



Oxygenate yourselves! -The Hyperbaric Centre Magazine

N. 24 – November- December 2015

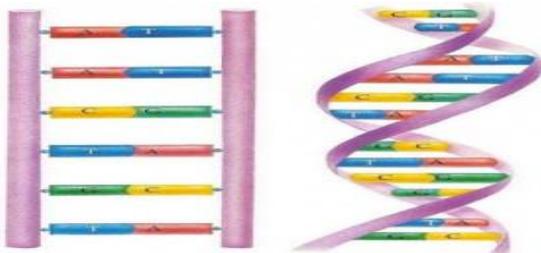


In 2010 the Hyperbaric Centre of Ravenna started a new experience with the blog www.iperbaricoravennablog.it. The aim of the blog was to share the stories of the patients because we believe that the solution to the problem of one person is the solution to the problem of so many others.

This experience led to "Oxygenate yourselves!", The blog magazine of the Ravenna Hyperbaric Centre. The magazine is a new tool to read and preserve the most widely read stories. This number contains the articles most-read in November and December 2015.

Enjoy the reading!

Scuba diving and difficult wounds: how much are these affected by genetics? Hyperbaric Centre of Ravenna and University of Ferrara start a research study



"Genetic predisposition to diseases related with scuba diving", this is the title of the webinar held by Dr. Pasquale Longobardi last Friday. The webinar fits in the presentation of a comprehensive and

ambitious project that the Hyperbaric Centre of Ravenna has launched in collaboration with prof . **Michele Rubini**.

We asked prof Rubini to tell us the features of the project and which opportunities such a genetics research will bring to our patients.

Prof. Michele Rubini is a researcher and associate professor in Medical Genetics at the Department of Biomedical and Surgical Specialistic Sciences of University of Ferrara since 2001. Previously, he worked in genomic medicine in the oncology field at the Kimmel Cancer Center of Thomas Jefferson University in Philadelphia, USA. Now he conducts research in multifactorial genetics and pharmacogenetics, with particular interest in rheumatic autoimmune diseases and diseases associated with pregnancy. Recent developments in his research led him to study the influence of genetics in response to the assimilation of micronutrients and to the lack of oxygen.

Professor Rubini, can you tell us about the project on genetics we are working at? What kind of results can be brought by this type of study?

The body's response to conditions of impaired blood oxygen concentration is largely influenced by its specific genetic profile.

Variants in genes encoding enzymes involved in the synthesis of endothelial nitric oxide and in the regulation of vascular pressure, exert an important role in determining dyspnea and hemoptysis in subjects engaged in underwater activities. However, these genes variants are believed to play an important role also in other conditions, as for example the healing of skin ulcers. Experimental evidence, in fact, indicate that the lack of nitric oxide synthesis could lead to reduced angiogenesis and it constitutes an inhibition to the healing of skin wounds.

Practically, the genetic profile of people influences the body's response in particular underwater activities and it is also believed to have implications in the healing of difficult wounds.

The collaborative project, therefore, consists of two parts:

1. the first one is dedicated to individuals engaged in **scuba diving activities** and thus potentially at risk of developing pulmonary edema for deep immersion (DIPE)
2. the second part refers to a wide and diverse series of patients with **skin ulcers** characterized by **difficulties in healing**.

DIPE- (Deep immersion- related Pulmonary Edema)

The scientific activity involves the collection of blood samples from subjects engaged in scuba diving activities and at risk of developing DIPE. In the laboratory at the University of Ferrara we will run the extraction of the genomic DNA, its titration and its cryogenic storage in tubes. The identification will be carried by using two-dimensional barcodes (2D bar-codes), in compliance with the technical procedures recommended in the guidelines for biobanks. The DNA samples will then be used for genetic analysis related to functional variants in ACE genes (Angiotensin converting enzyme) and NOS3 (nitric oxide synthase 3).

The genotypic results will be crossed with physio/pathological parameters of the subjects included in the study, in order to identify possible genotype/phenotype associations indicative of a role of genetic variation in determining the risk of DIPE. The study will eventually be extended to other genetic variants linked to cellular hypoxia (i.e. HIF-1A) or to variants deemed relevant to the respiratory function. In this way we aim to obtain more exhaustive genetic profiles and to investigate any complex polygenic interactions.

