Chapter 19

The Treatment of Cancer: A Comprehensive Therapeutic Model Entailing a Complex of Interaction Modalities

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Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/55696

1. Introduction

Although an overall rise in cancer incidence has been observed over the past 300 years concomitantly with the industrial revolution, a more prominent increase has been recorded since the '30s, with a further acceleration during the last 2 decades.

Genetic factors are thought to account for 5-10% of all malignant neoplasms, even though hereditary susceptibility will be variably relevant depending on histotype, anatomic site, and epidemiologic context; additionally, a key role is played by environmental factors. Socioeconomic improvements have resulted in an increase in food availability as well as significant changes in lifestyle habits; with new technologies allowing for automation of manual work, an overall physical activity reduction has been observed leading to unbalances between caloric intake and energy expenditure.

Cancer is no longer a rapidly lethal disease for an increasing number of patients. Knowledge of the main risk factors for cancer development is essential for establishing a comprehensive and integrated treatment plan (tab 1).

Cancer patients receiving treatment combinations of surgery, radiation therapy and chemotherapy are prone to developing several treatment-related diseases.

Pain, heightened risk of infection, neural deficits, lymphedema, fatigue, nausea and vomiting, loss of flexibility, myopathies, muscle weakness, cachexia, dehydration, emotional distress, shortness of breath are common side-effects capable of negatively affecting patients' lifestyle and physical activities. Any combination of surgical treatments, chemotherapy, and radiotherapy must be integrated within a global therapeutic plan aimed to reduce the above-

1. Obesity and overweight
2. Low fruit and vegetable intake
3. Physical inactivity
4. Smoking
5. Alcohol consumption
6. Unprotected sex
7. Urban air pollution
8. Indoor air pollution due to household use of solid fuels
9. Spread of bacterial and viral infections through unsafe health care procedures

Table 1. The 9 modifiable risk factors responsible for a third of all cancer deaths in the world

mentioned negative effects that may become apparent immediately as well as after several months or years.

Mullan (1985) classified the life of cancer survivors into three stages: 1) Acute Stage, spanning from diagnosis to the first year after primary treatment; 2) Extended Stage, until the 5th year after primary treatment; 3) Permanent Stage, from the 5th year after primary treatment onwards.

The first year after primary treatment should be considered just as the "tip of the iceberg", and it is crucial that any approach to cancer treatment is holistic and comprehensive, based on the assumption that cancer is a chronic illness rather than an acute condition.

The aim of this chapter is not to describe the specifics of early management of patients diagnosed with cancer; however, the authors' view is that such approach should be as integrative and comprehensive as possible.

It is essential that physicians in the process of planning specific therapeutic interventions (either actions specifically aimed to the primary disease or supportive therapies) extensively profile patients according to their physical status in order to establish an individual patient-tailored strategy.

The integrative management approach relies on a number of basic interventions, including:

1. Therapeutic changes of lifestyle habits and daily diet;

2. Specific physical exercises and walking prescriptions;

3. Physical therapies coupled with psychophysical techniques.

2. Therapeutic changes of lifestyle habits and daily diet

2.1. What do you know?

Up to 30-40% of all malignant cancers could be prevented by interventions on diet, physical activities, and daily lifestyle.

http://dx.doi.org/10.5772/55696

Calories intake directly correlates with risk of developing obesity as well as cancer.

Obesity *per se* is considered to be to blame for up to 14% and 20% of all men and women deaths.

Approximately 50% of all primary malignant cancers arise in tissues with a primary involvement in obesity physiopatology.

Cancer is responsible of approximately 25% of all deaths in the US.

According to recent predictions, by 2020 the global world population will have reached 7,5 billion, with a cancer incidence and disease-specific mortality of 15 million per year and 12 million per year, respectively.

At present the total US cancer survivors population is made of 5-y cancer survivors for up to 66%, and by 2020 it has been estimated that cancer survivors aged at least 65 years will have been increased by 42% compared to now.

The diet is responsible for approximately 30-35 % of total mortality in the US, with its impact on cancer development depending on histotype and anatomic location; nutrition may play a key role in up to 70% of colorectal cancer-related deaths.

Nowadays, men and women in Occidental countries are progressively increasing in body size, with average body-mass indexes (BMI, i.e. the ratio between weight and squared height) relentlessly soaring beyond the normal range (18.5-24.9); conversely, an increasing number of individuals is falling into the overweight range (25-29.9) as well as the overt obesity range (> 30).

Obesity is easily diagnosed by assessing the increase in horizontal body dimensions compared to height.

One method for measuring such imbalance is the BMI, i.e. the ratio between weight (kilograms) and squared height (centimeters^2). BMI ranges identifying malnutrition, normal weight, overweight and different obesity degrees (mild and severe) have been defined.

