition in a population.

Population ≥ 6 years			Pregnant (nursing) population	
Median urinary iodine (μg/l)	Iodine intake	Iodine nutrition of the population	Median urinary iodine (μg/l)	Iodine intake
<20	Insufficient	Severe deficiency	<150 (<100)	Insufficient
20–49	Insufficient	Moderate deficiency		
50–99	Insufficient	Mild deficiency		
100–199	Adequate	Adequate nutrition	150–249 (>100)	Adequate
200–299	More than adequate	Adequate in pregnancy. Mild risk in the rest of the population	250–499	More than adequate
≥300	Excessive	Risk of adverse effects	≥500	Excessive

Source: WHO, ICCIDD, UNICEF.[1]

Table 2 Recommendations for iodine intake (μg/day).

IOM[12]			WHO[13]		EFSA[14]	
Age groups	EAR	AI or RDA	Age groups	RNI	Age groups	AI
0–12 months	–	110–130	0–5 years	90	7–11 months	70
1–8 years	65	90			1–3 years	90
					4–6 years	90
9–13 years	73	120	6–12 years	120	7–10 years	90
≥14 years	95	150	≥12 years	150	11–14 years	120
					15–17 years	130
					≥18 years	150
Pregnancy	160	220	Pregnancy	250	Pregnancy	200
Breast-feeding	200	290	Nursing	250	Nursing	200

AI: ''adequate intake''; EAR: ''estimated average requirements''; EFSA: European Food Safety Authority; IOM: Institute of Medicine (USA); WHO: World Health Organization; RDA: recommended dietary allowance; RNI: recommended nutrient intake.

(Table 3).[18] However, it should be noted that in 8 of them, pregnant women present ID. Leaving aside Turkey and Denmark, where universal salt iodization programs have been introduced more recently (2013 and 2014, respectively), ID still exists in countries where such programs have been in force for over 5–10 years. Of note is the case of Italy, where all the studied population groups are iodine-deficient. This paradox is further commented on below.

The current situation in Spain

In Spain, as in many other countries throughout the world, ID has been known about, as such, since the end of the nineteenth century.[19] In the past 30 years, many publications in Spain have documented the high prevalence of ID and the changes associated with it.[20–26]

Fortunately, and for different reasons, both the evolution of ID in Spain and its consequences have been favorable, though with some nuances as commented on below. The latest studies very clearly show a positive change that places Spain as a country with ''optimum iodine nutrition''.[17] In a study conducted on a representative sample of more than 5000 individuals over 18 years of age from all parts of Spain, the median urinary iodine levels were 117 μg/l.[27] Another recent study conducted on a representative sample of almost 2000 Spanish schoolchildren aged 6–7 years documented a median urinary iodine level of 173 μg/l.[28] These good results in the general and pediatric population cannot be extrapolated to the pregnant population. Although some studies have observed good results,[29–32] there is still evidence that a large part of this population presents ID.[33,34]

What factors have influenced the current situation?

In the past 30 years, the changes in iodine nutrition in Spain have been attributable to different factors. These include changes in legislation, measures carried out by different administrations, the intervention of our group, or unforeseen factors such as the high iodine content in dairy products.

Legislation

Undoubtedly, two official decrees have been crucial for the evolution of iodine nutrition in Spain:

In 1983, the marketing of IS was approved. As a result of the participation of Spain in the World Assembly of the WHO, in April 1983 Spanish Royal Decree 1424/1983 was published (BOE No.° 130/1983), approving the technical-health

Table 3 Iodine nutrition registries of the ''Iodine Global Network''[17] and the universalization of salt iodization according to the ''Global Fortification Data Exchange''[18]

