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mediterranean diet

Eat well live better

Mediterranean food culture in a globalized world

Acts of the International Conference organized by Calabria Region and Department of Pharmacy Health and Nutritional Sciences University of Calabria at EXPO Milano 2015
Proceedings of the International Conference organized by the Calabria Region and the Department of Pharmacy Health and Nutritional Sciences University of Calabria at EXPO Milano 2015

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I am pleased to present this issue of " Stringhe" the Journal of scientific and cultural Information of the University of Calabria, which is dedicated to the key theme of the Mediterranean Diet.
The special issue provides the wide readership (both the specialist and lay audience) with a number of important contributions, authored by a group of colleagues from the Department of Pharmacy, Nutrition and Health Sciences, led by Professor Sebastiano Ando', and presented at the Conference on the theme: "The culture of Mediterranean food in a globalized world", organized on June 28, 2015 by the Region of Calabria at the Expo recently held in Milan.
The experience offered a salient comparison and analysis, favored by the strong strategic and cultural synergies between the two institutions, leading also to the publication of this issue, which highlights the results achieved on the occasion.
Along with Sebastiano Ando', professors Giacinto Bagetta, Francesco Menichini, Gaetano Ragno, Stefania Catalano, Daniela Bonofiglio and Stefania Sinicropi effectively proved how scientific expertise can be placed at the service of citizens. And, therefore, showing the close relationship - which I can state - must! be established between those committed to research and those who can draw benefits from this fundamental work.
The success of the conference in Milan - particularly appreciated, not only by the audience, but also by Vandana Shiva, the protagonist of an extraordinary commitment to the issues of environment and biodiversity – is not, hence, an isolated moment of dialogue and discussion.
But there is much more. Shortly after the event in Milan, another prestigious award was assigned to the Department, headed by Prof. Sebastiano Ando': the acknowledgement of the flagship of Pharmacy, Nutrition and Health Science, ranked in the top position in the medical area in Italy in the annual survey of Censis.

This issue of "Stringhe", which is thus dedicated to the event held on 28th June, gives me the opportunity to recall this further achievement, and highlight the commitment, passion and the scientific level once again demonstrated by these researchers; elements and values that go together with the overall quality of the contributions, the ability to interact with the territory and the variety of educational and cultural options that the University of Calabria once again confirms as possessing.
A mix of fundamental importance, which aims not only at strengthening its social role, but also increasingly can be accredited as an essential reference for fulfilling the expectations of growth, and of the current and future development of the people of Calabria.

EXPO
MILANO

REGIONE
CALABRIA

Calabria and the Mediterranean Diet A regional strategy for food and sustainability

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In the Autumn of 1957, an American physiologist whose name is Ancel Keys travelled from Naples to Nicotera, a small village on the coast of Calabria.
The road appeared to be long and difficult, along the up and down winding roads through the great mountains of the South. But that journey changed the history of human alimentation.
During his stay in Calabria, in fact, Keys realized the fundamentals and principles, later confirmed by international research, that developed just starting from the pilot study of Nicotera, which distinguish the food culture of the Mediterranean people from other human communities, defining it the healthiest food model in the world.
Calabria has, therefore, originated the extraordinary epic of scientific, social and cultural development that has led to the identification of the Mediterranean Diet as the exemplary model of alimentation. UNESCO recognized it in 2010, and has enlisted it in the Intangible World Heritage of Humanity.
The historical, cultural and anthropological identity of Calabria is closely linked to the pivotal principles of the Mediterranean Diet.
In the Mediterranean lands, especially those belonging to Magna Graecia of ancient cultures, cultivations, customs, habits, social practices over the millennia have been accumulated, and have settled a life model and its unique alimentation. A wealth of traditional dishes made with wholesome food that intersect with the cultures of the different local communities, resulting in countless variants of a nourishment style that the entire world appreciates, and that the international scientific community invites to practice, for its obvious repercussions on health and life quality.
Calabria is an expression of the Mediterranean Diet because it is a treasure trove of knowledge and expertise that keeps the synthesis and the perfect union of company and food culture.
This awareness raises the enhancement of the Mediterranean Diet at the center of political and regional planning. For the sustainability in agriculture, the preservation of the cultural identity and of its landscape, protection and care of health , the internationalization of food production sectors, rural development, the fight against food waste.
The spotlights of the Universal Exhibition in Milan 2015, dedicated to the topic of nutrition, have exalted, from our point of view, the meaning of a dietary pattern that represents us and makes us recognizable.
For this reason, to the issues of cultural, social and health characteristics of the Mediterranean Diet that the first International Conference organized by the Calabria Region has been dedicated , in partnership with the Department of Pharmacy, Health and Nutritional Sciences of the University of Calabria, on the stage of Milan Expo 2015, last June 28th, with the Lectio Magistralis of Vandana Shiva, environmentalist and activist, scientist and philosopher , awarded with the prestigious Right Livelihood Award, one of the world's most authoritative voices in defense of biodiversity and the universal right to good, clean, sustainable food . Vandana Shiva continues to be one of the most important cultural references for the Region of Calabria, in regards to the right to food, health and sustainable agriculture. From our point of view, her speech last June has marked, in fact, the first stage of a complex and articulate project , in the framework of a regional strategy for good, clean, sustainable food , which we put at the center of our Government program of Calabria and that will take a final form in the coming months. A concrete project , articulated also by cultural and communicative events.
A second and important step was made on September 28, also in Milan Expo 2015, where the Region organized another major International Conference dedicated to the Mediterranean Diet, focusing on the significance of Ancel Keys' work and the legacy that the great American nutritionist left. A conference - realized with the partnership of the University of Calabria, the University of Rome Tor Vergata and the National Institute for the Mediterranean Diet and the contribution of several research centers, Italian and foreign universities and other different institutions – that relocated Calabria as a reference territory for the Mediterranean Diet in the international scientific and cultural debate.
For us, therefore, Expo Milano 2015, which is approaching its final stage, was not only a showcase and an opportunity for the promotion of products of excellence. In fact, with four weeks of activity rich in meetings, conferences, encounters , exhibitions - both in the Exhibition area , or in the urban context of Milan - Expo has been an opportunity to start implementing a precise plan in terms of agricultural policies, rural development and regional food strategy, in which the recovery and total valorization of the Mediterranean Diet is a major element.
The basic conditions of this project are clear. Calabria has one of the highest landscaping,climatic, natural, environmental and agricultural gradients of Italy, including very different environments and landscapes, including mountains, hills, plains, valleys, sandy beaches, high coasts, cliffs, rivers, streams, torrents . This complex diversity is reflected in an extraordinary agrifood and gastronomical variety, which makes Calabria a unique example , with few parallels in Italy and beyond. With hundreds of horticultural products and fruit farming , fish and seafood, grapes and wine, olives and olive oil, Calabria intercepts all possible environmental and productive horizons : from the fisheries and coastal crops to the cultivations of the hills, from the agricultural production of the plains to the farm products grown on the highlands ,from the variety of valleys to the products of the high mountains.
Precisely because of this diversity of production - the unique heritage of the many local communities - and because of the fact that it has always been a frontier territory, crossed by numerous cultures and civilizations, the gastronomic and culinary diversification in Calabria reaches extraordinary levels, with hundreds of typical and traditional preparations and of countless local variants.
For such reason, in our great Italian region, the Mediterranean food culture reaches the highest levels of wealth and variety.
For this , Calabria is a region of choice of the Mediterranean Diet.
For this, the future of Calabria can be registered in the future of food and human nutrition, which is not a secondary issue.
For these reasons, we all - institutions, economic operators, associations, research and education systems, citizens - are called to a strong joint commitment to build and implement integrated policies and consistent, medium and long term strategies.
In this, the Calabria Region wants to be at the forefront for the valorization of the great heritage represented by the Mediterranean Diet.

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Today's meeting, which is part of the initiatives with which the Region of Calabria intends to valorise its presence at Expo 2015 in Milan , has a particular importance.

Not only for the theme of recovering and enhancing the Mediterranean diet, but for the scientific contribution of the research group of the Department of Pharmacy, Nutrition and Health Sciences and of the University of Calabria; and the presence of Vandana Shiva, witness of the environmental commitment and culture of world class biodiversity.

Along with Vandana Shiva and the faculty members of the University of Calabria, we are called to face a problem, considered with growing interest by the public audience; along with issues such as meeting food needs and enhancing sites of identity production; places where time has entrenched a culture of a balanced diet, whose elements characterize a large part of the Mediterranean Diet whose health effectiveness is universally acknowledged.

Hence, an event that fits within the projects pointed to with decision by Agronomists cannot be underestimated; also, and especially, with the goal of characterizing their institutional role in an even more incisive manner, placing their experience at the disposal of our country

It is significant how the initiative "The Global Farm 2.0" places key issues - the well-being worldwide, the pervasiveness and the quality of production, the satisfaction of dietary needs in our time and for future generations - with concrete proposals at the heart of our work agenda. Without ever forgetting or underestimating, the path of those who have preceded us and the value of history, fundamental in this application of knowledge.

It is useful to recall how the conditions of the future European Union were created through the great alliance, based on agricultural production, which was signed in 1957 by Italy, France, Germany, Belgium, Netherlands and Luxembourg, to help the people exhausted by war to move ahead, looking confidently towards a future of peace, solidarity and economic development. Today, after 55 years, the situation is completely different. The problem, if anything, is the opposite: we must deal with a surplus of food and serious waste, while whole areas of the planet see suffering - and unfortunately millions of human beings dying from hunger. We cannot continue to produce more than necessary, wasting leftovers - large quantities of food - in the rubbish bins. We must take into account the real needs but, above all, the needs of all.

In these decades, the production processes have been too oversimplified and the idea of industrialized agriculture has prevailed. This has caused, among other things, a progressive detachment with the territory and with the food culture of our ancestors. That wealth that today we aim to recover through the Mediterranean Diet, rich of the dishes that were part of the culinary wealth of the past, but disappeared from our tables.

A lifestyle engulfed by rhythms and habits and completely different approach to food: content, measured in relation to the calories that are actually consumed. A relationship with food, which should be considered for what it actually is, from the point of view of food style and its cultural importance; otherwise, discussing these issues will remain a useless thing.

The theme of this conference will donate a concrete contribution in this direction, helping to improve the approach with respect to the various issues at hand and the ability to respond to such reports. I stress that we have to become producers of sustainability, proponents of a redistribution of food that allows the fulfilment of all requirements by offering everyone the chance to live. Let us meanwhile be interested in a topic of very current and great importance, such as the Mediterranean Diet, that must be recovered within well-defined and effective rural development policies, which may represent also a tool of territorial government.

Not a paradigmatic manner, then, but an effective cultural choice in which everyone has more than one reason to recognize themselves, knowing that in doing so, we all will have more opportunity not only to choose a balanced and correct health pattern, but also to reflect on our own identity. And today this is surely not really a small matter.

The Heritage of the Mediterranean diet

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The important educational constituent of the Department of Pharmacy, Health Sciences and Nutrition at the University of Calabria has long been focusing on the historical and cultural origin of the Mediterranean Diet, but also at its current dimension, assumed as an integral part of modern evidence-based medicine.

The work carried out particularly in recent years has highlighted the Mediterranean Diet as a model of Health Pedagogy that must be handed down to the new generations through a training effort aimed at involving the school system, starting from primary education to the higher grade level.

In this direction, the Department of Pharmacy, Health Sciences and Nutrition at the University of Calabria has specifically activated two educational courses of significant cultural and scientific relevance: the Masters in "Nutrition and Nutraceutical Integration " and "Expert in Control of food certification" , which encompass a complementary and current relevance of learning outcomes in line with the basic concepts of the Mediterranean Diet, able to interpret the potential of the entire socio-economic regional agro-food chain.

The theme of the Mediterranean Diet assumes, in any case, an international value and a majorsignificance in terms of training research, advanced entrepreneurship and biodiversity as confirmed by the contribution made by Vandana Shiva to this debate as the first ambassador of the food needs of Third World countries.

I would like to remember that in April 2013 in the occasion of the twentieth anniversary of the Faculty of Pharmacy, Health Sciences and Nutrition, the University of Calabria awarded Vandana Shiva the first honorary degree in Nutrition Science.

The link between the Mediterranean Diet and biodiversity, now universally recognized, comes from a long scientific-anthropological itinerary that began in the late '50s thanks to the contribution of the American Ancel Keys, one of the greatest nutritionists of the last century. The American scientist has revolutionized the knowledge of social medicine by being the first to deepen the understanding of the relationship between abnormal lipid metabolism and the onset of vascular diseases, which at that time struck around 70% of the male population of the United States. Of this eating pattern with its low-fat feature characterizing

UN PO' DI STORIA

The discovery of the Mediterranean Diet in the world is due to the intuition, in 1945, of the nutritionist Ancel Keys on the correlation between diet and chronic and degenerative diseases.

In the late 50s, Keys started "The Seven Countries Study" (conducted in Finland, Holland, Italy, USA, Greece, Japan and Yugoslavia) to document the correlation between lifestyle, diet and cardiovascular diseases.

Nicotera (Calabria)
Crevalcore (Emilia)
Montegiorgio (Marche)
Pioppi (Cilento)

the healthy Mediterranean Diet, Keys identified in the southern part of Italy the paradigm: a nutraceutics "ante litteram". The scientist's relationship with Calabria started precisely in the most famous of his studies, the Seven Countries Study, a comparative study of the diets of seven different Mediterranean and non-Mediterranean countries, namely, Greece, Yugoslavia, Italy, Japan, Finland, the Netherlands and the United States. The investigation took its origins within the rural community of Nicotera, which thus became the model of the Mediterranean Diet in the subsequent chain of studies and research.

Over time, the model has not only maintained its food characteristics, but has highlighted a process of mythical ancestralization rooted in the gestures and habits of the community studied, without altering the more literal philological meaning and the modernity of the concept Diet as a lifestyle.

The prototypical communities identified have, therefore, a cultural and territorial heritage that still widely makes the area outstanding due to the typicality of its products, while at the same time becoming the expression of good behavioral and dietary commitment addressing adequate political choices.

This kind of food "archeology" is currently expressed through new forms in terms of local marketing, as well as through old and new food typicality.

The placement of the Mediterranean Diet in the socio-cultural and economic context of this region begins right from Calabria in 2002/2003, with the first and the second forums on food culture that convened nutritionists and anthropologists from 17 Mediterranean countries for the first time. This ongoing process of reflection was completed in 2005 at La Sapienza University of Rome during the third Euro-Mediterranean forum on food cultures. It was on this occasion that an appeal was made, aiming at strengthening the sustainability of the agro-food systems in order to reduce the increasing erosion of the diverse heritage of the Mediterranean food cultures.

In recent years, researchers, scientists, experts and representatives of national and international organizations have gathered together to jointly discuss the evolution of the Mediterranean Diet, reviewing and updating its figurative original model of the food pyramid with a frequency of climbing upwards from the bottom to the top of the various categories of foods of which it is composed.

This model, which was presented in November 2009 in Parma by the Inter-University Centre of Studies on Mediterranean food cultures, was also opportunely contaminated by national variants of the different Mediterranean countries in the prospect of preparing the UNESCO dossier. In November 2010 in Nairobi, the dossier acknowledged the Mediterranean Diet as intangible cultural heritage of humanity, following the application submitted by Italy, Spain, Greece and Morocco.