BMI, however, being frequently used in epidemiological studies to assess the effect of diet as a risk factor, may become a confounding factor; indeed, BMI is less reliable in elderly patients, with height being gradually reduced due to spinal degenerative processes. Likewise, children BMI measurements may be biased by different growth rates in different body areas. Additionally, BMI fail to provide any definite information regarding body composition, i.e. the percentage of lean body mass versus fat mass, bone mineralization status, and total body water, just to name a few examples.

The value of lean body mass is critical because it is the body component consuming higher energy values per weight unit, being therefore critical for any estimations of appropriate caloric intakes.

Any diet based on caloric restriction alone would be ineffective as well as potentially dangerous if no caloric intake assessment were to be calculated according to body composition and estimated energy requirements for performing daily physical activity (including walking, writing, or accomplishing ordinary housework actions).

Obesity plays a critical role in cancer promotion, progression, and therapy resistance; obesity oncogenic actions are thought to be mediated by dysregulation of hormonal networks (i.e., circulating insuline, IGF-1, testosterone, and estrogens levels) as well as through pro-inflammatory effects due to adipose tissues cytokines.

Increased BMI values correlate with circulating inflammatory cytokines levels, that appear to be related to insulin resistance.

A positive correlation between high BMI values (>30) and cancer risk is being observed in different areas worldwide, with significant increases in cancer risk being recorded for every 5 Kg/m^2-gain in BMI.

Obesity directly promotes tissue inflammation. Lipids intake should be proportional to that of other nutrients in order to reach an adequate energy balance; in this regard, it should be remembered that 1g of fat provides approximately 9 Kcal of energy, while 1g of carbohydrates or proteins only provides 4.5 Kcal. However, specific lipids significantly differ in their chemical structure and will result in different metabolic responses when given at equal calories levels. Increased amounts of fat per portion, a phenomenon commonly occurring in restaurant and cafèteria, leads to significant inflammatory response spikes, that can be quantified by assessing increases of circulating inflammatory factors; the latter are capable of inducing insulin resistance and free radicals production, resulting in oxidation of cell structures such as nucleic acids, proteins, and membrane lipids. Other lipids possess an anti-inflammatory activity. There is plenty of literature addressing the beneficial administration of omega-3 unsaturated lipids for lessening the inflammatory consequences of several chronic diseases. Omega-3 unsaturated lipids are available either as dedicated over-the-counter preparations or through several common foods, more prominently fish and dried fruit. Omega-3 lipids are unsaturated lipids, i.e. they are in liquid form at room temperature (oils); they can easily undergo oxidation if not protected by intrinsic animals antioxidant systems or by vitamin E addition in commercially available preparations. Their content in fish meat changes according to the species, the fishing site, temperature, type of feeding (algae or other kinds of food for livestock); these features make difficult to calculate the omega-3 unsaturated lipids daily dose. Many public health authorities have been encouraging increases in diet fish intake, but it is important to know diet fish origins because of the risk related to heavy metals; it is therefore necessary to avoid eating exceedingly large amounts fish. Of course, such details are hardly specified, if ever, in epidemiological studies assessing the effects of fish-based diets. Obesity results in a status of enduring subclinical inflammation within fat tissues. In obese individuals both visceral and subcutaneous adipose tissues are infiltrated by macrophages surrounding necrotic adipocytes forming the so-called crown-like structures (CLS). The infiltrating macrophages release inflammatory cytokines whose plasma levels in post-menopausal breast cancer patients were shown to correlate with cancer progression and disease-specific mortality. In both experimental animals and humans the CLS number is directly related to BMI values.

Diets with high concentration in saturated fatty acids (cafeteria food, sausages, dairy products, red meat) are becoming more and more frequent worldwide, leading to a global escalation in overnutrition-related diseases.

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Diets rich in saturated fatty acids closely correlate with metabolic syndrome and inflammation, especially inflammation of the white adipose tissue, which is not only a storage organ for lipids but also an endocrine organ.

It has been known since 1885 that hyperglycemia is more frequent among cancer patients than in the healthy population.

Warburg in 1930 highlighted the abnormal glucidic metabolism occurring in cancer cells, i.e. the so-called aerobic glycolysis, defined as the tendency of the cancer tissues to produce lactic acid even in the presence of sufficient oxygen to sustain Krebs cycle and mitochondrial membrane oxidation processes.

Glucose intolerance is an established risk factor for several cancers (including colorectal, breast, prostatic, pancreatic, and gastric cancer). Obesity and glucose intolerance are part of the metabolic syndrome, a condition characterized by increased insulin levels both during fasting and after glucose load. Metabolic syndrome, first described by Reaven in 1988, is defined by the presence of at least three of the following components: intra-abdominal or visceral obesity, glucose intolerance, hypertension, low HDL blood levels, and high triglyceride levels. In 2001, the National Cholesterol Education Program developed an alternative definition, which required the presence of at least 3 of the following 5 factors: increased waist circumference, hypertriglyceridemia, low HDL cholesterol, hypertension, and high levels of fasting glycemic levels. At the roots of metabolic syndrome there are increase in visceral fat, excessive caloric intake, and low physical activity.