	School population	Urinary iodine μg/l	General population	Urinary iodine μg/l	Pregnant population	Urinary iodine μg/l	USI (since the year)
Albania	Adequate	100			Deficit	85	Yes (2008)
Germany	Adequate	122	Deficit (women)	54	–	–	
Andorra	–	–	–	–	–	–	–
Austria	Adequate	111	–		Deficit	87	Yes (1999)
Belgium	Adequate	113	–		Deficit	124	
Bosnia	Adequate	157	–		Adequate	157	
Bulgaria	Adequate	182	–		Adequate	165	Yes (2001)
Croatia	Adequate	248	–		Deficit	140	Yes (1996)
Cyprus	–	–	–	–	–	–	–
Czech Republic	Adequate	163	–	–	–	–	–
Denmark	Adequate	145	Deficit	83	Deficit	101	Yes (2014)
Slovakia	Adequate	183	–				Yes (2005)
Slovenia	Adequate	148	–				Yes (1998)
Spain	Adequate	173	Adequate	117	Deficit	120	
Estonia	–	–	–	–	–	–	–
Finland	–	–	Deficit	83			
France	–		Adequate	136	Deficit	65	
Greece	–	–	–	–	Deficit	127	
The Netherlands	–	–	Adequate	130	Adequate	223	
Hungary	Adequate	228	–	–	–	–	Yes (2013)
Kosovo	–	–	–	–	–	–	Yes (2008)
Iceland	Adequate (adolescent females)	200	–	–	Adequate	180	
Ireland	–	–	Adequate? (women of childbearing potential)	101	–	–	
Israel	Deficit	83	–	–	Deficit	61	
Italy	Deficit	83	Deficit	75	Deficit	72	Yes (1990)
Latvia	Adequate	110	–	–	Deficit	60	
Liechtenstein	Deficit	96					
Lithuania	–	–	–	–	–	–	Yes (2015)
Luxembourg	Adequate	148	–	–	–	–	–
Macedonia	Adequate	241	–	–	–	–	Yes (1999)
Malta	–	–	–	–	–	–	–
Monaco	–	–	–	–	–	–	–
Montenegro	Adequate	174	–	–	Deficit	134	–
Norway	–	–	–	–	Deficit	69	
Poland	Adequate	112	–		Deficit	113	Yes (2010)
Portugal	Adequate	106	–		Deficit	85	
United Kingdom	Adequate	138	Adequate? (women of childbearing potential)	117		99	
Romania	Adequate	102	–		Deficit	68	Yes (2009)
San Marino	–	–	–	–	–	–	
Serbia	Adequate	195	–		Adequate	158	
Sweden	Adequate	125	Deficit (women of childbearing potential)	74	Deficit	98	
Switzerland	Adequate	137	Deficit (women of childbearing potential)	86	Deficit	136	
Turkey	Adequate	107	–		Deficit	95	Yes (2013)

USI: universal salt iodization.

regulations for the procurement, circulation and sale of edible salt and brines, and defining IS. This was a crucial step in ensuring the access of the general population to IS. The decree states that the iodine content in salt should be 60 ppm, a concentration exceeding that in other European countries. It facilitates the recommendation to reduce salt intake while advising the consumption of IS. With a minimum amount, such as 2 g, the iodine requirements of a large part of the population are met.

In 2005, potassium iodide was registered by the Directorate General of Pharmacy and the Spanish Medicines Agency to be administered to pregnant and nursing women, with inclusion in the public funding of the Spanish National Health System. Approval of this medicinal product has led to a considerable part of the pregnant population in Spain being protected against ID.

Role of the institutions (state and Autonomous Communities)

State. Unfortunately, the publication of the decree on salt iodization was not accompanied by an information campaign aimed at the general population, nor was it converted into concrete actions at state level for implementation of the guidelines proposed by the WHO. After 20 years, in 2003, the Inter-Territorial Council of the National Health System unanimously adopted a number of very promising decisions. The consumption of iodine-rich foods such as fish, dairy products, and IS, was recommended, and additional potassium iodide provision for pregnant and nursing women was indicated. The avoidance of iodinated antiseptics and the consumption of only IS in school lunchrooms in all Spanish Autonomous Communities (ACs) was also recommended. Of all this, however, only one measure was implemented. In 2004, according to our working group (IDDs of the Spanish Society of Endocrinology and Nutrition [SEEN]), the Directorate General of Public Health conducted an awareness and information campaign targeted to healthcare professionals, pregnant women and the general population. Although well received and with good material resources, this represented an isolated measure.

At the proposal of the Spanish Ministry of Labor and Social Affairs, in 2006 the Council of Ministers approved the National Strategic Plan for Children and Adolescents 2006–2009, that contemplated the agreement to ''*promote measures for the prevention and eradication of IDDs capable of avoiding the serious consequences of this deficiency in children and adults*''.[35] These measures were never fully implemented. Likewise, no measures have been documented of the agreements reached in 2011 by the Chairman of the UNICEF – Spanish Committee and the Spanish Minister of Health and Consumer Affairs.