The Communities directly acknowledged by the UN agency were the Cilento for Italy, Koroni in Greece, Chefchaouen in Morocco and Sorìa in Spain. Subsequently, at the UNESCO meeting held in 2013 in Baku in Azerbaijan, the countries of Cyprus, Portugal and Croatia also joined the partnership. Nowadays, the UNESCO dossier considers the Mediterranean Diet as a cultural heritage in constant evolution, an expression not only of food freshness and seasonality, but

primarily of the ways in which to offer them, present them and share them at the table in the context of a convivial frugality. The UNESCO recognition and the following increased worldwide visibility of high-quality and extensive scientific evidence on its beneficial effects in terms of longevity, life quality and in the prevention of a broad spectrum of chronic degenerative diseases, ensures that the Mediterranean Diet is currently experiencing an unprecedented historic moment.

We must, however, remain vigilant without just retaining a “mythical” knowledge of a model of food culture, which must cope with current issues related to obtaining and processing food in our geographical area.

It is thus necessary to make the Mediterranean Diet an element of resource valorization, as well as valuing it as a rebirth of the areas which identify themselves in the cultural and anthropological process of this pathway.

Of course, this implies avoiding degrading processes of deculturation and the degradation of agriculture encouraged by globalized food production, but also disseminating intense scientific activities, which have shown a clear relationship between nutrition and health.

For this reason, we need to launch a project of “re-education to the Mediterranean food culture”, by taking effective action in the schools of all the countries of the Euro-Mediterranean partnership especially at nutritional and gastronomic levels.

The recent revival, implemented by the regional executive government within the reset programming of EU funds 2014-2020 for the entire agriculture and agri-food chain will soon produce its fruit in the light of this consideration.

On this basis, the initiative of our department can be concretely oriented to create an educational training network, in particular with the countries that have dealt with the publication of the UNESCO dossier in 2010. It is necessary to draw the attention of the younger generations towards the evolution of the Mediterranean food culture, characterized by a complementarity and variety of products, whose identity and quality are not only able to promote the conquest of new markets, but can achieve the idea of a Mediterranean agro-food system to be built gradually through synergies expressed both by public institutions and private enterprises.

In our opinion , the food industry in the Euro-Mediterranean context has two fronts to sustain. On the one hand, the promotion of the “Made-in-Italy” brand, which requires support for our business initiatives of internationalization, and for the establishment of an agency, which enhances our products, safeguarding them from the risk of counterfeiting. This should be considered as “Italian Sounding”, that is, the market area dealing with the products that simulate a local origin, amount to about 54 billion euro: double the export value of Italian food products, which amounts to about 23 billion euro. A parallel market, which must be fought decisively.

In Calabria, the structural problems of our agriculture concern generational turnover, the reorder of land and technological innovation, which are crucial to maintaining adequate standards on strategic and design levels. Let us consider still an achievable agriculture in the regional context, expression of a social capital understood as a complex of extra economic ties typical of local production systems, able to integrate traditional knowledge with technical scientific specialist skills.

Yet, on the other hand, we need to closely cooperate with countries neighboring the Mediterranean area as they are able to meet these challenges, supported by adequate economic and especially technical resources.

In other words, it is crucial to ensure that the domestic demand for food sovereignty overlaps with that of food quality and safety, regarded by EU citizens as an essential right to hygiene health, and that new technical barriers to Mediterranean exports from the EU market are avoided.

Therefore, biodiversity, food culture, scientific and civil passion are the ways in which we consider our territories can be protected. It is hence in this way that our project may be tied with Vandana Shiva’s ecological thinking. We believe that the food culture around the modern model of the Mediterranean Diet in itself claims the right to biodiversity. This is likely to be eradicated by a speculative kind of monoculture, and thus, especially claims the right to food sovereignty, understood as self-determination of food production to satisfy one’s own needs, based on autonomous agricultural policies capable of blocking abusive, speculative interferences.

The respect for food sovereignty is not a bucolic utopia locked in tradition, but a developmental strategy that has witnessed successful examples. In Brazil, subsistence farming has been transformed into small-business agriculture, which in less than 10 years, has subtracted36 million citizens from hunger and extreme poverty. It has increased subsidized credit tenfold to family-based agricultural economies, driving the use of 30% of local products in school canteens.

On this basis, Vandana Shiva’s absolutely original holistic intuition helps us see how our relationship, compatibly with the planet and all human beings, should strive to protect biodiversity as the natural source of food democracy, and the only instrument capable of influencing the present moment and transforming the future of this wide humanity so close to us, but that has yet to free itself from the basic needs of its existence.

The Mediterranean diet as a necessary link between biodiversity, bioagriculture and health care needs

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There are important analogies between India and the Mediterranean area regarding the richness in biodiversity which through an ancient culture has created a nutritious food model in harmony with nature and our environment. The recognition by UNESCO, together with scientific evidence of the Mediterranean diet's beneficial effects on longevity and quality of life and prevention of a broad spectrum of chronic-degenerative diseases, makes it a nutritional model that is increasingly recognized and accepted internationally. In addition to its nutritional qualities, the Mediterranean diet is a geographically environmentally sustainable food model, an ancient culture that gives a sense of identity and belonging. The many different food cultures the Mediterranean area offers are today expressed in a wide variety of diets within the Mediterranean. But these are being steadily eroded due to the globalization of our food systems, changing lifestyles, the loss of identity and of appreciation of local food cultures, leading to the crumbling of the ecological indigenous food heritage and consequent loss of biodiversity and food sovereignty, two essential pillars of a healthy and nutritious diet.

There is no reason why India should face hunger and malnutrition, and why our farmers should commit suicide. India is blessed with the most fertile soils in the world. Our climate is so generous we can, in places, grow 4 crops in a year - compared to the industrialised west where sometimes only one crop is possible per year. We have the richest biodiversity of the world, both because of our diverse climates, and because of the brilliance of our farmers as breeders. Our farmers

are among the most hardworking, productive people in the world. Yet India faces an emergency, in our food and agricultural system. This emergency is man-made and it's symptoms are being seen across the world.

Firstly, the poor and vulnerable are dying for lack of food. According to the Deccan Herald, Lalita S. Rangari, 36, a Dalit widow and mother of two children of the Gondiya tribal belt, allegedly died due to starvation. Justice Bhushan Gavai and Justice Indu Jain of the Nagpur Bench of the Bombay High Court has served notice to the government of Maharashtra seeking its reply to the starvation death of a Dalit widow. Even as India gets richer, we have emerged as the capital of hunger and malnutrition. According to the National Family Health Survey (NFHS), 42.5% of children under Five years old were underweight. This is more than double the African average of 21%, which until recently was the face of hunger.

The second tragedy is that our food producers, the small farmers who have provided food to more than a billion Indians, and hold the potential to provide healthy food for all, are themselves dying because of agriculture and trade policies which put corporate profits above the rights and well being of our small farmers. More than 300,000 farmers have committed suicide in India since 1995, when the rules for the globalization of agriculture of the WTO were implemented, transforming food into a commodity, agriculture into corporate business, and shifting control over seeds and food from farmers to a handful of giant multinational corporations.

The third tragedy is that even those who get food are being denied their right to healthy and nourishing food. The explosion of junk food, of pesticides and toxics in our food,

have created a disease epidemic that is a human tragedy and an economic burden. There is an epidemic of diseases related to our lifestyle and food, such as diabetes, cancer, hypertension, infertility and cardiovascular diseases. The recent Maggi noodle scandal highlights the rapid invasion of junk food in the Indian diet. We are what we eat . When we eat food full of toxic chemicals, we pay the price with our health. India has emerged as the epicentre of Diabetes.

In 2004, 8.2 lac Indians were diagnosed with diabetes and 2.6 Lac succumbed to the disease. In 2012, the diabetes numbers jumped to 180 lac diagnosed and 7 lac dead. In 2010 alone, India spent 32 billion dollars on diabetes care. Cancer has also seen an increase by 30% in the last 5 years, with 180 million people affected in India. At 10 lac treatment per cancer victim this multiplies to 300 billion dollars, or 18 lac crores in rupees. In extensive studies reported in "*Poisons In Our Food*" by Navdanya, elevated levels of PCBs, DDE and DDT have been found in the blood of women suffering from breast cancer. Studies show that 51% of all food commodities are contaminated by pesticides. My research over the past three decades on food and agriculture systems in India, and across the world, informs me that the three tragedies are not separate, they are related, and are, in fact, different dimensions of the food and agriculture crisis linked to promotion of an ecologically, economically and socially non sustainable model of food production and distribution referred to by various names, such as the Green Revolution, Industrial Agriculture, Chemical Farming. Solutions to all 3 dimensions of the crisis lie in shifting from the focus on an unhealthy, nutritionally empty, toxic, high cost food system to a healthy, nutritious, low cost and sustainable system which improves the health and well being of the earth, of the farmers, and all citizens. The industrial model relies on intensive consumption of energy, water, chemicals, capital and fossil fuel, inflating costs of production to much higher levels than the price farmers get for their harvested crops. This high cost system, which neither the farmers nor the nation can afford, is artificially kept afloat with a huge subsidy burden which only benefits the agrichemical corporations selling toxic chemicals. Financially, it is a negative economy, vulnerable to a chaotic climate in times of climate change and a manipulated commodity market. The debt and suicides of farmers are related to this feature of economic non-sustainability. In 2014-15, the government procured 51 million tonnes of wheat and paddy, which is 30 per cent lower than the previous year. With farmers now selling their food grains in the open market, wholesale prices of paddy and wheat crashed by 16% and 6%, respectively. In several parts of Bundelkhand and Western U.P., farmers sold wheat at a much lower rate than Minimum Support Price. In Punjab and Haryana, farmers were dumping stocks in front of government procurement centres. The farmers crisis is related to exploitation and injustice. Ecologically too Industrial, chemical agriculture is a negative economy, using ten units of energy as input for every one unit produced as food. The same system that drives farmers into a debt trap also creates malnutrition. Chemical monocultures and commodity production displace biodiversity which is a source of nutrition. The Green Revolution, which only works as monocultures, has destroyed our pulses and oilseeds - which were always grown as a mixture along with cereals. Today, in the land of *urad* and *moong*, *tuar* and *chana*, *gahat* and *naurangi*, we are importing "yellow pea dal", having removed them from our fields to grow Green Revolution

monocultures. In the land of *til* and *sarson*, *alsi* and coconut, we are importing GMO soya oil and palm oil. If we avoid growing nutritious biodiverse crops, malnutrition is a predictable outcome. If we grow or food with toxic chemicals then diseases related to these poisons are bound to increase. A recent Xield survey by Navdanya revealed that in a single village, GANGNAULI (BAGHPAT), there are 100 patients suffering from various types of cancer.

Chemical monocultures are pushing our farmers to debt and suicide, they are depriving our children of the nourishment that our fertile soils and hard working farmers could be growing, and they are spreading an epidemic of cancer. To address the triple crisis of farmers suicides, hunger and malnutrition, and disease epidemics, Navdanya is starting a Five year campaign - Anna Swaraj (Food Sovereignty)2020 - to make the growing and availability of healthy, nourishing food the foundation of a resurgent India where no child goes hungry, and no farmer commits suicide.

Our work over the past 3 decades has shown that when measured in nutrition per acre, biodiverse, organic, natural farming produces more food (*Health per Acre*). And food is supposed to provide nourishment and nutrition. We can grow enough nutrition for two India's, if we cultivate biodiversity without chemicals. Our farmers are small, and ecological agriculture is better suited for them. Ecological farming also gets rid of toxics from our food crops and thus reduces the risks of diseases linked to those toxics (*Poisons in our Food*). Since hunger and poverty go hand in hand, we need to promote an agriculture that does not create poverty by hemorrhaging the scarce resources of the agrarian economy

(to multinational corporations) for purchase of costly seeds and toxic chemicals. Our research in "*Wealth per Acre*" has assessed that farmers who have their own seed, practice chemical free, ecological agriculture and shape fair trade markets are earning 10 times more than their counterparts who dependent on costly corporate seeds, chemicals from the same companies and forced dependence on exploitative commodity markets. If wheat farmers shifted from monocultures to growing diversity their net incomes would increase two to three fold. The crisis of pulses is a result of the green revolution monocultures of wheat and can be overcome through growing mixtures. And we would not need to import low quality dals. Pulses grown with cereals provide free nitrogen to the soil and healthy protein to us.

The *Anna Swaraj* agenda for a food and agriculture revolution and food democracy with the participation of citizens and all levels of government, from the local, to the state, to the national level:

1. We must stop treating food as a commodity, to be wasted, contaminated, and proXited from. Article 21, of India's constitution, guarantees the Right to Life of all citizens. Food is the basis of life, the right to food is a basic human right. The National Food Security Act is a step in this direction and needs to be implemented with full commitment. Our culture teaches us "*Annam Brahman*" - food is divinity. Commodification of food is a violation of food as sustenance.

2. We need to promote chemical free organic farming, not as a luxury, but as an imperative for the well being of our land, our farmers and our health. Chemical free ecological agriculture reduces costs of cultivation, reducing the debt burden for farmers as well as the malnutrition and disease burden for all citizens .

3. We need to move away from centralized, chemical and fossil fuel intensive monocultures accompanied by long distance transport (including dependence on imports) towards promotion of local *Anna Swaraj* food circles for direct consumer – producer links, bypassing the exploitative 'middlemen', like giant corporations which exploit, both, farmers and consumers. These circles will promote biodiversity on our farms and biodiversity on our plates, which is vital for nutrition. Thereby, also promoting economic diversity, creating employment and cultivating food democracy.

4. We need to shift the use of public tax money from subsidising toxic, nutritionally deficient commodities as food for the vulnerable - who do not have adequate purchasing power to buy healthy, safe, diverse, nutritious food - by removing subsidies offered to multinational chemical corporations that only add toxicity to our food system. There is no justification for using crores of tax money to subsidise bad food when that money could promote a healthy and sustainable food system for Mid Day Meal schemes, PDS and ICDS through people's participation, specially that of women who would like to bring nutritious food to their children.

5. We need to grow more food and nutrition everywhere, in villages and in cities – in communities, in schools, in backyards, on roof tops and terraces. These Gardens of Nutrition and Gardens of Hope can contribute to creating a malnutrition and hunger free India. Gandhi Ji had started a Grow more Food campaign, and Lal Bahadur Shastri encouraged turning lawns into edible gardens. That spirit needs to be cultivated again to free India from the clutches of global agrichemical corporations. From Meerut, the sacred land of our Xirst freedom movement of 1857, a new freedom movement for Food Freedom - *Anna Swaraj* - was launched on 2nd August, 2015 by Navdanya.

Food freedom is based on the liberation of the earth from ecological destruction and toxic pollution, the liberation of the farmers from suicides due to debt created by dependence on the purchase of costly chemicals and seeds, and the liberation of the citizens from

malnutrition and disease caused by those toxic pesticides, insecticides and herbicides.

The Anna Swaraj Abhiyan was launched with a campaign on Food Smart Citizens for Food Smart Cities - connecting producers to consumers and the village with the town in direct links through safe, fresh, local and fair food. Navdanya has started to create Food Smart Cities to address the food and nutrition emergency we face. Food Smart Cities connect citizens directly to the farmers in their Foodshed area, allowing direct access to healthy, local, fresh , fair food for the cities and access to a fair market to the farmers.

The freshness and seasonality of local food, the frugal conviviality at the table are the characteristic healthy features of the Mediterranean diet. Reviving the Mediterranean diet means protecting its food sovereignty and reviving an ancient organic farming tradition, and bringing back common traditions and nutritious foods, both ethnic Balkan and Latin, and the rich diversity of the varied Mediterranean cultures. Protecting biodiversity and local food cultures in the Mediterranean area ensures the health and wellbeing of its peoples and local communities everywhere.