The prevalence of metabolic syndrome is steadily increasing all over the world together with the increase in several types of cancer.

In subjects with glucose intolerance (IGT), both the levels of glycemia and fasting insulin are increased. The latter are coupled until glycemia reaches the concentration of 7-8 mM, a level beyond which insulin does not show further increases and may even begin to decline as a result of functional failure of pancreatic β-cells (De Fronzo 1992). This is paralleled by the gradual increase in glycemia, starting with postprandial glycemia.

Many people with newly diagnosed cancer are obese, with further changes in body structure being induced by chemotherapy, surgery, and therapy-related physical inactivity.

Chemotherapy often changes, even a year later, body composition, increasing fat mass and reducing muscle mass, creating a phenotype that could be defined as post-cancer sarcopenic obesity; the latter appears to correlate with a high risk of cancer recurrence.

Modifications in body composition in cancer patients imply that many studies conducted through questionnaires, perhaps using only one scale, were affected by significant biases. The reduction in caloric intake as a strategy to reduce obesity should be assessed on a case by case basis, followed over time, and maintained proportional with nutritional needs of the whole body in order to prevent secondary nutritional deficiencies.

The caloric intake, however, should be calibrated according to the composition of energy sources (carbohydrates, lipids, proteins); the latter, in a typical Mediterranean diet, should be in the ratio of 60%, 25%, 15%, respectively.

The American Cancer Society guidelines suggests that carbohydrates should be in the ratio of 40-65% of the energy pool, the same as for healthy population, lipids in the ratio of 20-35%, of which <10% saturated fats, and proteins should be 10-35%.

Daily protein intake should not be less than 0.8-1 grams per Kg of body weight.

Nutrition does not mean only caloric intake, but also replenishment of the very primary elements that the body uses to live. Nutritionists from different countries define the optimal daily replenishment levels of micronutrients depending on gender, age, and functional status (i.e., pregnancy, sporting activities, etc.). However, patients suffering from cancer will be almost always exhibiting to nutritional deficiencies.

Obesity itself is a malnutrition disease characterized by several deficiencies, including vitamin D deficiency. Many other deficits can be induced by specific therapies (i.e., those impairing renal tubular reabsorption through tubular damage, or intestinal absorption through mucositis, anorexia, and vomiting) and by treatments for related comorbidities (cholesterol-lowering agents, diuretics, anti-hypertensive drugs, etc...) resulting in minerals and antioxidants loss. These events may worsen the peroxidation phenomena of several biological structures, that will have been already compromised by metabolic syndrome and administration of chemotherapy.

Obesity is also associated with insulin resistance, i.e. the insulin inability, despite being available in physiological concentrations, of exerting its metabolic tasks in different body districts.

Insulin resistance assessment is performed in specialized centers, at times requiring expensive and complex methods. Such assessment could be easier by evaluation of blood glucose levels and fasting insulin levels according to the HOMA-IR algorithm, with values above 2.5 being indicative of insulin resistance.

Diet should not cause any further increase in insulin levels, either basal or food-induced.

The daily intake of carbohydrates (i.e., glycemic load) should be proportional with the body composition, the energy percentage (calculated in relation with other energy sources), and the degree of physical activity (including daily activities as well as activities planned by the rehabilitation system to reduce overweight and improve muscular function).

Carbohydrates intake should be progressively reduced throughout the day in light of the circadian increase in insulin resistance, more prominently observed during the last day hours.

Last but not least, it is necessary to avoid foods with high glycemic index (GI). The GI is determined by comparing the post prandial glycemic response of a food with the postprandial glycemic response to the same amount of available carbohydrate from a standard food in the same individual.

Baseline plasma levels of cytokines in obese people return to normal values after weight loss.

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3. Diet, caloric restriction and cooking: A therapeutic way

The nutritional sources of food themselves are different from those used by our ancestors. The production doesn't respect the proximity criteria (0 km), seasonality criteria, or crop rotation criteria, resulting in a loss of micro-elements in soil. Fruits and vegetables generally meet more the preservation criteria instead of those of maturation with the result of the unpredictability of their content in terms of micronutrients.

The taste for food has been gradually changing giving priority to a rapid food intake (fast food), high levels of fat, flour and refined sugar. The large use of sweetened drinks contributes to increase the excessive energy introduction.

As for oxygen free radicals (ROS) production, it is related to inflammation during oxidative stress.

In obese patients and in those with cancer the ROS problem has a special role; supplements or diets with high content of vegetables with antioxidant activity have been given. The use of fruits and vegetables showed positive results in reducing the risk for cancer and recurrences.