Autonomous communities. The response of the different Spanish Autonomous Communities (ACs) to the prevention of ID has been very uneven. Clearly defined public health programs have been implemented in Asturias, the Basque Country, Catalonia and Galicia. In other ACs such as Andalusia, Aragón, Extremadura and Madrid, isolated measures have been implemented that do not form part of an integrated public health program. Other ACs, such as Cantabria and La Rioja, lack epidemiological studies. A few ACs (Andalusia, Galicia, Asturias) have also instituted the use of IS in school lunchrooms, a very positive measure for the protection of school-age populations.

Role of the ''IDD Working Group'' of the Spanish Society of Endocrinology and Nutrition

Our group has been continuously active for over 30 years, and its members have conducted most of the studies on iodine nutrition in Spain throughout this period of time. In addition, the activity of the group has included collaborations, monographic publications, updates, campaigns and media presence, and participation in working groups with both central and regional authorities, as well as with the healthcare industry. In addition, relevant members of the group have contributed to a better understanding of the physiopathology of the alterations related to ID throughout this period. The rationale underlying the global activity of the IDD Group has been and remains the obtaining of sufficient evidence for health authorities to confidently implement full health measures in order to ensure adequate iodine nutrition in the entire population.

Unforeseen factor

Until not much more than 10 years ago, dairy products had not been considered as a source of iodine. In effect, milk iodization has largely contributed to the improvement of the current situation in Spain. Some studies have shown a close relationship between the consumption of dairy products and urinary iodine levels.[28,36,37] In this regard, two studies have demonstrated the high iodine concentration contained in milk marketed in Spain, with values ranging from 197 μg/l[38] to 259 μg/l.[39] A portion of the iodine contained in milk may be derived from iodophors used for the hygiene of the udder in cows or for milk containers. However, most of it comes from animal feed. European legislation allows for a maximum content of 5 mg iodine/kg feed, but the European Food Safety Authority (EFSA), in its 2013 ruling,[40] recommended that this figure be lowered to 2 mg iodine/kg feed for cattle, in order to avoid the risk of excessive iodine in heavy milk consumers.

What are the current concerns?

Despite the good results achieved in the general population, and particularly in children, the topic of iodine nutrition has not been completely resolved to date and even less so in relation to the future. There are some data in support of this concern. The most relevant are detailed below.

The absence of ''iodine'' in public health programs in most Spanish Autonomous Communities and the Ministry of Health

With the exception of some ACs (Asturias, the Basque Country), ''iodine'' for many years has not been included in the public health campaigns that have been carried out. Similarly, in recent years, and with the exception of the Basque Country, no iodization monitoring studies and/or studies on iodine nutrition have been the initiative of the respective regional Health Departments or the Spanish Ministry of Health itself.

The pregnant population and nursing women

Many studies conducted in the pregnant population up until 2011 continued to document iodine nutritional deficiency according to the WHO criteria. Although potassium iodide tablets were approved for marketing in 2005 and their use was recommended, the fact is that ID has not been eradicated in this population.[34] A proposed alternative formula is to recommend the use of IS plus 2–3 servings of dairy products daily in order to cover iodine requirements during pregnancy. Recent studies show the effectiveness of the consumption of IS and dairy products for at least one year before pregnancy.[29,30] However, the fact is that only a minority of women consume these foods in the recommended amounts. The Di@betes study[27] showed the population of women of childbearing potential to have a median urinary iodine concentration of 114 μg/l, which is adequate in a situation of non-pregnancy, but poses a high risk of ID in pregnancy. Iodine nutrition of mothers during lactation may also be deficient, even in areas with adequate iodization of the population.[41]

Iodized salt

Studies conducted in adults and children show IS consumption to be 44% and 69%, respectively,[27,28] which is far less than the 90% recommended by the WHO. Campaigns have only been conducted in a few ACs to promote IS consumption, and in some cases these initiatives represented isolated events and have not been repeated since. Another key problem is the lack of control of ''adequate salt iodization'' on the part of the country's food agencies. There is only evidence that this has been done in Asturias. Recently, our group, under the leadership of Dr. Juan José Arrizabalaga, analyzed a large sample of IS containers. The preliminary results show the iodine content to be outside the legal range in almost 50% of the containers (data not yet published). This is a crucial issue. Campaigning in favor of IS consumption without such control may cause it to be ineffective.[42] The apparent contradiction in certain countries between the mandatory consumption of IS and the continuance of ID in pregnant women, and even in the general population (Table 3), is probably due to inadequate salt iodization.