In the same vein if we take care of our biodiversity everywhere and join the mission of Anna Awaraj 2020, India can become a land of good food for all. The Taitreya Upanishad has said the growing and giving of good food is the highest Dharma - *Annam Bahu Kurvitha* - let us all be reminded of this duty on this, our Independence Day.


MILANO 2015
NUTRIRE IL PIANETA
ENERGIA PER LA VITA

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The Mediterranean diet between history and prevention

The remarkable progress and the financial resources in agri-food research and in the technological production have led in the second half of the last century to a significant increase in the availability of food, not only in industrialized countries, but also across the entire planet, without however solving the problem of malnutrition in developing countries. Economic growth, technological progress and social health organizations have also created favorable conditions for three epochal changes, represented by demographic, epidemiological and nutrition transitions.

The demographic transition is defined as the passage from a regime of high to low fertility and mortality, leading to an increase in life expectancy. The epidemiological transition is represented by the shift from a pattern of a high prevalence of communicable diseases, such as infectious diseases, to one of a high prevalence of chronic and degenerative diseases, related to modern lifestyle. The nutrition transition reflects the enormous changes, which have occurred over the past 20 years in both dietary and physical activity. In particular, modern societies seem to converge on a diet rich in saturated fats, added sugars, and animal products, but low in fiber, and on a lifestyle characterized by a reduced physical activity and an increased sedentary timespan.

Consequently, a direct transition from malnutrition to obesity has been observed, now representing a global health emergency, defined as "globesity" by the World Health Organization, as well as an increase in other diet-related diseases. Hence, there is a need for effective prevention interventions through strategies that enable people to adopt healthier lifestyles in terms of physical, psychological and social wellbeing. Among different factors, diet is a key component able to significantly influence the quality of life of individuals and communities.

The Mediterranean Diet, which is originally inspired by the traditional dietary patterns of the countries bordering the Mediterranean area, represents a balanced nutritional model, which is mainly vegetarian as only a small share of calories is of animal origin; cereals are the basic ingredients, pulses and olive oil respectively the main protein and fat sources. The Mediterranean diet is not a simple dietary regimen, but an unequalled legacy of landscapes, places, knowledge, expertise, local products, myths and beliefs, creativity and hospitalities. Another additionally important milestone in the dissemination of its significance has been the inscription of the Mediterranean Diet in the List of the "Intangible Cultural Heritage of Humanity" by UNESCO in November 2010 (Fig 1).

Fig. 1 Mediterranean Diet

"Intangible Cultural Heritage of Humanity" ,by UNESCO in November 2010
"The Mediterranean Diet encompasses more than just food. It promotes social interaction, since communal meals are the cornerstone of social customs and festive events"

The Mediterranean Diet has a very remote historical origin, dating back even ten thousand years ago to the Fertile Crescent, a portion of land of the Middle East (encompassing Mesopotamia, Levant, Ancient Egypt), which historians called "the cradle of society" and the birthplace of agriculture (Fig. 2).

In the Mediterranean area, the climatic conditions and water availability allowed different varieties of cereal production. Syria and Palestine began to produce oil from both olives and other seeds in the third millennium BC, while the earliest evidence of the vinecultivation in Egypt comes from the Predynastic period (3900-3100 BC). From this area, agriculture spread to regions with similar climatic characteristics as those of the Mediterranean Basin. This has entailed the cultivation of the so-called

Fig. 2A little bit of history....

Wheat, vines and olives, the so-called 'triad' of Mediterranean crops, were imported from the Fertile Crescent, a portion of land of the Middle East, in the Mediterranean area thousands years ago.

Plowing, Tomb of Sennedjem, XIX Dynasty, 1500-1050 BC. [Deir el-Medina (Egitto)]

The contest between Athena and Poseidon for the dominion of Attica, the first century. B.C. [Napoli, Museo Nazionale]

Fig. 3 3 Rockefeller Foundation Study

Rockefeller Foundation Study (1948-1953): epidemiological study on the nutritional and health benefits of the Mediterranean diet.

Food group	Crete: 7-d [illegible]	Greece: food balance	US: food balance
Energy			
(MJ/d)	10.6	10.4	13.1
(kcal/d)	2547	2477	3129
Foods (%)			
Cereals	30	61	25
Pulses, [illegible] and potatoes	11	8	5
Vegetables and fruits	11	7	5
Meat, fish, and eggs	6	3	19
Dairy products	5	4	17
Table oils and fats	29	15	15
Sugar and honey	2	4	15
Wine, beer, and spirits	1	2	

Nestle M., AM J Clin Nutr 1995

Fig. 4 The Seven Countries Study

Multicenter Longitudinal Epidemiological Study

13000 man between 40-59 years of age, divided into 16 Cohorts belonging to 7 different Countries from United States, Europe and Japan.

Aim of the Study: to evaluate prevalence, incidence and mortality of coronary disease and other cardiovascular disorders in relation to a different dietary pattern.

'triad' of Mediterranean crops: wheat, vines and olives, alongside the products of farming and fishing. Agricultural and rural models in non-sedentary populations have gradually led to the definition of the Mediterranean Diet.

However, only after a few millennia, the international literature has focused on the nutritional value of the Mediterranean Diet. The first to discover the connection between diet and metabolic diseases has been the italian nutritionist Lorenzo Piroddiin in 1939. Next, the Rockefeller Foundation Study (1948-1953), commissioned by the Greek government, was carried out as an epidemiological study on the nutritional and health benefits of the Mediterranean Diet. This study aimed at identifying appropriate strategies to improve the health of the inhabitants of Crete island. As shown in the reported table (Fig. 3), the results have documented a higher consumption of plant foods and a lower intake of foods of animal origin in the population of Crete, as well as in that of Greece, compared to the population of the United States. In addition, during the Korean War in 1950, pathologists responsible for conducting autopsies on soldiers' bodies discovered that about 80% of the US military had atherosclerotic plaques, while a lower percentage was found in the Korean soldiers.

The discovery of the Mediterranean Diet in the world, as previously reported by Prof. Sebastiano Andò, is attributable to the nutritionist Ancel Keys, who during World War II became convinced that the Mediterranean Diet, typical of farming communities of Southern Italy, could represent a healthy lifestyle habit able to prevent cardiovascular diseases. To advance his hypothesis, Keys launched one of the most ambitious epidemiological study "The Seven Countries Study" in the '50s, involving Finland, Holland, Italy, USA, Greece, Japan and Yugoslavia to examine the correlation between lifestyle, diet and cardiovascular diseases across different populations.

The Seven Countries Study was the first international multicenter longitudinal epidemiological study involving about 13.000 men aged between 40-59 years, divided into 16 cohorts belonging to 7 different countries (Fig. 4). The aim of the study was to assess the prevalence, incidence and mortality of Coronary Disease and other cardiovascular disorders in relation to a different dietary pattern. The results of this study showed a higher incidence and mortality of coronary heart disease and other cardiovascular diseases in the population of North America and Northern Europe than in the population of the Mediterranean countries and Japan. These differences were, at least in part, correlated to different consumption of saturated fats, cholesterol levels and other risk factors. The scientific findings resulting from this study have been published over the past 50 years (1-2).

However, it was very clear, even from Keys's early studies, that the dietary patterns of the Mediterranean coastal areas represent an ideal model for both the prevention of cardiovascular diseases and other important health benefits that justify their promotion. Keys published three best-selling cookbooks describing a

Fig.6 The Mediterranean Diet Pyramid

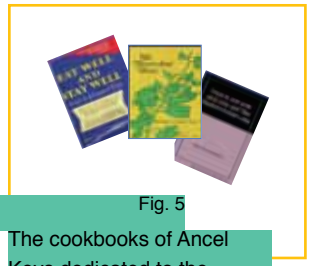
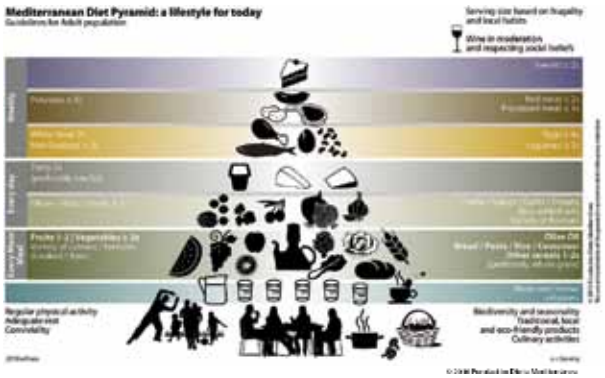
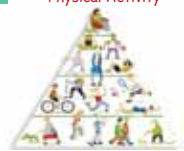


Fig. 5

The cookbooks of Ancel Keys dedicated to the Mediterranean Diet



Physical Activity



Conviviality

Biodiversity and Seasonality

Traditional Products

Fig.7 Mediterranean Diet … in the prevention of chronic and degenerative diseases

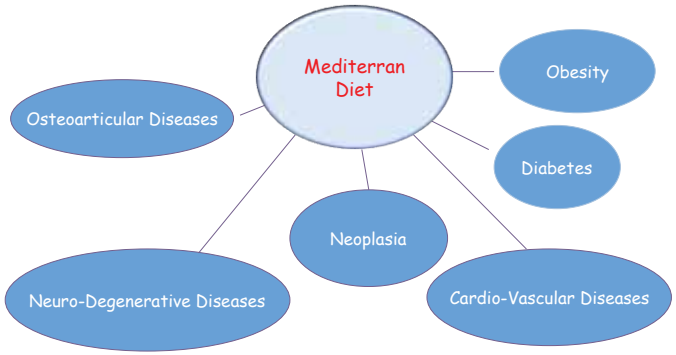
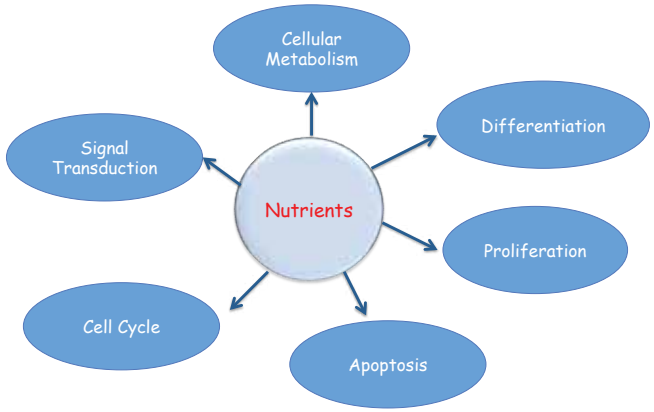


Fig.8 Nutrients……..and cellular processes involved in carcinogenesis



Mediterranean diet dedicated to the public. The most famous one "How to eat well and stay well. "The Mediterranean Way" in its title contains the explicit concept of the Mediterranean diet, representing the scientific evidence of the Mediterranean Diet Food Pyramid(Fig. 5).

What is the Mediterranean Diet Food Pyramid?

The Mediterranean Diet Pyramid is a nutrition guide that was developed with a simple graphic model, which divides foods based on whether they should be eaten daily, weekly, or occasionally into three parts. The main elements of the traditional Mediterranean food (olive oil, and grains, preferably whole)are placed at the bottom of the pyramid. Foods located in the middle part should be consumed daily, but less frequently. At the top of the pyramid are located those foods, such as red meat and sweets, that should be consumed weekly and in moderation. The pyramid also highlights the crucial importance of physical activity, as a regular practice that offers health benefits. Moreover, the concepts of conviviality, biodiversity and seasonality, fresh, traditional and locally grown products, were introduced (Fig. 6).

Since Ancel Keys' studies, the Mediterranean diet has been acknowledged by the international scientific community as a dietary model for healthy living and sustainable food. The benefits of the Mediterranean diet, in fact, are now supported by Evidence Based Medicine, an approach to medical practice intended to optimize decision-making by emphasizing the use of evidence from well-designed and conducted research.

Several multicenter observational epidemiological studies have shown that the preventive action of the Mediterranean diet is referred to a broad spectrum of chronic degenerative diseases such as metabolic (diabetes and obesity), cardiovascular, oncological, neurodegenerative and, to a lesser extent, osteoarticularones (Fig. 7).

In particular, in a recent review published in 2014 (3), data emerging from different studies have demonstrated that the Mediterranean-style diet reduced risk of all-cause mortality, especially from cardiovascular diseases and cancers, but also decreased the incidence of diabetes mellitus, and metabolic syndrome.

In a recent meta-analysis (4),twelve prospective cohort studies were examined to assess the incidence and mortality from the abovementioned diseases in relation to the adherence to the Mediterranean dietary pattern. The analysis of the data showed a significant reduction in the incidence and/ or mortality from cardiovascular events, but

also from neurodegenerative diseases and cancer.
Interestingly, the crucial role played by nutrients in several processes involved in carcinogenesis, such as differentiation, proliferation, apoptosis, signal transduction and cellular metabolism has been largely reported (Fig. 8).
In this field, we have provided evidences for anti-cancer activities of some typical nutrients of the Mediterranean Diet (5-10).
Finally, it is worth noting that the enormous progress achieved in the field of nutritional research (11) offers the possibility of obtaining specific transcriptome* analysis from different dietary patterns, allowing to identify protective genes and those involved in pathological processes.
Therefore, by applying new disciplines –omics, it is possible to prevent many pathological events, adopting personalized nutrition plans based on a deep knowledge of the patient, starting from its gene profiling(Fig. 9).

Due to the scientific evidences supporting its beneficial health effects, the Mediterranean Diet should be considered as a part of the health promotion strategies, which should be applied globally for the prevention and treatment of the most important chronic degenerative diseases that characterize the epidemiology of the

* The transcriptome is a collection of all the gene readouts present in a cell.

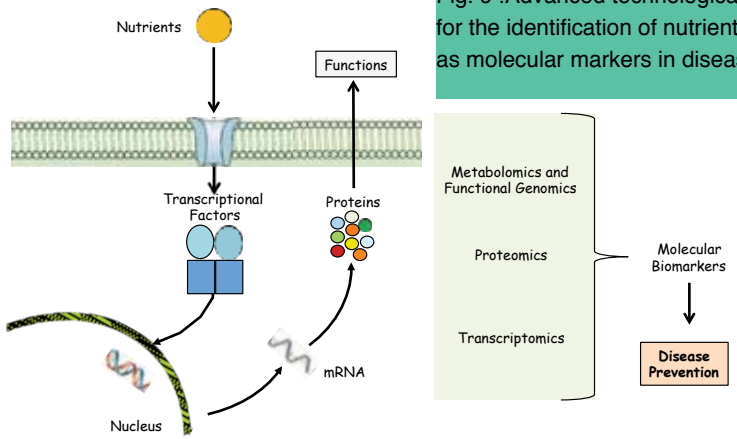


Fig. 9 .Advanced technological platforms for the identification of nutrients as molecular markers in disease prevention

Annibale Carracci, Il mangiafagioli, 1583-84

…If we can provide everyone the right amount of nutrients and exercise, not at fault, or in excess, we would find the right way to health…

(Ippocrate 460-377 a.C.)

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The Mediterranean Diet against childhood obesity

Obesity has been defined by the World Health Organization (WHO) as "a metabolic disease characterized by excessive body weight due to the accumulation of adipose tissue, to an extent that adversely affects the health condition". The global epidemic obesity has been termed "globesity", a disease that results from multiple environmental and socioeconomic factors that strongly influence the eating habits and lifestyles of populations, leading to an epidemic of obesity considered "the most important public health problem worldwide."