Data, however, are not univocal. Each vegetable contains many different compounds, their availability is not always in relation with their content (it is a typical example for Beta carotene of carrot), the contents of a type of antioxidant may differ for the production site, stage of maturation to collection, preservation, and preparation methods (tomato sauce contains more available lycopene than raw tomato). The availability of a substance may change in different individuals according to the integrity of the intestinal mucosa (often damaged by chemotherapy) or to the kind of intestinal flora (1-1,5 kg of bacteria). This condition can also modify the food chemical structure, producing harmful or healthy substances for our health as in the case of soy isoflavones transformed into the much more active Equol only in subjects with suitable bacteria. In our blood and urine there's a large amount of products of bacterial metabolism which may influence our health; it may differ depending on the breed, gender, functional states (pregnancy) and dietary habits: there's much more complexity in epidemiological studies with the use of the food or nutritional supplements than expected in the research protocol.

The real availability (absorption) of substances in food or in supplements has a good chance to be different from that hypothesized and calculated with questionnaires or bromatological tables.

Diet should not cause any further increase in insulin levels, either basal or food-induced.

The daily intake of carbohydrates (i.e., glycemic load) should be in proportional with the body composition, the energy percentage (calculated in relation with other energy sources), and the degree of physical activity (including daily activities as well as activities planned by the rehabilitation system to reduce overweight and improve muscular function).

Carbohydrates intake should be progressively reduced throughout the day according to the circadian increase in insulin resistance, more prominently observed during the last day hours.

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glycemic response to the same amount of available carbohydrate from a standard food in the same individual.

Often using fruit we take more attention to the amount (5 servings a day) and to the concentration in antioxidants rather than the sugar content, which brings us back to the problem of calories and metabolic syndrome (fructose plugged to lead to a lower insulin response, is indeed much more dangerous than glucose for the pathogenesis of metabolic syndrome).

Diet is often unbalanced, not respecting the right proportions between carbohydrates (60%), lipids (25%) and proteins (15%).

The use of processed foods induces a higher salt intake, with effects on blood pressure and 10 on the integrity of structures such as the gastric mucosa with possible susceptibility to cancer.

The use of sweetened drinks and refined flour, without fibers, which are characteristics of white bread and pasta, causes a rapid absorption of carbohydrates and a rapid elevation of blood glucose, followed by a massive insulin response. Insulin is a hormone with multiple activities involved in the regulation of blood glucose, the transport of amino acids, the mobilization of fat from their deposits, the monitoring of urine output and of cell proliferation.

Persistent high levels of insulin indicate a loss of activity of the hormone (insulin resistance) that goes together with obesity, dyslipidemia (low HDL cholesterol, high triglycerides), high blood pressure and, according to data, even the cancer.

Fast food diets, also known with the term "Cafeteria Diet", are often characterized by an excessive fat content, often saturated, (those who melt at higher temperatures) contained in marbled meat, so defined because at a thin shear it shows impregnation of lipids within the muscle structure, typical of those animals kept under movement restriction.

A high-fatty acids diet an altered ratio between saturated and unsaturated fats, an alteration in the ratio of unsaturated omega-6 (those that have a double bond in position 6 from terminal COOH) and omega-3 (those that have the double bond in position 3, typical of fish, nuts, etc.) causes increase in blood inflammatory markers. In a state of inflammation it leads to resistance to insulin receptors, which is the first step for obesity and metabolic syndrome.

Foods with sugar and refined flour should be reduced or abolished. Bread and pasta should be made with whole grain flours, that give them a distinctive dark color, rice should be strictly integral.

As for pasta it should be investigated whether the product is integral outset or if fibers have been added to starch in a second time. The difference is huge because the slow release of the starch in an originally integral flour can give an IG <40% than the refined flour = 75%. Rice and pasta should never be overcooked.

It is absolutely necessary to avoid using fructose as an alternative to sucrose.

Salt is an important part in the preparation and storage of food. It is blamed for stomach cancer, but may be also critical for its action on blood pressure and, indirectly, on the metabolic and inflammatory situation. Very often it is not calculated in nutritional epidemiological studies in oncology.

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During the cooking process an improper use of heat can turn food into a non-profit element, even dangerous for health. The use of high temperatures for long periods can produce carcinogenic substances. The use of cooking helps the extraction of carotenoids from tomatoes and carrots, but degrades the antioxidants in cruciferous vegetables, often investigated for their anticancer properties. The problem regarding the cooking should be extended to the used instruments types (oven, microwave, fry, steam, etc.).

All food should be cooked with adequate methods, tools and cooking times. A typical example may be that of the french fries, for which the interest in compositional characteristics of nutritional caused a controversy about their potential toxicity, related to frying due to the formation of acrylamide.

4. Caloric restriction

Caloric restriction is an integral part of religion requirements in several countries (Islamic Ramadan, Orthodox Church abstinence during Christmas, Easter, Assumption, the Jewish tradition of Daniel's fasting, etc.).

Over the past 30 years there have been more and more studies addressing health benefits related to caloric intake reduction in animal models and in humans.

Data seem to show that maximum benefits may be achieved by applying the highest possible calory reduction without resulting in overt malnutrition, and by prolonging this status as long as possible.

In animal models, caloric reduction of not more than 10-40% of the normal calories intake exerts an anticancer effect which is directly related to its duration.