Iodine in milk

In addition to iodine coming from udder hygiene, which actually constitutes ''accidental contamination'', iodine in dairy products is mainly obtained directly from animal nutrition, which is regulated by European legislation. In some countries, such as Spain, the addition of iodine in feed was not a public health measure, but was introduced to prevent ID related disorders in livestock.[43] The reproduction and production problems in the event of ID in cattle are well known. Thus, although iodine in dairy products has contributed to improve iodine nutrition in the population, potential changes in different factors influencing iodine content in milk[44] can modify the current iodine sufficiency status. These changes may be of a legislative nature (the reduction of iodine content in feed), or refer to udder hygiene habits or to changes in animal feed sources, such as an increased proportion of rapeseed, which because of its glucosinolate content[45] decreases the passage of iodine into milk. Changes in the dietary habits of the population also need to be taken into account regarding the consumption of dairy products, particularly in the progression from childhood to adulthood, when it is usually drastically reduced.[46] In some countries such as the United Kingdom more recently,[47] or in Australia[48] a decade ago, situations of ID have been reported. These were related to changes in iodine content in milk in the case of Australia and to consumption habits in the case of girls aged 14–15 years in the United Kingdom. These data led Australia to rethink its strategy for ID prevention, and the iodization of salt intended for bread preparation has been mandatory there since 2009.[49] In the case of the United Kingdom, there has never been a public health plan to eradicate ID; the previous situation of optimum iodine sufficiency was therefore described as ''the story of an accidental public health triumph''.[50] In sum, dairy products have greatly contributed to iodine nutrition in the population, particularly in children, but potential changes in the iodine levels of these products, for different reasons, and their decreased consumption after adolescence should not classify these foods as a key to ID prevention, at least in our setting. This role should be reserved for IS.

Priorities and proposals

Spain comprises 17 ACs with transferred competences in relation to public health. Nevertheless, the Spanish Ministry of Health, Social Services and Equality can lead some initiatives, and through the Inter-territorial Council of the National Health System can encourage other ACs to study and implement them in their respective territories.

In our view, in the current situation in Spain, the points requiring action can be reduced to the following (Table 4):

- *Guarantee that most of the population consumes an adequate amount of iodine:* In order to do this, it is essential for all ACs to undertake a firm political commitment for the prevention of IDDs. This commitment should be accompanied by a commitment to develop and implement an autonomous public health program with the same objective in mind.
  - Universal salt iodization, recommended by the WHO and the ICCIDD, would be the ideal option. However, current legislative difficulties mean that IS consumption remains voluntary. Therefore, regular campaigns should be carried out and maintained over time by central government and the different ACs to promote IS consumption, though always based on the premise of ''reducing salt consumption but ensuring that the salt consumed is iodized''. Such campaigns do not need to refer specifically to iodine nutrition, but can be incorporated into other nutrition-related health campaigns.
  - Women of childbearing age and pregnant women are the populations at greatest risk, in addition to children, in the event of ID. These populations therefore require protection. This means encouraging the use of iodinated salt, promoting the consumption of dairy products and, in pregnant women and during nursing, ensuring an adequate iodine supply. The most effective and safe form

Table 4 Priorities for the eradication of iodine deficiency in Spain.

Guarantee that most of the population consumes an adequate amount of iodine:
It is essential for all ACs to make a firm political commitment to develop and implement a regional public health program for the prevention of iodine deficiency.
Regular campaigns should be carried out and maintained over time by central government and the different ACs to promote the lowering of salt consumption but ensuring that the salt consumed is iodized.
Special emphasis should be placed on risk populations such as women of childbearing age, pregnant women and during lactation, promoting the consumption of dairy products and IS.
While low dairy product and IS consumption persists, potassium iodide supplementation should be promoted for pregnant women in this situation.
Health professionals should be made aware of the importance of adequate iodine nutrition.
A ''Day against iodine deficiency'' in Spain should be established.
Monitor the suitability of iodine sources
Establish regular control of the adequacy of IS iodization.
Motivate the dairy industry to incorporate the advantages of iodine consumption and the amount of iodine supplied on their labeling.
An epidemiological surveillance system allowing confirmation that ID prevention measures are being implemented and are effective should be introduced.
Promote collaboration between the Thyroid Knowledge Area of the SEEN and Institutions
The Thyroid Knowledge Area of the SEEN may participate with Institutions in information exchange regarding all aspects with a bearing upon iodine nutrition and offer its collaboration whenever needed.
The participation of the Spanish authorities should be encouraged when a common strategy is under consideration, among the countries of the European Union, regarding the prevention and control of ID.