The WHO, in particular, indicates that approximately 1.9 billion adults are overweight, which represent 39% of the population. Of these, 600 million or 13% of the population are obese. These data are dramatic since they have doubled compared to 1980 (1).

Specifically, adults show a prevalence of

overweight in 38% of men in the world, with the highest rates in North America, but also in some countries of South America (Venezuela, Argentina, Chile Uruguay); in most European countries (including Russia and Kazakhstan), Australia and New Zealand, but also in Turkey, Arabia and Libya.

40% of women worldwide are overweight with the highest prevalence in the United States, Alaska, Mexico, Peru, Venezuela, Chile, Uruguay and, surprisingly, in countries around the Mediterranean sea: Morocco, Tunisia, Algeria, Libya, Egypt, South Africa, Turkey, Iran, Iraq, Arabia, and New Guinea.

The overall percentage of obesity is represented by 11% of male subjects, mainly in the US (Fig. 1). Obese women are 15%, with the highest prevalence ever in the United States, Alaska, Mexico, Guyana, Chile, Uruguay and, once again, in the countries bordering the Mediterranean sea: Algeria, Libya, Egypt, Tunisia, South Africa , Turkey, Iran, Iraq, Arabia, and New Guinea (Fig. 2).

In recent years, rates of overweight/ obesity have dramatically increased around the world, both in industrialized and in developing countries. In particular, the analysis of OECD (Organization for Economic Cooperation and Development)

Fig. 1 Percentage of obese adult men worldwide

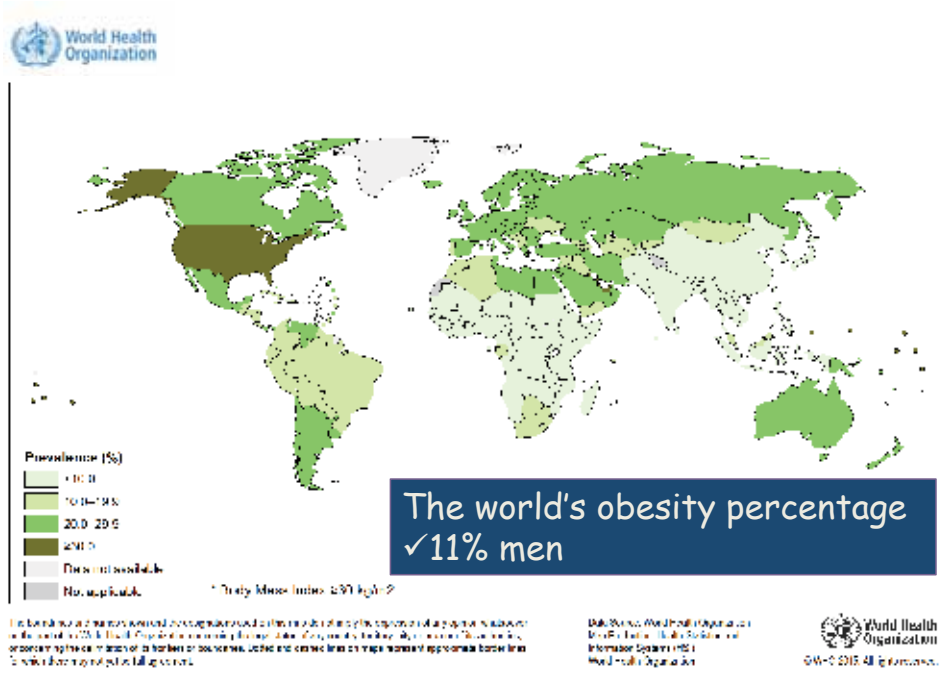


Fig. 2 Percentage of obese adult women worldwide

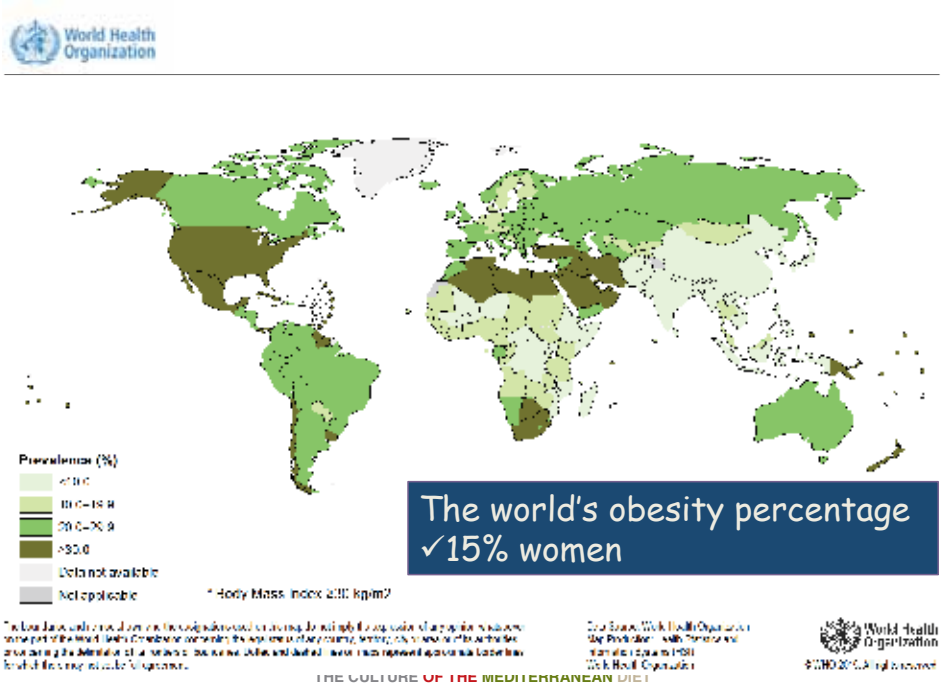
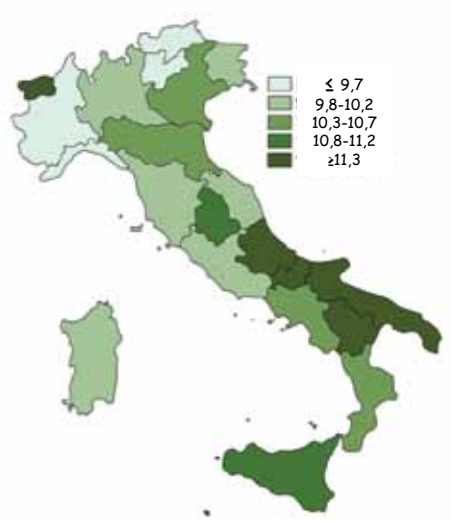


Fig. 3 Increasing trend of obesity in developed countries

Fig. 4 Percentage of obese adult in Italy



Regions	Adult obese
Piemonte	8,3
Valle d'Aosta	11,7
Liguria	9,6
Lombardia	10,2
Bolzano/Bozen	*6,8*
Trento	*8,8*
Veneto	10,6
Friuli-Venezia Giulia	10,2
Emilia-Romagna	10,7
Toscana	10,0
Umbria	11,1
Marche	9,8
Lazio	9,9
Abruzzo	12,1
Molise	12,7
Campania	10,3
Puglia	12,0
Basilicata	14,2
Calabria	10,5
Sicilia	10,8
Sardegna	9,9
Italia	10,3

ISTAT 2013

data indicate how since the 1980s, there has been a general increase in the rate of overweight in all countries that are part of this organization, with a growing trend over the next 5 years (Fig. 3). As for Italy (2), the most recent data (2013) provided by the National Institute of Statistics, show that 35.8% and 10.4% of the adults are overweight and obese, respectively, with a higher prevalence in men than in women in both conditions.

The percentage distribution of Italian obese adults shows a significant difference between Northern and Southern Italy: the southern regions and particularly, Abruzzo, Molise, Puglia and Basilicata, in fact, have the highest percentage of obesity. The same trend is reported in Calabria, where 10.5% of obese people ranked above the national average are present (Fig. 4).

The most alarming aspect, however, is that Italy presents one of the highest prevalence of overweight and obesity in children and adolescents among the countries. The percentage of children and adolescents aged 14 and 17 years who are overweight or obese is 23.7% in males and 11.3% females (mean 17.5%); in the age group between 11 and 13 years, it is 32.1% in males and 20% females (average 26%), while the percentage is dramatically higher between 6-10 years: 34% of children are obese or overweight (one-third of Italian children).

An important national surveillance program on this phenomenon has been conducted by "Okkio alla salute", promoted and financed by the Ministry of Health in 2007 and coordinated by the Italian Institute of Health, which brings together all the Italian regions and the Ministry of Education, University and Research. Results from this program are a solid source of epidemiological data on the lifestyles of primary-school children and is the institutional response to the needs of knowledge of the Italian problem related to overweight and obesity among children. In 2014, an epidemiological study has been carried out involving 48,426 children who attend the third year primary class (8-9 years), distributed across all Italian

regions. The data show a clear difference between North and South Italy, since the highest prevalence of obesity (≥37%) was recorded in the regions bordering the Mediterranean, such as Calabria and Sicily, but also Basilicata, Campania, Molise and Abruzzo (Fig. 5).

These data confirm the average percentage of obese children in Italy that the OECD's report indicates as about 31.6%: conferring the first ranking position to Italy in Europe and the second in the world, after the United States, in which the percentage of obesity is about 35.5% (3). The negative impact of overweight and obesity in childhood and adolescence is extremely important, both for state budgets in terms of social and health negative costs, and the repercussions that these diseases have on children and adolescents' correct physical and cognitive development of (Fig. 6).

Considering that this phenomenon is so alarming, it is useful to define the extent of overweight and obesity in children and adolescents. The degree of obesity of an individual is not immediately measurable. Internationally, however, the most widely used indicator is the BMI (Body Mass Index), measured as the ratio between weight (kg) and height (in m2). The National Institute of Health (NIH) has begun to define and classify the condition of obesity in terms of BMI in the 1980s, particularly in children, using appropriate tables of percentiles.

In Italy these tables have been validated on the Italian population aged 2-20 years old and published by Cacciari and collaborators in 2006 for the correct definition of overweight and obesity in both sexes (4).

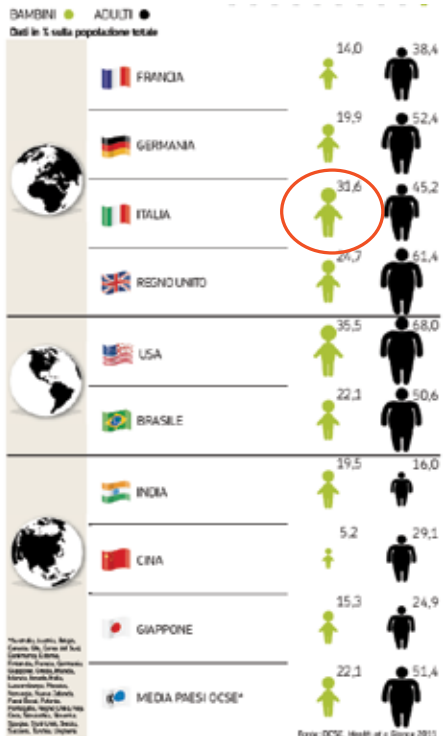
But what are the factors that determine the onset of obesity?

The origin and causes of obesity are

Fig. 5 Percentage of overweight and obese children in Italy

Italian Institute of Health 2014

Fig. 6 Percentage of adult obese worldwide



Report OCSE: Health at Glance 2011

Fig. 7 Genetic and environmental factors in obesity

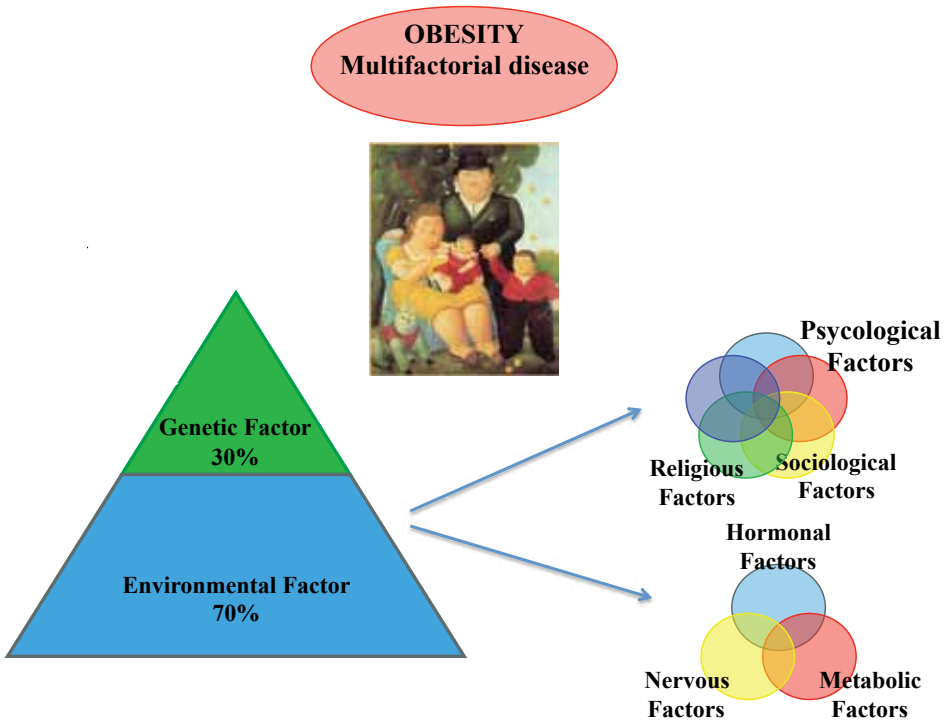


Fig. 8 Environmental and behavioral factors associated with obesity

many and complex and involve a small percentage of the genetic factors and in most cases the lifestyles of children and their families influence the onset and persistence of the disease (Fig. 7).

The development of the food industry has led to a wide range of foods with good palatability, high energy content and low nutritional level. An additional factor is also represented by the gradual decline in prices of food and soft drinks and a larger purchasing power around the globe. The sedentary lifestyle is another risk factor for overweight and obesity. Indeed, sedentary behaviors such as television viewing, computer use, and video game playing often replace vigorous physical activity in children. Moreover, the use of cars or public transportation instead of walking also reduces their basic motor activity (Fig. 8).

The premise of a short loop is simple. When the caloric intake from food introduced exceeds energy expenditure, the surplus calories are stored as fat in adipose tissue leading to overweight and obesity only resulting from a chronic state of positive fat balance.

The increasing prevalence and severity of obesity in children and adolescents have provided greater emphasis on the wide variety of comorbid conditions and complications that can be experienced as a consequence of obesity, such as cardiovascular, respiratory, kidney, liver, musculoskeletal, endocrine-metabolic

and neurological (benign intracranial hypertension) (Fig. 9). These complications can occur both in the short term and in the long term. The negative impact exerted by obesity on obese children are also emotional, social and psychological. A significant negative repercussion on children affected by obesity and being overweight is the low self-esteem they have, which often makes them feel inadequate with regard to their social frame of reference, compared to their peer group, and which may have more marked manifestations of depression, loneliness, anxiety, isolation, and marginalization by their playmates and at school. (5).