Caloric restriction induces changes in metabolic and hormonal status in a similar way among animals and humans.

Caloric restriction improves sensitivity to insulin and improves glucose metabolism.

Caloric restriction can reduce oxidative stress.

Caloric restriction can increase life expectancy in animals; however, the restriction of carbohydrates or lipids alone does not seem to influence this result, which instead appears to be related to the reduction in methionine intake by lowering consumption of animal proteins. One year-long caloric restriction alone, even without physical activity, can reduce several markers of inflammation in obese postmenopausal women, including C-reactive protein, serum amyloid, and IL-6.

Accordingly, the excess of caloric intake induces obesity and represents a risk factor for cancer.

From rodents to primates, including humans, caloric restriction has been shown to be one of the most powerful tools in the prevention of carcinogenesis.

However, epidemiological data deriving from forced restrictions during the events of II World War showed conflicting results.

Conversely, Norwegians with a mean caloric intake reduction of about 50%, maintaining a balanced diet, showed a reduction in the incidence of breast cancer compared to controls.

In the Netherlands, a caloric intake reduction (70% in adults, 50% children) was paralleled by an increase in breast cancer but not in other forms of cancer.

The survivors of German and Russian concentration camps showed a sharp increase in all forms of cancer.

This apparent inconsistency of results can be due, in our opinion, to the distinction between caloric restriction and forced malnutrition characterized by the presence of other factors such as emotional stress, infections, etc.

5. Physical exercise and walking prescriptions

5.1. What do you know?

About the component of physical exercise, the American Cancer Society recommends the exercise like part of a continuum of cancer survival care.

The physical exercise is able to reduce the risk to develop the breast cancer and colon on 25% and pulmonary cancer on 30%, uterine cancer and ovary cancer about on 20% and on 9% about the prostate cancer.

After the diagnosis and the treatment there is a reduction from 26 to 40% of recruitment of Brest cancer and of colon cancer with daily physical exercise and also good quality of life.

Also during the prostate cancer the aerobic and endurance physical activity can reduce the fatigue and improve the life's quality.

During the hematological cancer especially in non-Hodgkin lymphoma and multiple myeloma, the physical exercise can improve the quality of life with reduction of fatigue and also the aerobic capability in bone marrow transplantation.

The general benefits of physical exercise in cancer treatment are numerous and include: improved cardiac output, increased ventilation, improved flexibility and range of motion; increased muscular strength and endurance; decreased resting heart rate; improved stroke volume, vasodilatation, perfusion; improved metabolic efficiency; improved blood counts; improved psychological attitude to resist to the cancer disease. The cancer-specific benefits are related to cancer treatment toxicity especially to muscular degeneration with 1) fatigue and weakness, 2) neurotoxicity, 3) cardiotoxicity, 4) pulmonary toxicity.

Our therapeutic approach using the physical exercise and walking prescriptions is divided in 3 phases to: 1) recovery of residual capacity; 2) sensory-motor and functional recovery capacity; 3) the quality of life improvement.

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The recovery of residual capacity is designed to recovery joint mobility and to increase the uninjured muscle tone after reprogram of flexibility.

In the cancer patient there is usually a marked reduction of the flexibility.

Flexibility is one of the physiological parameters involved in almost all forms of the human movement and is similar to aerobic capacity, strength, and neuromuscular endurance in being a trainable fitness parameter.

Flexibility has been defined as mobility compliance and, alternatively, as the reciprocal counterpart of stiffness. Most of the authors define flexibility either as range of motion at or about a joint. Another definition represents flexibility like the ability of a joint to move throughout its potential range of motion. Those definitions confuse the property of flexibility with the criterion able to measure the range of motion and using hardly synonymous; since potential range of motion is a variable factor among others in deterring flexibility, flexibility cannot be understood simple as relative to it.

We define flexibility like the disposition of body tissues to allow, without injury, excursions at a joint or set of joints. This property is measured by, but not equivalent to, range of motion. Both joint tissues and the surrounding soft tissues contribute to flexibility, although only the latter should be modified in order to enhance flexibility.

To increase this capability is possible to use yoga, slow / static and dynamic stretching techniques, Pilates method; in our experience we prefer anyway Elispheric Imoove method (fig. 5) and exercises deriving from proprioceptive neuromuscular facilitation (PNF). This last technique is designed as a manual, partner-assisted stretching; a partner is needed to provide the fixed resistance against which the lengthened agonist isometrical contracted at or near maximum (to use spindle facilitation).

Some factors that affect flexibility are modifiable, subject to voluntary control to some or large extent, others are not modifiable.

Flexibility decreases with age. In cancer patients, it suggests that regular activities, in order to maintain elasticity, or to do specific stretching programs, are important for aging.

Gender is another factor that influences flexibility. Females are generally more flexible than males especially during the same stretching program; probably women have a larger percentage of elastin in their miofascia.