is tablets containing at least 150 μg of potassium iodide a day. The regular consumption of IS (''well iodized'') and 2–3 servings of dairy products may also provide a sufficient amount of iodine. The Spanish Ministry of Health and Social Affairs, in its Clinical Practice Guide ''Care of Pregnancy and Puerperium'',[51] suggests that daily potassium iodide supplementation should not be routinely used in women planning pregnancy or in pregnant women, and only advises supplementation when the recommended daily iodine amounts are not reached (3 servings of dairy products + 2 g of IS). This recommendation cannot be left only in writing. Campaigns should be carried out to raise awareness among healthcare professionals and these populations at risk of the negative consequences that may result from a low iodine intake and of the importance of the regular consumption of IS and dairy products. The consumption of iodine-rich foods long before pregnancy should also be promoted in order to ensure adequate intra-thyroid iodine deposits at the time pregnancy starts. Such consumption should be continued and increased during pregnancy and lactation. As long as there is no effective majority IS consumption or universal salt iodization, the administration of potassium iodide tablets guarantees an adequate supply for preventing ID.

- Monitor the suitability of iodine sources:
  - It is essential to establish regular and systematic control of the suitability of IS iodization on the part of the national food agencies.
  - Current legislation does not require the control of iodine levels in milk, nor does it require specifying the iodine contents in the labeling of dairy products or other foods (Spanish Royal Decree 1334/1999 of 31 July 1999), except when the label of a given product or its advertising indicates that the food possesses specific properties. In this regard, it is advisable to encourage the dairy industry to incorporate on their labeling the advantages of iodine consumption and the amount of iodine supplied.
- *Implement an epidemiological surveillance system* allowing confirmation that the ID prevention measures are being implemented and are effective.

Most studies conducted in Spain, except for those carried out in some regions (the Basque Country, Asturias, Catalonia), have been the initiative of investigators from the IDDs Group of the SEEN. Specific monitoring measures for iodine consumption are not required. In general, it is sufficient to include some consumption indicators (IS, dairy products) in the health surveys that may be carried out, including the analysis of ioduria.

- Promote collaboration between the Thyroid Knowledge Area of the SEEN and Institutions
  - The preliminary Act on Food Safety and Nutrition 621/000094 of 14 June 2011[52] included the initiative to ''establish an Information System as a tool for the coordination and exchange of data among professional entities, investigators and administrations. This Information System should constitute an extremely useful database affording the most advanced knowledge on the matter, as well as a reference for entities and institutions. The bases for the communication of risks to the population when these are detected are also generated''.

The Thyroid Knowledge Area of the SEEN (TIROSEEN) may participate in this information exchange regarding all aspects with a bearing upon iodine nutrition.

- The contribution of our group to the recent ''Science in Parliament'' initiative[53] is likely to be of help in ensuring that awareness of the importance of iodine nutrition reaches Parliament, with the adoption of new legislative projects or the improvement of those that are already in force.
- Along with 24 other countries, our group participated in the European project *(EUthyroid)*, supported by European Community aids (Horizon 2020), with the purpose of harmonizing ID prevention and monitoring programs. The next step will be to engage those responsible in their respective governments to implement a common strategy for the prevention of ID. The project was completed in May 2018, and all the data are currently being analyzed.

The project closed with the drafting and dissemination of the Krakow Declaration on iodine nutrition,[54,55] which describes the ''tasks and responsibilities of the prevention programs targeted to IDDs''. This is the first time such a statement has been made in Europe with the support of investigators and entities from 24 countries. Its main objective is for the European Community to be able to generate European-wide measures to facilitate their implementation in member countries with a view to eradicating ID, both now and in the future.

In sum, although iodine nutrition has demonstrated positive changes in Spain in recent years, the problem has not been completely resolved. In addition, some of the circumstances that have favored this situation were not planned; a certain risk of setback therefore exists. It is essential for the institutions to establish measures to ensure that iodine nutrition in the whole population is adequate, both now and in the future, particularly in higher risk groups (children and adolescents, women of childbearing age, pregnant women and nursing mothers). The recommendation of low salt consumption in the general population made by various health bodies should be accompanied by a specification that the salt consumed should be iodized. It is essential for food control agencies to establish effective control regarding adequate salt iodization. Health surveys conducted in the future should include indicators on iodine nutrition. The opportunity provided by the EUthyroid study and the Krakow Declaration on iodine nutrition in relation to establishing a pan-European plan for the prevention of ID should be considered and exploited by the health authorities.

Conflicts of interest

The authors state that they have no conflicts of interest.

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