The treatment of essential obesity in children, therefore, has a positive and persistent impact on lifestyle changes, by adopting a healthy diet associated with the promotion of physical activity (6). There is accumulating research on the Mediterranean Diet and whether it could prevent or treat obesity. Proposed by INRAN (National Institute for Research on Food and Nutrition) (7), the new pyramid of the modern Mediterranean Diet not only highlights the crucial importance of physical activity, the conviviality at the table and maintaining a good state of hydration, but also suggests the consumption of local products on the basis of seasonality. A unique relationship with cooking and traditional food production is set, without neglecting the pleasure of food, the sharing of flavours and good food traditions. The Mediterranean Diet pyramid signals the food to be included in the main meals and, going upwards, food that should be eaten weekly or daily, but not necessarily in every meal. The portions of the balanced diet provide 55% of carbohydrates (of which 70% polysaccharides), 30% of lipids (of which 65% of vegetal origin) and 15% protein (of which 60% vegetal origin). As suggested by the recommended daily allowance, the daily calorie intake, is composed of at least 5 meals (3 meals + 2 snacks), with the following distribution of calories: Breakfast + snack 20%; lunch 40%; snack 10%; dinner 30% (Fig. 10).

As described, the Mediterranean Diet pyramid is considered a cultural model for healthy eating, since many components have been shown to exert very positive effects on health. Greater adherence to a Mediterranean-like dietary pattern is associated with a significant improvement in health status. However, adherence to the Mediterranean Diet is assessed through indicators of adequacy. One of these is the Mediterranean Diet Score (MDS), which assesses the degree of adherence with a score from 0 to 9 (from the minimum degree to the maximum degree of adhesion to the MD) (8) through the frequency and the amount of consumption of 9 typical components of the Mediterranean diet.

Although the prospective epidemiological studies have shown an inverse association between adherence to the Mediterranean Diet and the risk of chronic and degenerative diseases, which represent the most frequent causes of death in developed countries, its role in the prevention of obesity has not been fully clarified. In particular, in the literature, few data have been reported on adherence to the pattern of the Mediterranean Diet in children from different European countries. Recently a multicenter study has been carried out involving over 16,000 European children aged 2-9 years from eight European countries as part of the IDEFICS study (Identification and prevention of Dietary- and lifestyle-induced health Effects in

Fig. 9 Childhood obesity complications

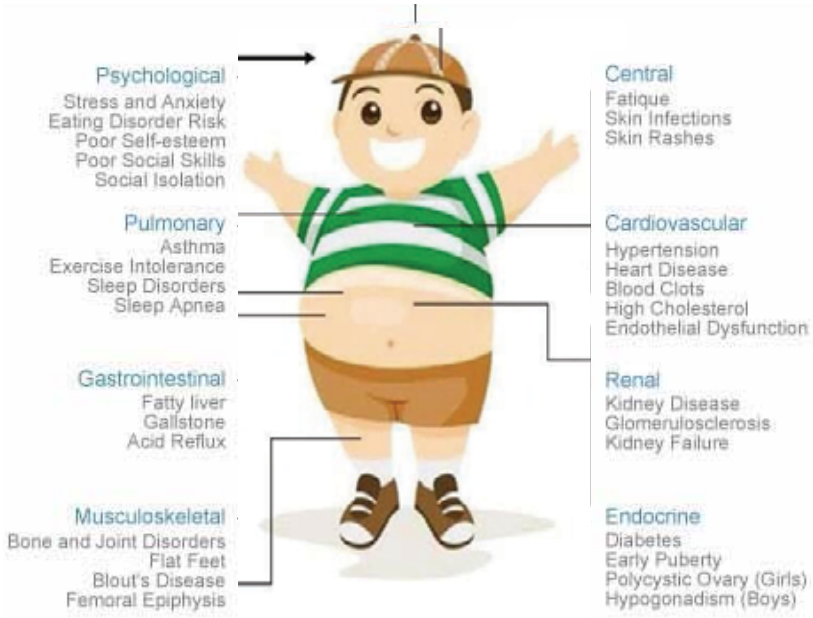
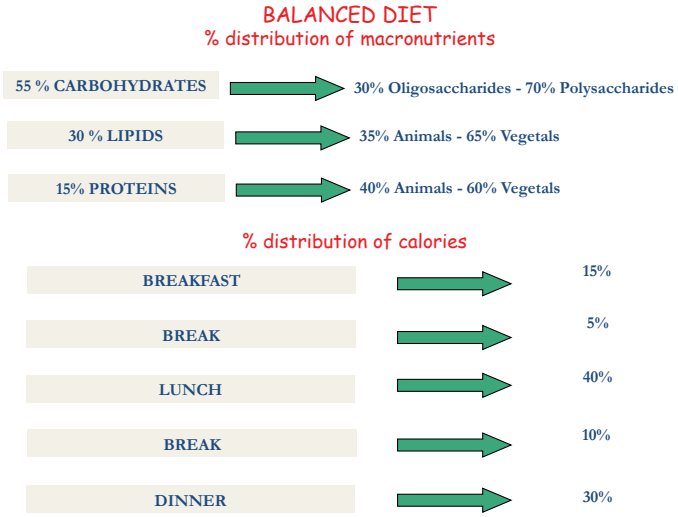


Fig. 10 Dietary guidelines in the macronutrient and calorie daily distribution



Children and Infants) which has allowed an assessment of the adherence to the Mediterranean Diet and the association with overweight and obesity (9). Paradoxically, the country that has the highest adherence to the Mediterranean Diet pattern is Sweden, with the highest percentage of children who consume vegetables, fruits, cereals and fish, while it is a surprise that the lowest level of compliance is observed in Cyprus and Italy, where only 37.5% of adhesion has been recorded. Therefore the Mediterranean Diet, that represented the basis of eating habits until the mid-twentieth century, is now gradually being lost due to the spread of the western-type economy and urban and technological society, as well as the globalisation of production and consumption. The data recently published by the IDEFICS study, relating to European children under the age of 10, show a low prevalence of overweight and obesity in Sweden and a high prevalence in Italy and in other countries around the Mediterranean sea, where the traditional Mediterranean Diet has probably been abandoned by populations who have gradually adopted western-like dietary habits (10).

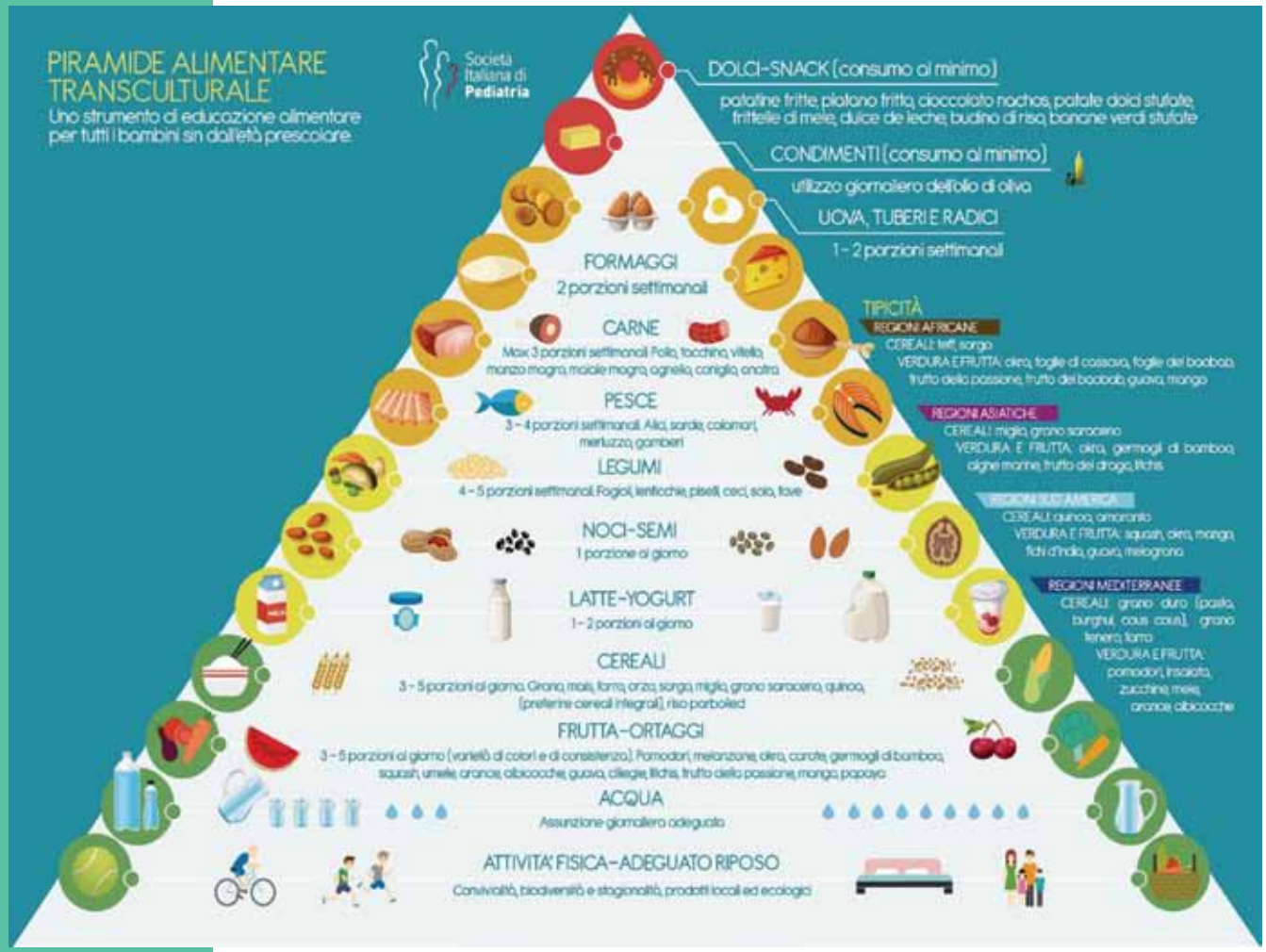
The Mediterranean Diet should, therefore, be re-discovered, re-evaluated and considered for inclusion in European obesity prevention strategies. For these reasons, but also to take the characteristics of our multi-ethnic society into account, the Italian Society of Pediatrics has promoted a cross-cultural food pyramid that incorporates the principles of the Mediterranean Diet with ethnic foods, encouraging the mix of different food traditions, including those of the typical regions of Africa, Asia, South America, even respecting the caloric balance and quality of micro and macronutrients. The New Pyramid highlights the importance of practising light physical activity every day (30 min), moderate 3-5 times a week, intensive 2-3 times a week, and suggests reducing the time spent by young people in front of the computer, television or electronic devices (Fig. 11).

In this regard, the most recent data from the World Health Organization show that in Italy, as in few other countries in the world, the percentage of children aged 11-17 who practice less than 60 minutes a day of moderate physical activity or intense is greater than 90% (1).

In conclusion, there are a number of important reasons for choosing the Mediterranean Diet as the healthy-eating model especially among children: an obese child has a very high probability of maintaining this pathological condition throughout his/her life. It has been estimated that 26-41% of obese preschool children become obese adults; 69% of obese school-aged children become obese adults; this percentage rises even more to 89% for the obese adolescent.

This is a very serious situation that must be addressed with the utmost commitment.

Fig. 11 Cross-cultural food pyramid



To defeat "globesity", the epidemic of our millennium, the slogan coined by Ancel Keys, the first scholar bringing the concept of "Mediterranean Diet" to the attention of science in his book published in 1975: "EAT WELL STAY WELL: THE MEDITERRANEAN WAY" must become effective and concrete.

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The Mediterranean Diet as First Medicine

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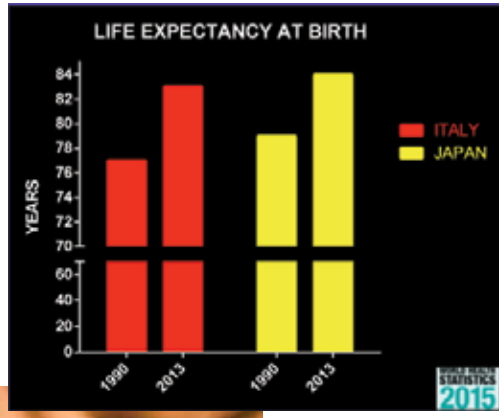

Fig. 1. Life expectancy at birth in Italy and Japan. Modified from World Health Statistics 2015. Data available online at the World Health Organization website.

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University of Calabria

Fig. 2. The mediterranean diet "alimentary pyramid", as recently revised, includes cultural and scientific data (Modified, with permission, from ref. 3).

It is widely known that Italian and Japanese are among the most longlivingpeople. This notion is in agreement with the recent epidemiological data published in May 2015 by the World Health Organization (WHO); accordingly, a child born today in Calabria has a life expectancy only one year shorter than a child born in any island of Japan (83 and 84 years, respectively; Fig. 1).

This condition can be attributed, at least in part, to the high quality of the health systems inbothcountries, a deduction supported by epidemiological data demonstrating similar mortality risk inbothcountries among the population between 15 and 60 years of age (1).

Together with a good health system, these two countries share the cultural value of their diet and the consumption of considered important for an excellent physical and mental health preservation and to warrant longevity.

Based on apparently diverse, though tasty, food (i.e. pasta vs rice, olive oil vs soy, mozzarella cheese vs tofu, wine vs sake, basil vs shiso), these two diets share their prevailing, but not exclusive, vegetal nature; in fact,fish and meat are also consumed, the former but not the latter eaten mostly raw in Japan, the reverse being true for Italy.

The vegetal pattern (highly rich in fruits and vegetables) in conjunction with the low content in saturated fatty acids (<8% in energy value) of the Mediterranean Diet, as described also in its quantities by the recent revision of the alimentary pyramid (Fig. 2), is considered the basis for reduced incidence of some degenerative and cancer diseases and long life expectancy; its positive health impact has been known since the sixties when it wasfirst monitored among the populations of Crete, other areas of Greece and southern Italy (2) thus granting to the Mediterranean diet the value of "first medicine".

The mechanism underlying the positive health impact of the Mediterranean Diet has been the object of intense basic and clinical researches; these have previously defined the chemical food composition and, more recently, have identified the biologically active ingredients in conjunction with their health properties (Tab. 1).

The wide variety (also chromatic) of fruits and other vegetables (vegetables, herbs, cereals, etc) makes the Mediterranean Diet particularly rich in

principles generally defined as anti-oxidants.Some of these are endowed with important biological activity and preventive health propertiesof human diseases. Thus, for instance, the constant presence of extra virgin olive oil (EOO) in the Mediterranean Diet plays a fundamental role for increasing the blood level of HDL and reducing LDL cholesterol, minimizing the cardiovascular risk, lowering blood pressure, reducing platelet aggregation and inflammation, and displaying anti-atherosclerotic activity. Altogether, these actions have been attributed to the content in monounsaturated fatty acids (MUFA) of EOO and to specific anti-oxidants (e.g. tocopherol, hydroxityrosol, oleuropein, etc) which are able to counteract the detrimental impact of free radicals on cells (see refs. in ref. 4).

Low to moderate red wine consumption during meals displays beneficial effects on health, similar to those of EOO. These are attributed to the content of anti-oxidants (e.g. resveratrol) responsible for lowering the production of endothelin (among the most potent endogenous vasoconstrictors) (5), dilating the arterioles and reducing platelet aggregation via nitric oxide production and, hence, reducing the cardiovascular risk. These properties of red wine seem to be responsible for the phenomenon known as "French paradox"i.e. the mortality rate for myocardial infarction in France is inversely related to red wine consumption (5-7).