Flexibility varies during the course of the day. There is greater flexibility of cervical spine during the late afternoon and evening hours and about the lower lumbar spine data show an improvement during daytime later hours.

About the anatomical constraints, the excessive fatty tissue limits range of motion related to the tightness of soft tissue structures. This problem is connected with some conditions of diseases like arthritis, diabetes mellitus, hemophilia and finally the cancer but also is correlated to bad posture in orthostasis or with seated flexed posture.

Other ways to improve flexibility: massage, warm-up and stretching are three basic techniques used to increase flexibility but neither massage or warm-up is as efficient as a proper stretching regimen in increasing flexibility.

The best method to realize stretching involves a series of less than maximal isometric contractions of the agonist muscles in a pre-lengthened state (to set up the stretch), followed by concentric contractions of the antagonist muscle group (to lengthen the agonist) in conjunction with light pressure from a partner when needed and with an instrumentation like sensorized postural bench system (TecnoBody, Italy).Though this mode the objectives are to alleviate muscle tension, to facilitate healing by increasing blood flow, to decrease muscle pain by reducing vasoconstriction. This work is to applied day by day using at the cancer patients home a specific personalized postural bench like Fleximat postural bench (fig. 1 DeltaDue, Italy).

Figure 1. Fleximat

When it is not possible to get a flexibility increase in cancer treatment: there are specific contraindications, due to time and circumstances, where stretching should not be performed to get flexibility improvement. Especially when there are reduced joint receptor and pain sensation, when mobilization of tissue is not possible, for example in post-acute cancer surgical treatment or when stretching or tension in tissue elicits pain.

After the recovery the joint mobility with the flexibility replanning, the improvement of the uninjured muscle tone and strength should be possible using before focused vibratory acoustic

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stimulation at high intensity with Vissone (fig. 4 Vissman, Italy) and after anaerobic work with TRX system. Vibrations are able to induce muscular adaptions to the recovery of muscle tone at the 300 Hz, of frequency and to stimulate the upper motors centers in order to obtain a better performance of controls, responsible for the muscle recruitment. Is noted that so is possible to 1) activate the aerobic metabolism; 2) determine an analgesic effect; 3) increase local circulation and bone density; 4) finally increase the contractile capacity and elasticity of the muscle treated.

6. Walking prescriptions

To elicit the sensory-motor and functional recovery we need to get acceptable walking.

Human movement usually is defined by the walk and is not limited to bipedal locomotion; however, such locomotion is a fundamental part of daily life and is a prominent focus of public health physical activity guidelines.

The human gait is more complex; going one step forward, although it can start from the hip flexors of the Deep Frontal Line, especially the psoas and iliacus, afterwards, it involves the hip flexion, the knee extension, and the ankle dorsiflexion necessary to step forward, thanks to the myofascia of the Superficial Frontal Line. As the leg travels forward, the entire myofascia prepares to receive the weight of the body and the ground reaction.

Once the heel places on the ground and the step begins, the Superficial Back Line takes over as the back of leg engages into hip extension and plantar flexion. The abductors of Lateral Line, Ischio-Tibial-Tract, and the lateral compartment of the lower leg provide stability that prevents the hip adduction, while the adductor group and the other tissues of the Deep Frontal Line assist the flexion- extension motions and provide stability to the inner arch of the foot and up the inside of the leg. In the upper body, the common contralateral walking pattern involves the Functional Lines bringing the right shoulder forward to counterbalance the left leg when it swings forward and vice versa. Therefore the gist of walking capability is to improve the miofascial flexibility.

The walking objective monitoring evolution, using pedometer and accelerometer technology, offers an opportunity to perform guidelines, including recommendations for cancer patients.

All the studies in literature have used a variety of objective parameters using instruments that have been previously validated. The Yamax pedometer is considered a criterion research quality pedometer (Schneider et al., 2004), the Lifecorder's validity is well documented (Crouter et al., 2003; Schneider et al., 2004), and the ActiGraph has been adopted by national surveillance strategies (Troiano et al., 2008) and is probably the most utilized accelerometer in research today.

Therefore is possible to define with the pedometer the sedentary level into < 2,500 steps/ day (basally active) and into < 2,500 to 4,999 steps/day (limited activity); but using an established step-defined physical activity scale is possible to establish a level one for sedentary < 5,000

steps/day ; a level two >5,000 <7,499 steps/day for low active; a level three >7,500 <9,999 steps/day for somewhat active ; a level four >10,000 <12,499 steps/day for active; and a level five ≥ 12,500 steps/day for highly active.

We also noticed that healthy adults can perform between approximately 4,000 and 18,000 steps/day, and, in our opinion, also 7,500-9,9990 steps / day, resulting in between 50/ 85 steps /minute. That would be a reasonable target for the cancer patients in the first Mullan phase.