It is believed that the results of this study will be helpful in defining the genetic profile of the individuals that have higher risk to incur in decompression accident and deep diving-related pulmonary edema. In this way the study will contribute to raise awareness in the real capacities and in the objectives limits for the people engaged in scuba diving activities.

The study will be the ground for a safer access to these kind of activities and for a significant reduction of cases of accident and illness.

Skin ulcers

The fact that the response to hyperbaric oxygen therapy differs at the individual level has been known for over 25 years. There is broad consensus in the consideration that genetic variants may play a primary role in determining this variability.

The availability of large number of case studies of patients with skin ulcers of difficult healing and the availability of clinical data on treatment's response allows to investigate the possible existence of genetic components that influence the therapeutic response, setting the ground for the development of Hyperbaric therapies personalised on the basis of individual genetic profile. The focus will be mainly on the genetic variants in ACE and NOS3, and in HIF-1A (Hypoxia inducible factor-1A).

The hyperbaric oxygen therapy is known to have inhibitory effect on the expression of HIF-1A, and it is hypothesized that the reduction of the levels of this nuclear factor is part of the mechanism by which the therapy manifests its effectiveness. Functional variants of HIF-1A are distributed in the population, and were found to be associated with a variety of diverse conditions diseases such osteoarthritis, cancer, viral hepatitis, obstructive lung disease and retinopathy.

To complete the study, there may be considered variants related to the pathophysiology of coagulation (i. e. MTHFR, FV, FII) or to the metabolism of micronutrients (folate, homocysteine).

The project aims to collect from each patient a blood sample in order to obtain the genomic DNA. The set of samples collected from the case studies will compose a specific DNA-bank which will allow the genetic investigations.

The genotype results will be compared with the clinical diagnosis of patients and the response to hyperbaric oxygen therapy, in order to identify any significant associations. The data can be further investigated by including in the system also the evaluations of the therapeutic dose. This would allow to set thresholds for effectiveness of individual response.

The results of the research will provide useful information to identify in advance those with poor responsiveness to hyperbaric oxygen

treatment. This would allow to properly modulate the dosage of treatment, creating a customized and personalised application of hyperbaric medicine.

Carmela's father suffer from spondylodiscitis: what therapy should he follow?



Hello,

my father is 82 years old, he suffers of kidney insufficiency, diabetes and hypertension. On November 12 he was diagnosed with spondylodiscitis. The back pain began in July, after an episode of fever with chills that lasted only one day. On July 31, it performed a CAT scan that provided evidence of arthritis for which he did a local therapy of corticosteroids and lidocaine.

Due to the continuing pain symptoms, he reiterated the CAT and the NMR. The diagnosis is: negative C-reactive protein, normal white blood cells and the ves (velocity of eritro-sedimentation) is 76.

I ask you help in finding the best centre close to my city, Messina, considering my father age and diseases.

Thank you, Carmela

Dr. Nedjoud Belkacem responds

Dear Carmela,



I am very sorry for your father that is suffering for a painful disease that limits his autonomy. I thank

you for the interest you show for our blog.

I can give you information regarding this disease and what treatment we offer at our Centre but I regret not being able to help you in finding other facilities closer to you.

Certainly, this is a disease that should be treated at infectious disease hospital departments, or in neurosurgery/orthopaedics departments.

The Spondylodiscitis is an inflammation of an intervertebral disc (a cartilaginous tissue located between the vertebrae that is required for the elasticity and mobility of the spine) that occur at the same time of an inflammation of the adjacent vertebrae. Usually, Spondylodiscitis causes intense pain in the spine, which prevents the patient to move and is accompanied by fever and chills.

Spondylodiscitis can be of infectious origin. It may be due to the passage of a bacterium in the blood during a septicaemia, a dental infection, an intestinal infection at the skin level, or also specific infections such as tuberculosis, infections originated from surgery (for example, disc herniation) or intra-disc injection of drugs.

It is rare that it is non-infectious origin. In such a case it would be linked to a chronic inflammation related to an immune system disorder, spondyloarthritis or a SAPHO syndrome (synovitis, acne, pustular formation, hyperostosis, osteitis). Risk factors for Spondylodiscitis are considered to be diabetes, chronic renal failure (as in the case of your father), rheumatoid arthritis, immune deficiency, smoking, alcoholism, drug use, tuberculosis and prolonged treatment with steroids.