Of unique importance, though of recent acquisition, is the action of specific components of the Mediterranean Diet in the modulation of fundamental neurobiological processes.

It is conceivable that adaptive mechanisms that allowed food acquisition and energy efficiency have operated a great evolutionary pressure on the brain of the modern human being and on the development of its cognitive abilities. Several paleonthological evidence suggest a direct relation between food availability and skull dimension and support the notion that even small changes in diet composition may impact negatively on fertility and survival (8). Greater brains in humanoids have been associated to the development of abilities such as cooking, food acquisition, energy saving, upright walking and running:these activities demand coordination of cognitive functions centered upon food success (8).

Tab. 1. Composition of the mediterranean diet including the biologically active principles and their respective health properties. (Modified, with request of permission, from ref. 4).

Feeding as an Adaptive Mechanism for the Development of Cognitive Skills

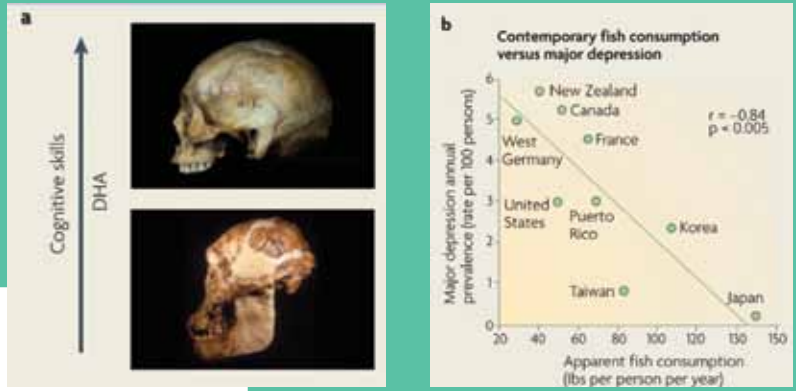

Fig. 3. (a) The diet with high fish content exercised an evolutionary pressure on hominidis determining the encephalization process underlying the development of cognitive abilities not seen in other animal species. Docosaexahenoic acid (DHA), a polyunsaturated fatty acid (PUFA) n-3, has been implicated in the encephalization process likewise, (b) during the last century, its reduced content in the diet of people with high level of industrialization has been correlated to higher incidence of major depression in these populations (USA, Germanyetc). Modified, with permission, from ref. 8).

Consumption of polyunsaturated fatty acids (PUFA) n-3 is one of the most studied interactions between food and brain evolution. Docosaexahenoic acid (DHA) is one of the most abundant PUFA n-3 in neuronal membrane; mammalians are unable to synthesize DHA and rely on diet content, mostly present in fish (salmon, bleu fish etc). It has been proposed that access to DHA promoted the "encephalization process" of hominidis (Fig. 3a), i.e. the growth of the brain compared to body mass (archeological evidence support the notion that hominidis adapted themselves to fish consumption before encephalization (8).

The relationship between brain and environment is always an active process. During the last century, in highly industrialized societies, increase in saturated fatty acids consumption has been paralleled by reduction in PUFA n-3 (DHA) consumption and this correlates with increased incidence of major depression in countries like USA and Germany (Fig. 3b) (8).

In industrialized countries, enhanced survival rate due to socio-economic development is accompanied by a parallel increase of age-related neurodegenerative diseases.

Actually 46.800.000 individuals suffer of dementia worldwide; in Italy the number of affected people is 1.241.000 (50% being of the Alzheimer type) and this is expected to increase by 116% in the 2050 (9). In the USA the cost for care is about 226 billion dollars, and this is paid out for its 30% directly bythe pocket of demented patients (Fig. 4).

Aggregate Cost of Care by Payment Source for Americans Over 65 with Ad and Other Dementias

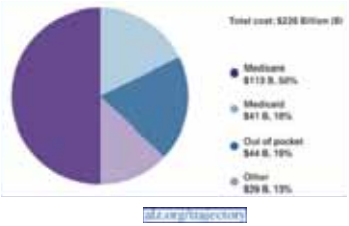

Fig. 4. Data aggregated for origin of the resource needed to pay the costs for health assistance of Americans older than 65 years suffering from Alzheimer's or other types of dementia.

Med Diet Supplemented with olive Oil or Nuts Counteracts Age-Related Cognitive Decline PREDIMES Study Cohort

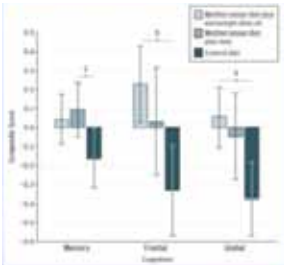

Fig. 5. The Mediterranean Diet added with extra virgin olive oil (EOO) and nuts prevents the age-dependent cognitive decline. The PREDIMED cohort trial shows statistically significant effects of EOO and nuts on specific forms of memory. Modified from ref. 12).

Neurons are highly vulnerable to the detrimental effects of oxidative stress and, therefore, antioxidants should slow aging process and neuronal degeneration (10); this hypothesis stimulated, during the last two decades, a wealth of scientific researches with disappointing results. In fact, clinical trialsconducted on Alzheimer's patients have failed to demonstrate measurable efficacy over placebo of single active principles (e.g. antioxidants like Vit. E) in slowing down the cognitive decline and the degenerative process (11).

Nonetheless, these negative data do not undermine the important role played by oxidative stress in age-related neurodegenerative processes. Instead, it is conceivable that a diet that leads to a long term exposure to food endowed with high content of antioxidants may slow down degenerative cellular processes linked to aging.

This hypothesis, in conjunction with the notion that the Mediterranean Diet is based on foods containing high amount of antioxidants, is the rationalebehind several clinical trials that have yielded inconclusive results on the effectiveness of the Mediterranean Diet.

It is conceivable that the inconclusive nature of trials of the past stems from the poor design and the lack of markers to monitor the diet adherence.

Accordingly, recent experimental evidence collected from a cohort of aged subjects rigorously selected and monitored shows that adherence to the Mediterranean Diet leads topositive results on cognitive decline.

A study published in June 2015 in the prestigious Journal of the American Medical Association (12) reported the result of a randomized study conducted assigning 447 patients to three arms: Mediterranean diet added with known quantity of EOO, Mediterranean diet added with known quantity of nuts and control diet. Respectively 127 out of 157, 112 out of 147 and 95 out of 145 individuals completed the study.

Adherence to the diet has beenconfirmed by monitoring blood markers. The results clearly demonstrate that adherence to the Mediterranean diet for a long period (6 years) impacts positively on memory slowing down significantly the cognitive decline as compared to patients on control diet. Furthermore, the trial has shown a positive, specific, effect of EOO on frontal lobe and on global cognitive functions and a specific effect of nuts on different memory forms evaluated using validated clinical test (Fig. 5).

Although the latter study does not clarify the mechanisms underlying the effect of the Mediterranean Diet on cognitive decline, it is true that the content in antioxidants plays an important role. Indeed, it is widely demonstrated that DHA prevents dendritic spine degeneration in animal models of Alzheimer's disease through activation of gene products implicated in neuronal survival and inactivating those genes inducing neuronal death processes (13).

It is well established that drugs for Alzheimer's disease treatment have low efficacy, act for a short period and are active on cognitive symptoms only (14). Unfortunately, short after diagnosis, Alzheimer's patients develop behavioural and psychological symptoms such as agitation and aggression, which are sometimes very serious (15), insensitive to typical Alzheimer's therapy.The treatment of these symptoms with antipsychotic drugs (including atypical ones) is often ineffective and unsafe and enhances the risk of death (14). Accordingly, a warning has been recently launched against the routine use of neuroleptics in Alzheimer's patients. Concomitantly, it has been demonstrated that pain treatment (with an incidence of 40-60%) in Alzheimer's patients (which are unable to report it) minimizes serious behavioral and psychological symptoms (agitation, aggression, etc) (16). Incidentally, it has been reported that DHA reduces experimentally induced chronic pain (17).

The Italian population, likewise the rest of the world, is undergoing a fast and progressive aging process (actually people over 60 are about 900.000.000 worldwide and this number is estimated to rise by 22% in 2015 and 36% in 2050). The increase of life expectancy is accompanied by a dramatic number (46.800.000) of demented people worldwide with 1.241.000 patients resident in Italy. These data remind the huge costs for this age-dependent neurodegenerative disease (9).

In addition, the damage inflicted to patients, caregivers and the entire society by ineffective therapy cannot be ignored further and, therefore, it is no longer possible to postpone the development of novel therapeutic strategies built on validated, but novel, scientific bases.This concept is strengthened by the negative result, on both efficacy and safety, reported by clinical trials testing biotechnology-based therapy of Alzheimer's disease aimed at lowering beta amyloid.

These negative news drive to huge investments in conjunction with the large attrition in drug research and development encountered recently by industry in this therapeutic area (18). With this in mind, it is envisaged that additional public resources will be invested in research including clinical trials addressing the role of the Mediterranean Diet in counteracting the cognitive decline, minimizing pain symptoms and improving life quality in Alzheimer's patients with consequent reduction of major behavioral and psychological disturbances.

In conclusion, the Mediterranean Diet could reasonably represent at once the right test to prove the maturity of the biomedical and health research system in Calabria and to speed up industrial development and market of the Calabria trade mark, including environment, agriculture, biodiversity, culture, tradition, etc. in great demand in Europe and worldwide.

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Plants from Calabria and their health properties: the role of biodiversity

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Biodiversity is a term commonly used to refer to all forms of diversification of life on Earth at all levels of organization: from molecules to ecosystems.

For several decades, according to what has been prescribed by the Convention on Biological Diversity (CBD) (Rio de Janeiro, 1992), and by the International Union for Conservation of Nature (IUCN) and the European Programme IPA (Important Plant Areas), the conservation of Biodiversity is one of the priorities of the international scientific community and, in particular of the European Union.

In particular, the Global Strategy for Plant Conservation, as defined during the Conference of the Parties in 2002, provides for the ex-situ conservation of almost 60% of the endangered species. Protecting bio-

diversity is, therefore, in the interest of every human being, not only for its intrinsic value, and that is whether man can benefit from it , but also for ecosystem services that nature provides, often not replaceable by technology, and that allow life on Earth (eg: consolidation of land, waste disposal, climate regulation and water balance, production of pharmaceutical substances, control of weeds and pests, nourishment supply , impact mitigation of extreme situations, etc.).

Operating a massive intervention on nature, man has, however, quickly and seriously, modified, damaged or even destroyed many ecosystems. Driven by a strong concern on the social, economic, ecological and cultural biodiversity loss, in December 2006, the United Nations General Assembly has declared 2010 the "International Year of Biodiversity".

Italy, with its peninsular shape and location at the centre of the Mediterranean Basin, is characterized by a high biodiversity both at the plant as well at the ecosystem level.

According to current knowledge, Italy is the European country that boasts the highest number of higher plants, distributed in a mosaic complex of habitats and landscapes.

The Italian flora consists of little more than 6700 wild species, belonging to 196 families and 1,267 genera (data updated to 2005, according to the text shown alongside). The natural value of Calabria is undoubtedly high and popular, not only for the great variety of plant species, but also, and especially, for the amount of rare species that the Calabrian soil boasts along with many animal species. That is why, for example, the need to set up in two large nature reserve areas of the region: the Pollino National Park and the National Park of Calabria. The Pollino National Park extends itself on the mountain that gives it its name and together with the Sila, the "Silva Brutia" of the Romans, the forest par excellence. From a phytogeographical perspective the Region of Calabria has a refuge area for different species and plant communities coming from very different environments. Calabria preserves a rich floral heritage, made up of almost 2,700 species, including some important botanical rarities.

Calabria is a region with a series of particular landscape and natural features. Calabria is a territory characterized by an orographic system that crosses longitudinally, from the lack of plain areas and a sizeable spread and amount of geomorphological instabilities .

Species of European , Mediterranean or Balkan or even North African distri-

bution are, at times, the limit of distribution in Southern Italy, and this makes them particularly interesting in terms of its biodiversity, because they are probably more or less genetically differentiated from populations that live in the central core of the distribution area. The study of the chemical profile and of the biological properties of those plant species is of considerable interest from the pharmaceutical, food and cosmetics point of views. Epidemiological and clinical studies have shown that "phytochemicals" in the diet can play an important role in preventing the onset of many chronic diseases including cardiovascular diseases, cancer and diabetes mellitus.

Among the Calabrian species, of particular interest are *Capsicum*, *Citrus* (*C. medica* cv Diamante and *C. bergamia* Risso & Poit.), *Glycyrrhiza glabra*, *Ficus carica* and *Capparis sicula*.

The genus *Capsicum* belongs to the Solanaceae family and includes more or less 27 species and more than 2000 varieties of perennials and annuals, delicate and rustic-limbed shrub. The number of varieties of *Capsicum* is difficult to assess as to those best known new selections and hybrid varieties are added each year. (Fig.1) Nevertheless, especially in recent years, the local varieties have been reconsidered and have been tried to save, not just for the set of external characteristics , but mainly for their taste characteristics that refer to specific traditions of individual cultivation sites. *Capsicum annuum* is a specie from which the most part of the variety of red pepper as well as chilli pepper comes from. Other interesting species are *C. frutescens*, *C. chinense*, *C. pubescens* and *C. baccatum*. The species in Italy is the C.annum, while the other species are cultivated moreover in South America and Mexico. The fruits of *C. annuum var. acuminatum* at the maturity stage can reach a length of almost 5 cm *acuminatum* small, 9 cm *acuminatum* medium and 13 cm *acuminatum* big. Fig.2 The extracts from these varieties were tested in experimental models to assess their antioxidant and hypoglycaemic properties by the inhibition of carbohydrate hydrolysing enzyme, alfa-amylase and alfa-glucosidase. *C. annuum* var. *acuminatum* big showed the highest total carotenoids and capsaicinods content. It is responsible also of the great antioxidant activity (1-2). This bioactivity could be related to phenols (3). However, even the extract of *C. annuum* var. *acuminatum* small was able to counteract oxidative stress. Moreover, although all peppers showed a significant inhibitory activity of carbohydrate hydrolysing enzymes in a concentration-dependent manner, the extracts obtained from *C. annuum* var. medium showed greater efficacy.

Fig.1 Varietà di peperoncino in Calabria

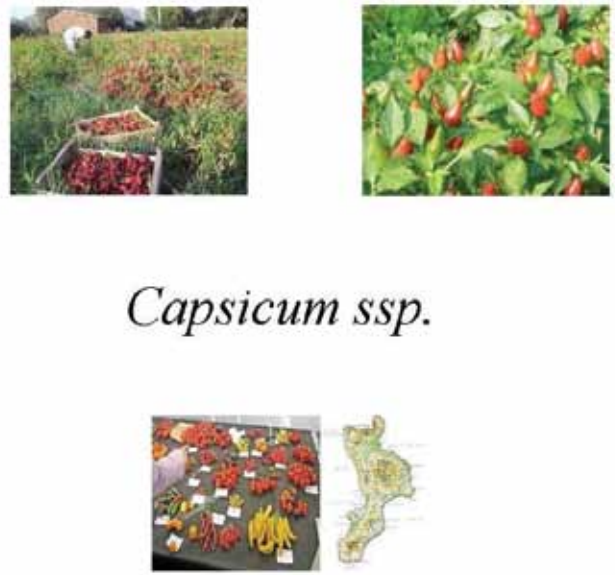


Fig. 2 Peperoncini oggetto di studio

Fig. 3 Una piantagione di cedro

Fig. 4 Un esemplare di cedro

Among the endemic species of the genus *Capsicum* under investigation in our laboratory we decided to include also the cultivar Roggiano. This cultivar in 1996 was awarded the IGP (Protected Geographical Indication) and DOP (Protected Designation of Origin) marks. This “sweet” variety was investigated when fresh, dried (processing mode most commonly used), and even when dried or fried . Both fresh and dried peppers showed a promising antioxidant activity probably linked to the high content in polyphenols and total flavonoids.