In order to get a better walking performance in the first phase of Mullan, and also in the second phase, we adopt two integrate procedures: 1) normalization of the foot-ground reaction forces using a personalized viscoelastic insoles to control vertical and shear forces on the foot during the stance phase without the obligatory use of athletic shoes; 2) use of the microgravitary system S.P.A.D (fig. 2) that determine the sensory-motor and functional recovery of the posture during the walking in combination to the development of proprioceptive information from the periphery to the cortical central system.

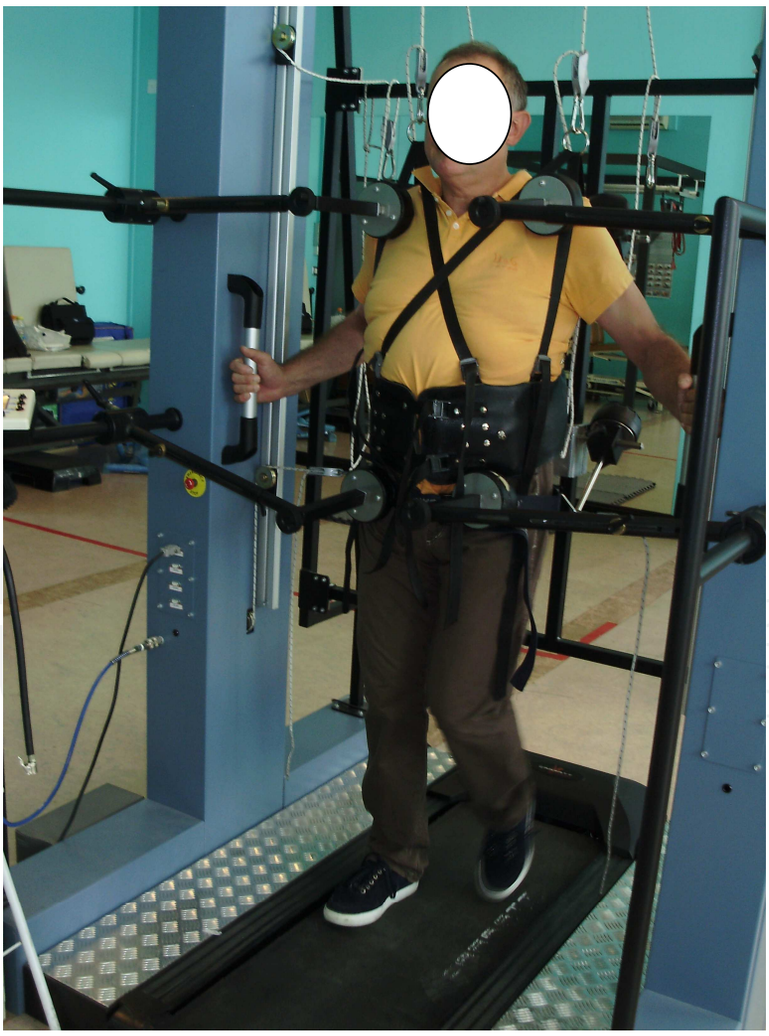

Figure 2. SPAD

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7. Physical therapies connected with psychophysical techniques

During the first year after the cancer treatment the immune system shows some specific changes in patient with cancer especially in some specific T-cell populations.

There is no scientific evidence that physical therapies, like magnetic fields, are effective in the treatment of cancer itself. Global physics community perfectly knows what the extreme low frequencies and intensity of magnetic fields are. They also know how they provoke the resonance of ions (Ion Cyclotron Resonance), with the exact frequency in order to remove an ion from its orbit of rotation in order to escape.

Only in the last decades the studies in biophysics have shown that with the ion cyclotron resonance is possible to stimulate the passage of ions through the membranes of the cells of the living beings changing their permeability and therefore improving the ion exchange on both sides of the membrane itself. The increase of the bioavailability of the essential ions, makes better the efficiency of the cell itself to achieve its correct metabolism.

The role of electromagnetic fields for control of cancer pain and chemotherapy nausea-induced symptoms remains controversial but this theory is to be correlate to water coherence domains' theory (G. Preparata, E. Del Giudice, G. Talpo 1999).

The activities and the exchanges of the molecules in the body doesn't happen by chance, but they follow an "order" dictated by the magnetic field produced by the water, where all the elements fluctuate in phase in the those regions called coherence domains.

Only the molecules which react to the frequency of this magnetic field, interact with each other, starting in ordered way the correct chemical reactions necessary for life of the cell and the organism. An imbalance of this 'order' jeopardizes the functioning of the cell, with the consequence of the manifestations of the diseases.

The 40% of the water is coherent and it can receive and deliver electromagnetic information, while the remaining 60% is not coherent, equally essential for life; it represents the solvent of the ions and of the fundamental elements to the cellular economy.

Also Montagnier L. in 2009 has recognized the validity of the coherence domains, stating how the water is not an inert substance, but may take special configurations emitting electromagnetic waves that can become an not pharmacological instrument of the therapy and the adjustment, but always deeply medical care.