The frying process leads to a reduction of the content of active ingredients and to a decrease of the antioxidant activity . The data on the assessment of glucose of the Chili peppers of Roggiano have given us the possibility to evidence that the best asset is owned by the samples drawn fresh (4).

The study evaluates the influence of drying and cooking processes on the health properties of this bell *Capsicum annuum* L. cultivar compared with fresh peppers.

Citrus medica L. (Citron) belongs to the Rutaceae family. Citron cultivars are mainly of two types: (a) those with pinkish new growth, purple flower buds and purple-tinted petals, acid pulp and dark inner seed coat and chalazal spot; (b) those with no pink or purple tint in the new growth nor the flowers, with non-acid pulp, colorless inner seed coat, and pale-yellow chalazal spot. Among the better-known cultivars are: ‘Corsican’, ‘Diamante’, ‘Etrog’, ‘Fingered Citron’. Diamante citron, known as Italian and Calabrese, is the cultivar most diffused in Italy and most sought by industry. The cultivation is limited to only one area, from Tortora to Cetraro, on the Tirranean Coast of Calabria, Southern Italy and in the Province of Reggio Calabria(Fig. 3). Ripe fruits are big, with a thin, smooth and lemon yellow peel. The most important part of the citron is the peel which is a fairly important article in international trade. The main products obtained from citron extracts are candy and liqueurs, while the oil is a minor product, used as a flavouring in sweets and beverages (Fig.4).

Our experimental studies demonstrated that *C. medica* cv Diamante extracts obtained from maceration of flowers, leaf, fruit peel and mesocarp have several health properties (5). In particular, the peel extract showed a promising *radical scavenging* activity.

In order to evaluate the hypoglycemic activity of citron, extracts and essential oil were tested in α-amylase and α-glucosidase inhibition assays. Extracts from mature fruits showed a promising activity against both enzyme in a concentration-dependent manner. This extract is characterized by the highest phenols and

flavonoids content. Naringin, hesperetin, quercetin and apigenin were identified by HPLC. Moreover the hydro-alcolic extract of mature fruit peel was able to inhibit the carbohydrate hydrolysing enzymes and induce the insulin secretion in MIN6 cells used as model (6). *C. medica* cv Diamante was tested also *in vivo*. The extract was able to reduce the level of glucose, cholesterol and triglycerides.

Bergamot (*Citrus bergamia* Risso & Poit.) belongs to the Rutaceae family. Its origin are unknown. The legend would like to have the bergamot coming from the Canary Islands, from where Christopher Columbus would have brought it to Europe and to Calabria.

The most reliable etymology, however, seems to be Berg-armudi in Turkish "the Lord's pear", because of the similarity that bergamot has with the bergamot pear. Bergamot grows in a restricted area of Calabria (hundred kilometres range), between Villa S. Giovanni and Gioiosa Jonica, and between the Ionian Sea and the Tyrrhenian Sea, in the Province of Reggio Calabria.

The most important bergamot product is the essential oil, which contains 350 phytochemicals. This ingredient is essential to the International perfume industry. The essence was used also in the food and confectionery, as a flavouring agent of liquors, tea, sweets, candies, ice cream and soft drinks. Recently, it has been used with great success in sun tan lotions thanks to the presence of photodynamic substances (furanocoumarin) that have long been known for their properties to stimulate melanogenesis.

Bergamot is also a source of pectins that are used to prepare jams, or for the production of tooth pastes, soaps, hair lotions and creams.

Several *C. bergamia* samples were collected in the Reggio Calabria Province (17-50 m of altitude), (7). (Fig. 5). The peel extract was investigated by gas-chromatography mass spectrometry in order to identify the chemical profile. The *ratio* Linalol/Acetate of linalile was chosen as marker since it represent the quality of essence. (Fig. 6) . Well known to the ancient Chinese doctors, cited by Hippocrates as a remedy for coughs, licorice (Glycyrrhiza glabra L.), takes its name from two Greek words, "glykys" which means sweet and "rhiza" which means root. The officinal drug consists of the dried rhizome and not peeled, or root of the plant, which belongs to the Leguminosae family. In Italy is it present almost exclusively in Calabria (where around 80% of the total national production is concentrated), in plain areas in the zone of Sybaris or north of the Greek Sila, in the area of the province of Crotone and only minimally in the province

Fig. 5 Area della Calabria dove il bergamotto trova il suo habitat ideale

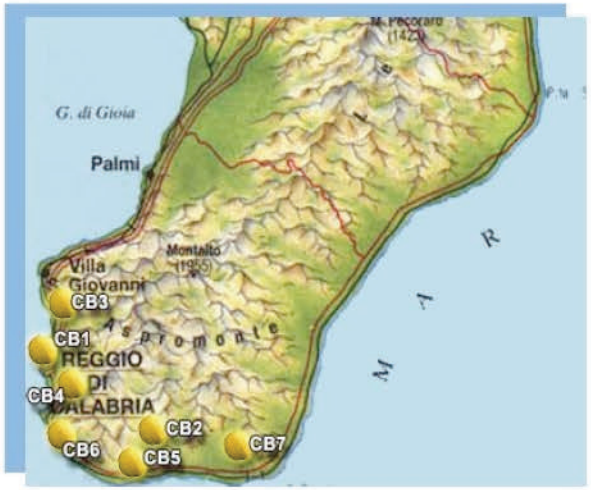
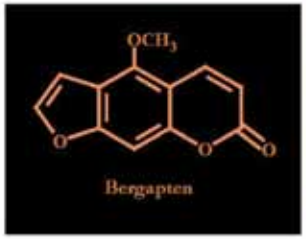


Fig. 6 Formula chimica del bergaptene,
componente essenziale del bergamotto (a sinistra);
biodiversità dei campioni raccolti sul litorale reggino (a destra)



Sample	Pentane extract	Bergapten	Linalool	Linalyl acetate	Linalool/Linalyl Acetate
CB1	3.94	29.96 ± 0.004	18.28 ± 0.003	148.44 ± 0.003	0.123
CB2	1.7	8.01 ± 0.003	0.053 ± 0.005	0.81 ± 0.005	0.065
CB3	2.08	42.71 ± 0.004	18.59 ± 0.004	39.18 ± 0.004	0.474
CB4	0.72	14.98 ± 0.002	3.14 ± 0.002	11.54 ± 0.004	0.272
CB5	0.83	32.55 ± 0.005	2.02 ± 0.001	13.15 ± 0.003	0.153
CB6	0.56	13.77 ± 0.004	4.62 ± 0.003	10.14 ± 0.005	0.455
CB7	0.92	22.93 ± 0.01	11.06 ± 0.004	20.22 ± 0.003	0.575

Stanzi GA, Conforti F, Sacchetti G, Muzzoli MV, Agrimonti C, Menichini F. 2004. *Fitoterapia*, 75: 212-16.

Fig. 7 Area della Calabria dove sono stati prelevati i campioni di liquirizia

Fig. 8 Ficus carica L.

of Reggio Calabria. In the rest of the Peninsula it is located in Basilicata, Puglia and Sicily, but only in limited areas. The part of the plant used to extract the active ingredients is represented by the roots and stolons, collected in autumn from plants with at least four years of age. The root system is well developed and covers an area of many square meters; the main roots, about 15 cm long, emit many roots and stolons which extend horizontally for one or two meters and produce branches at points far from the mother plant.

The considerable interest in *G. glabra* the main abundant class of phytochemicals is connected to saponins and flavonoids; without omitting other identified compounds such as cumarins and sterols.

Our research group investigated the *G. glabra* growing in Calabria. In particular, nine samples (n. 2 in Cosenza province, n. 6 in Catanzaro province and n. 1 in Reggio Calabria province) were collected and extracted by methanol (8). (Fig.7)

The extract, characterized by the presence of isoliquiritigenin and glycirrizic acid, demonstrated a strong antibacterial and antifungal activities. Moreover, isoliquiritigenin showed a promising cytotoxic effect against breast cancer cell lines (9). On the basis of these observations isoliquiritigenin could be considered a chemiopreventive agent.

Significant results have emerged from the study of the species *Ficus carica* L., and in particular the cultivar Dottato which is one of the finest in Italian figs. (Fig. 8) The Dottato cultivar is one of the most prized for its delicate fleshy pulp and for the sweetness of honey. *F. carica* cv Dottato is characterized by phenols, in particular flavonoids, and coumarins (bergapten and psoralen) which has raised great interest. All the components of the aboveground part of the plant were taken into account: fruit, bark, wood parts, leaf and latex. In order to assess the biodiversity of *Ficus carica* var. Dottato several samples were collected in the area of Cosenza at different times of the year. The purpose was to show a close relationship between content of active compounds, their bioactivity and multiple exogenous factors. All parts of the investigated plant showed antioxidant and anti-inflammatory activities. One of the most important results obtained by our research group was the possible application of *F. carica* cv Dottato in photochemotherapy for the treatment of melanoma. Photochemotherapy, based on the use of photoactivable chemotherapeutic agents, can in fact be considered a very promising approach in cancer treatment because of its low systemic toxicity and its selective action on cancer cells compared to conventional treatments.

In fig latex and in the fig leaf furanocoumarins psoralen and bergapten were identified.

Fig. 9 Capparis sicula Veill

Samples were tested against melanoma cell line and results clearly show the phototocity of the extract. The best results were obtained with the sample richest in psoralen, 8-metoxipsoralen, angelicine, bergapten, rutaretine and pimpinellin, and one pyranocumarin, the seseline.

Other significant results were obtained with C*apparis sicula* Veill. This plant is rich in glucosinolate, phenols, sterol and vitamin E. (Fig.9) The study of 20 samples collected in Calabria allowed to show that the exogenous factors, such constitution of the soil, climate and temperature, affect significantly the content of the active principles both from the quality and quantity point of views. C*apparis sicula* extract exhibited antioxidant activity *in vitro* and a significant anti-inflammatory activity *in vivo*. Moreover, the extract showed the ability to inhibit the pancreatic lipase enzyme that is involved in the cleavage of triglycerides. The inhibition of lipase reduced the absorption of fatty acids from the diet.

Collectively our studies confirm that the nature is an inexhaustible source of compounds that could be used as drugs (10-11) and offers a perspective for the development of new potentially useful formulations.

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University Master's Degree II level

EXPERT IN FOOD CONTROL AND CERTIFICATION ESCA

The Master aims to train experts in the management of the modernization of the food system, able to provide quality assurance to the market and to the consumer. Particular attention is paid to the activities of control and certification, which represent the most important aspects of the current regulations for the sector, nationally and internationally.
The training course aims to train:

- experts in modern chemical and biological technologies for quality control and food safety;
- professionals in the certification of products in the food industry;
- competent in computer science, organization and management for companies;
- HACCP experts, able to perform counseling for the prevention and reduction of health risks.

The project can also become a stimulus for regional industry in creating innovative systems in food production, which will result in investments, business growth and new jobs. The Master is also justified by the numerous and continuous requests from science graduates to perfect their training in the area of quality assurance and certification of the agricultural sector.

ADMISSION REQUIREMENTS

Those who can apply for admission must be in possession of:

- Degree or Master, according to the Ministerial Decrees 509/99 and 270/2004, in: Chemistry, Industrial Chemistry, Pharmacy, Pharmaceutical Chemistry and Technology, Biological Sciences, Natural Sciences, Veterinary Medicine, Nutrition Science, Agricultural Science

and Technology, Forest Science, Food Science and Technology, Plant Production, Engineering, Medicine, Biotechnology Sciences;

- Master Degree in disciplines similar to those of the previous point, achieved with regulations prior to DM 509/99;

- Degree obtained abroad and deemed equivalent by the board of the Masters course;

TRAINING ACTIVITY

The plan of studies provides 1500 hours of training activity (60 credits) divided into:

- 400 hours of classroom teaching, seminars, tutorials and laboratory (40 credits);
- 500 hours of final exam and internships at companies or Regional and National Institutions (20 credits);
- 600 hours of individual study.

TEACHING MODULES

1° Macromodule QUALITY ASSURANCE

Food matrices

Food principles and relation between food value and chemical composition. Major transformations of food: alterations depending on environmental factors or activity of microorganisms, adulteration and sophistication, with reference to the nutritional value and toxicity.

Quality Assurance of food and agricultural products

Food safety and quality control of products during production, processing and preservation. Analytical methods for the detection of food contaminants.

Chemical analysis and process food products

Application principles of analytical chemistry for food products. Elements of advanced statistical analysis and analysis of production processes.

2° Macromodule TYPICAL AGRIFOOD PRODUCTS AND INDUSTRIAL PROCESSES

Transformation processing of agrifood

Overview of industrial equipment related to various processes of transformation and conservation of agro-industrial products.

ACTIVITY	CREDITS	HOURS
CLASSROOM TEACHING	30	320
WORKSHOPS	10	80
INTERNSHIPS	17	425
FINAL EXAMS	3	75
INDIVIDUAL STUDY		600
TOTAL	**60**	**1500**

Framework of issues related to workplace safety, accident prevention regulations and systems, selection and layout of the facilities, organization of the chain of food production at all stages of traceability.

Chemical and biological characterization of local products

Typing of regional products, organoleptic characterization. The elements that characterize the typical products: historical memory, geographic location, quality of raw materials and production techniques. Chemical and biological characteristics of composition of some of the natural products or processing of Calabria.

3° Macromodule ASSESSMENT AND RISK PREVENTION IN THE AGRIFOOD INDUSTRY

Biological risk and contamination of agrifood products

Toxicological phenomena associated with the consumption of natural products and plants. Main classes of substances responsible for toxicological problems

The HACCP system in the agrifood chain

The module has the aim of illustrating the operational procedures that must be implemented in the context of the various types of industries in the food sector in order to prevent contamination and growth of microorganisms during the processes of transformation and preservation of food.

OGM, transgenic plants and their applications in agricultural biotechnology

Biotechnology in agriculture and recombinant DNA techniques. Genetic improvement and genes of agronomic interest. OGM, transgenic plants and applications in agrifood. Monitoring and evaluation of the transgenic plants. Methodologies and protocols in the identification and quantification of OGMs. Regulatory and social issues related to genetic engineering of plants.

4° Macromodule CERTIFICATION OF QUALITY IN THE FOOD CHAIN

Organic farming standards, techniques and certification

Treatment of the production system and the production techniques of organic food. The problems of biodiversity, the transparency of the method of production and certification stages along the production chain. Local development, lower environmental impact and greater safety for the health of producers and consumers. Product quality under the aspect of sanitation and liveability.

Safety regulation of the food industry

Nationally and internationally rules, considering the fundamental principles of UNI (and related systems of quality) and ISO (and related environmental systems) guides with particular reference to the sector of the supply chain of food production.

5° Macromodule R&D IN THE AGRIFOOD INDUSTRY

Management of the innovative business process. Evolution of technological innovation in the food system with particular reference to the sector of packaging and their life cycle (LCA).

Project management

The module aims to provide a structured method of project in all its phases. Students will practice in the preparation and development of a project idea.

SEMINARI

The seminars will be used to convey expertise in the field of quality control of the organic sector and biotechnology through testimonies of opinion leaders, members of the political and business experts.

Food labeling

Tools for internationalization (Halal, BRC Food)
Functional Foods
Problems in starting a business
Processing of analytical data for quality control in the food industry
Organoleptic qualities of extra virgin olive oil
The artisanal conserves
Organoleptic qualities of wines
QUALITY FOOD DAYS

- The stability of the wine: state of the art and recent innovations
- Certification in the food industry: regulated certifications (DOP, IGP, …)
- Official controls in Calabria
- Certification in the food industry: voluntary certifications (ISO 22005, ISO 22000, BRC, ...)

VISITS TO COMPANIES

Through visits at the Company, the students have the opportunity to immerse themselves in the organizational and productive aspects and have the opportunity to exchange views and discuss issues with business owners and operators of the company.

Salumificio San Vincenzo – Spezzano Piccolo
Gruppo Barbieri – Altomonte CS
Fattorie iGreco Vino e Olio - Cariati

Aziende ed Enti partner del Master

INFO AND CONTACTS

TIME	10 months
LOCATION	Department of Pharmacy, Health and Nutritional Sciences
INTERNSHIP	Regional and National Companies or Institutions
CANDIDATES	maximum 30, minimum 16
FEE	€ 2,300.00

- The Master ESCA earned in the edition 2014-15 the INPS accreditation obtaining 15 scholarships for sons / orphans of employees / pensioners
- The Master ESCA meets the requirements for the granting of training vouchers financed by regional and national Institutions.

The Director of the Master is Prof. Gaetano Ragno, full professor at the University of Calabria.

The board of course is made by the course teachers.

- Tel. 0984/493178-493201
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-

Call of the Master and registration form can be found at www.unical.it

University Master's Degree II level

Master's Degree in "Nutrition and Nutraceutical Supplements"

Maria Stefania Sinicropi
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Direttore Master
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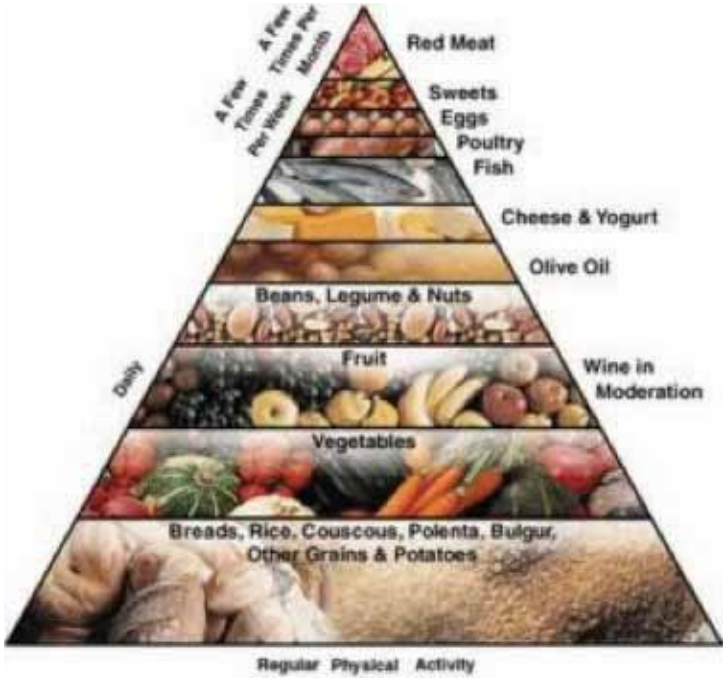
The Master's Degree in "Nutrition and Nutraceutical Supplements" promoted by the Department of Pharmacy, Health and Nutritional Sciences of the University of Calabria is based on a fundamental basis: FOOD IS / AND HEALTH. The health of populations living in both more or less developed countries is strongly influenced by the level and quality of nutrition, and there are overwhelming evidences that lifestyle and food choices act incisively on both the onset and progression of many chronic diseases. In this context, the training course of the Master in "Nutrition and Nutraceutical Supplements ", aims to deepen the study of foods and their relationships with health by providing to the health workers enrolled many knowledges about a proper nutrition and the proper use nutraceuticals in the treatment of pathophysiological states and malnutrition. Adequate nutrition and health are considered fundamental human rights, strictly related to each other, and in this respect, the world is currently experiencing an important public health emergency affecting both industrialized and developing countries. Especially in recent decades, in most developed countries there have been deep socio-sanitary changes leading to, at the same time, a significant decrease in infectious diseases but, on the other hand, to an



increase in: cardiovascular, inflammatory and neurodegenerative diseases as well as different forms of cancer, diabetes, etc. For all these syndromes it has been recognized as an important risk factor individually, even if not a contributory cause, a diet lacking of certain nutrients or poor in biodynamic nutrients and protective factors. In industrialized countries almost 2 billion of people are obese or overweight (in the richest countries one to teen is obese), with overweight and obesity on the rise while, paradoxically, 36 million of people die every year of hunger in the poorest areas of the planet. Under this point of view, it is necessary, more than ever, to revise the models of food consumption, food choices, dietary patterns in order to meet the challenges arising from new lifestyles and the resulting environmental, social, economic and global impacts. Thus, the Mediterranean Diet, whose health benefits have been universally recognized and scientifically proven, must surely be preserved, disseminated, set off and protected.

It was declared by UNESCO "Intangible Heritage of Humanity" and is, indeed, characterized by the abundance of food and typical products (pasta, bread, olive oil, oily fish, fresh vegetables, cereals, legumes, fresh fruit, wine, etc.), containing a large number of nutraceuticals able to exert antioxidant activity, antithrombotic, anticancer neuroprotective, etc. The word "nutraceutical" is derived, in fact, from the fusion of the terms "nutritional" and "pharmaceutical" and is now used to denote foods or food components, which provide important benefits for human health and their nutritional components

GOALS

The Master in " Nutrition and Nutraceutical Supplements" proposes, as its main goal, to investigate the relationships between nutrition and health, namely the proper nutrition education and the correct use of nutraceuticals for the treatment of pathophysiological (obesity, malnutrition, chronic or degenerative diseases in general) and physiological (proper nutrition from pediatric age to geriatric) states, for the psychological and physical wellbeing, sports and preventive medicine.
During the training they will be fully elucidated the biochemical, phytochemicals, pharmaceutical, nutraceutical, technological, communication and marketing of nutraceuticals aspects and studied the biological actions and toxicological drug-food supplements, whose market is expanding greatly and represents a very important piece of health products, responding to a new demand for health, viewed in terms of both prevention and wellness.
In fact, today in the third millennium, there is a need to face a new request of health, which is the new culture of wellness. The preservation of a proper psychophysical and physiological state becomes a primary need of the population, and consequently there is a growing demand for health products, in particular of food supplements, able to support the bio-physiological organism mechanisms.
Therefore, the training of experts in the nutraceutical and food field, which is an objective of the Master in "Nutrition and Nutraceutical Supplements", determines not only an impact on employment but proposes and awakens to a new cultural approach towards food.

ADMISSION REQUIREMENTS

For the admission application the following titles are mandatory:

• Degree or Master, according to the DD.MM. 509/99 and 270/2004, in: Chemistry and Pharmaceutical Technology, Pharmacy, Industrial Pharmacy, Nutrition Science, Chemistry, Industrial Chemistry, Biological Sciences, Natural Sciences, Biotechnology (Medical, Veterinary, Pharmaceutical, Industrial, Agro-food, etc.), Medicine, Veterinary Medicine, Food Science and Technology, Chemical Engineering, Agricultural Sciences, and Sports Science related degrees.
• Degree in disciplines similar to those of the previous point, achieved with regulations prior to DM 509/99;
• Degree obtained abroad and deemed equivalent by the board of the Masters course.

TRAINING ACTIVITY

••• The plan of studies provides 1500 hours of training activity, which allow the acquisition of 60 credits, divided into:
• 400 hours of lectures and exercises (40 credits);
• 300 hours of training / internship (10 credits) and 100 hours of seminars, training courses, study days and visits aimed to enhancing food typical of the Calabria region, as a source of nutraceuticals (6 credits);
• 100 hours preparation for the final exam (4 credits);
• 600 hours of individual study.

ACTIVITIES	CFU	HOURS
TEACHING FRONTAL	40	400
STAGE	10	300
SEMINARS, GUIDED TOURS AND STUDY DAYS	6	100
FINAL EXAM	4	100
INDIVIDUAL STUDY		600
TOTAL	60	1500

The didactic activity is developed in 6 Teachings/Macro-areas:
Nutraceuticals and degenerative diseases, Applied Biology, Phytochemistry and Pharmacotoxicology, Technology and Marketing, Nutrigenomics, Nutrition and nutraceutical integration in different pathophysiological states.
Each of the aforementioned teachings is divided, in turn, into modules:
Nutraceuticals and degenerative diseases (8cfu)
Structural and Molecular Aspects of Nutraceuticals
Goals: The module aims to give an overview on the chemical composition of foods, nutrients, food supplements and dietary supplements, functional and fortified foods.
The role of nutrition in cancer and chronic degenerative diseases
Goals: The module aims to investigate the role of nutrition and provide nutrition in certain diseases of great prevalence.

Applied biology (6cfu)
Nutraceuticals and mechanisms of signal transduction at the cellular level
Goals: The module aims to provide examples of nutrients such as activators or interfering mechanisms of cellular signal transduction, elements of nutritional genomics and biomarkers. Methods for the assessment of changes in gene expression and protein induced by nutraceuticals.
Biochemistry of Applied Nutrition
Goals: The module focuses on the metabolism of micronutrients. Nutrient interactions with physiological systems and biochemical pathways.

Phytochemistry and Pharmacotoxicology (6cfu)
Nutraceutical and Phytointegration
Goals: This course provides the theoretical and practical basis for obtaining extracts, enriched fractions and isolated individual active through various mining strategies, information on the evaluation of the biological activity in terms of effectiveness and phytocomplexes standardized both individual principles active for applications in the healthy.
Pharmaco-toxicology of nutraceuticals
Goals: This course provides in-depth informations on the efficacy and safety of dietary supplements through the detailed study of their mechanism of action and the toxicological profile.

Technology and Marketing (7cfu)
Extraction of nutraceuticals through innovative technologies
Goals: Thermodynamic aspects of base that regulate the extraction solid - liquid with reference both to consolidated technologies and particularly innovative systems using of supercritical fluids.
Nutraceuticals: Preparations and Formulations
Goals: Formulation of nutraceuticals with forms innovative. Strategies to improve the bioavailability and stability of nutraceuticals.
Evolution of health-supplement market, youth work and international business creation
Goals: Deepening of issues related to the evolution of the supplement market and new business opportunities. Principles of communication and marketing.

Nutrigenomics (6cfu)
Rational approach to health-supplements
Goals: The aim is to analyze the role of the compounds “nutraceuticals” as part of a proper role adjuvant: what criteria of choice to take and what objectives to pursue.
Practical aspects of Nutrigenomics
Goals: Interactions between food and genes useful for a rational approach to the use of nutrition and nutraceuticals.
Biochemistry of Nutrition
Goals: This course provides the basic elements for biochemical and nutritional understanding the role of macronutrients.
Nutrition and nutraceutical integration in different pathophysiological states (7cfu)
Applicative aspects
Goals: Analysis of nutritional approaches and nutraceutical integration in physiological states such as pregnancy, nursing, pediatrics etc.
Supplementation in energy and nutritional deficiency states
Goals: Nutrition and nutraceutical integration in sport; deepening of the issues that are at the basis of muscle tiredness and fatigue that are caused by an unbalance between the energy demand of the organism and its ability to produce or use energy.
Principles of dietary
Goals: Assessment of nutritional status. Practical exercises: techniques and procedures of anthropometric measurements, calculation of basal metabolism and daily energy requirements, etc.

DEDICATED STAFF
Director of the Master: Professor Maria Stefania Sinicropi.
Scientific Council of the course: Prof. Maria Stefania Sinicropi, Prof. Giancarlo Statti and Prof. Francesco Puoci.
N°15 professors of the University of Calabria;
N°4 Manager of Biofutura Pharma spa;
N°9 external teachers;
N°3 tutor to support teaching;
N°5 administrative staff.

COLLABORATION AND CONVENTIONS
The Master in “Nutrition and Nutraceutical Supplements” takes place in agreement and in collaboration with Biofutura Pharma Spa, leader in Nutraceutical- Pharmaceutical field.

DAYS OF STUDIES AND SEMINARS
Study open days: Nutraceuticals and Prevention; New dietary approaches and nutraceuticals and so on.
Seminars:
Role of nutraceuticals in disease colon proctologic; The food represented and interpreted by the

food in contemporary art; Supplements, Probiotics, Prebiotics and Synbiotics; Nutritional approaches and integration of Nutraceuticals in Pediatric Age; Nutraceuticals for the treatment of pain; Role of Nutraceuticals in the prevention of chronic respiratory diseases; The influence of nutritional status on the treatment of patients with kidney and liver disease; Energetic supplemention of Sarcopenie from hyperkinetic syndromes; Nutraceuticals in sports injuries; Nutraceutical integration in sport; Nutrition education: how to combat unhealthy lifestyles; Food and prevention from birth; Rational of nutritional supplementation in vulnology; Integration nutraceutical in phlebology; Cardiovascular disease: prevention and the role of nutraceuticals; Nutraceuticals: design and formulation development; The protein supplementation in the elderly; The therapeutic diet model multiphasic "penta" for the management of obesity and its metabolic complications; bioimpedance results in the treatment of VLCD and so on.

STAGE AND FINAL TEST

Internships and apprenticeships are held at several facilities affiliated with the Department of Pharmacy and SSN and graduation must pass a final test verification of the skills acquired in total, taking into account the activities of training, internships and preparation of projects or processed. The final grade is expressed as 110/110

INFORMATIONS

ACCREDITATION: In the academic year 2014-15, the Master has been accredited by 'INPS "Managing Public Employees" and therefore is awarded of a number of scholarships, covering the whole of the participation fee, for children from current or retired civil servants.

In the academic year 2014-15, 9 scholarships were provided by INPS.

The Master in "Nutrition and Nutraceutical Supplements" also has the requirements necessary for granting training vouchers financed by regional and national authorities.

DURATION: Annual.

LOCATION: Department of Pharmacy, Health and Nutritional Sciences, University of Calabria.

STAGE: Enterprises or local organizations Regional and National.

FEE: € 2,400.00; The registration fee can be paid in a single installment upon completion of the practice of enrollment or in two installments.

CANDIDATES: Maximum number 30, at least 16.

CONTACTS

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COMPANIES AND ORGANIZATIONS PARTNERS OF THE MASTER

biofutura

Ordine dei Farmacisti
della Provincia di Cosenza

CRA
CONSIGLIO PER LA RICERCA IN AGRICOLTURA E L'ANALISI DELL'ECONOMIA AGRARIA

HEALTH CENTER
CENTRO BIOMEDICO E NUTRIZIONALE

ASP
AZIENDA SANITARIA PROVINCIALE
REGGIO CALABRIA

ASP
azienda sanitaria provinciale catanzaro

Istituto Zooprofilattico Sperimentale del Mezzogiorno

ASL
AZIENDA SANITARIA PROVINCIALE DI CROTONE
MagnaGrecia

RealGene

Nutrigenetica – (RC)

LIPAC

ENERVIT
Science in Nutrition

A.S.P. Cosenza
Regione Calabria

mediterranean diet