The cells' DNA emits extremely low frequency waves, from zero to a few hundred of Hertz. The studies were published on the unbalance of this "range" that disturbs the harmony of the cell, with the onset of the manifestations of diseases. Some chronic diseases such as Alzheimer's, Parkinson's, multiple sclerosis, rheumatoid arthritis, and the viral diseases such as HIV -AIDS, influenza A and hepatitis C, "inform" the water of our body (biological water) of their presence issuing a special electromagnetic signals that can then be "read and decoded".

With Ion Cyclotron Resonance we have the possibility to intervene in a not invasive, natural and precise adjustment mechanisms of the body's homeostasis, where the only pharmacological support can be not complete.

Therefore you get the possibility:

1. To rebalance subjective metabolism
2. To adjust the enzyme functions, the ion channels and the body pH
3. To strengthen the immune system
4. To encourage the bioavailability and absorption of nutrients for cell metabolism
5. To treat neuralgia, headaches and migraines
6. To stimulate healing in all kinds of wounds, even after surgery.
7. To balance the water retention
8. To enhance the effect of drugs and supplements
9. To detoxify and to allow antioxidant function against free radicals, metabolites, toxins
10. To stimulate a pain-killer function (acute and chronic)
11. To get muscle relaxation, from anxiety and stress
12. To improve the homeostasis recovery under stress (physiological micro trauma and muscle protein catabolism)
13. To improve the quality of life for cancer patients.

In a preliminary observational study of 43 cancer patient group, they were divided into 3 groups of 14 patients, using also the Ion Cyclotron Resonance with QUEC PHISIS QPS1 (fig. 3) we observed the initial and final values of d-ROMs Test.

The first group only used the QUEC PHISIS QPS1

The second group used the QUEC PHISIS QPS1 and the antioxidants.

The third group only used the antioxidants.

The study shows a significant improvement after 90 minutes before the beginning of the first treatment. The values are improved and consolidated in the time after a month about the end of the cycle of treatments with the values well below average.

http://dx.doi.org/10.5772/55696

Figure 3. Qps 1

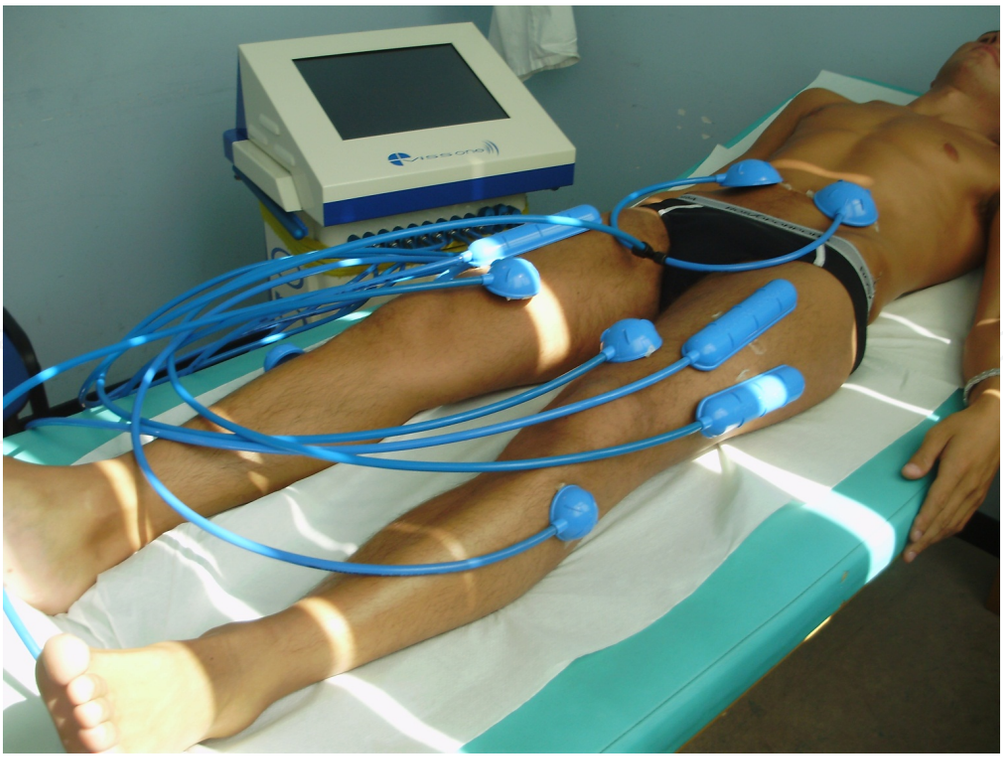

Figure 4. Viss

Figure 5. Imoove

8. Conclusion

The integration between the pharmacology, the biochemistry, the biophysics and the lifestyle with energetic modulation using therapeutic diet through the use of the information and the signals, probably will be able to restore a robust immune response in the tumor-bearing host or to promote by adoptive transfer of activated effector cells or tumor-specific antibodies into the tumor-bearing host.

http://dx.doi.org/10.5772/55696

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