The diagnosis is based on bone scintigraphy with labelled leukocytes and, above all, on MRI. Often, classical radiography if done at an early stage of the disease fail to notice anomalies. On the other side, magnetic resonance imaging allows to highlight alterations of the disc and of the vertebral bodies and eventually the presence of fluid abscess. Additionally, it also displays any vertebral collapse.

Therefore, it is possible to highlight the germ responsible of the infection. In case of septicaemia this is done through the blood culture, alternatively, through a ultrasonography guided biopsy puncture of the intervertebral disc.

In the infectious type of this disease, the blood tests show an increase in inflammatory markers, which are rather less altered in the non-infectious

type of Spondylodiscitis (as is the case of your father).

The initial treatment is conservative and it consists in resting and wearing a corset while doing an antibiotic therapy. The therapy will be targeted if the germ responsible of the illness is known or empirical if the germ is unknown. It is recommended the use, whenever possible, to disc-vertebral biopsy diagnosis.

If the medical treatment does not lead to results, or when there is a vertebral collapse, it is recommended to do a surgical treatment. This consists in the toilet of the outbreak of the infection and eventually in the reconstruction of the vertebral body and in the fixation of pedicle screws and rods.

At our centre we can intervene with hyperbaric oxygen therapy:

-To encourage the reduction of the outbreak of infection due to the direct antibacterial action of oxygen (bacteriostatic or bactericidal, depending on the bacterium) and indirect, since it enhance the effect of antibiotics.

-To promote the reabsorption of the edema that causes pain, obtaining with HOT a good anti-inflammatory effect

-To encourage the formation of new small blood vessels (angiogenesis) in order to improve oxygenation of the tissues, optimizing in this way their potential defence capability.

-To stimulate the formation of a healthy bone.

At the same time we do not neglect the rehabilitation in water and the physical therapy to maintain the muscular tone.

The commitment in Ravenna would be of two to three weeks (depending on the severity of the case), Monday through Friday. The program includes two sessions per day of hyperbaric oxygen therapy in combination with antibiotic therapy, that would be decided after a susceptibility test (included in the examination culture), and sessions of water rehabilitation and physiotherapeutic massages.

We propose a multidisciplinary approach emphasizing that we do not have a shelter; therefore it is necessary to evaluate the general conditions that affect the clinical feasibility of this route after a phone interview.

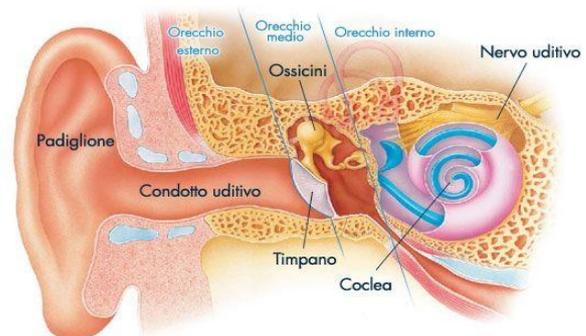
I hope you will find these information useful to assist your father. For any additional information you can contact our office at the phone number 0544500152, or at our email address segreteria@iperbaricoravenna.it.

I remain at your disposal for further clarifications

Dr. Belkacem Nedjoua

Degree in Medicine and Surgery at the University of Ferrara with specialization in internal medicine.

Meniere's syndrome and hearing loss in progress: any chance of recovery?



Good morning,

I was diagnosed Meniere's disease, but, except for its early stage I haven't had dizziness anymore.

It is about 10 years since I was diagnosed. Recently I had an advancement in hearing loss, but without attack of labyrinthitis.

I follow a low salt diet. Is there a therapy that will give me chance of recovery?

Thank you, Gabriella

Dr. Andrea Galvani responds



Good morning Ms Gabriella,

thank you for writing us. I am happy for the fact that you didn't have vertigo for so long. Vertigos often tend to "accompany" patients diagnosed with Meniere's

syndrome.

Moving on to the second part of your request, I want to inform you that hyperbaric oxygen therapy is indicated when it starts within 30 days from the diagnosis of hearing loss (always evaluated primarily by ENT specialist).

To be more precise about your case, you can send us your clinical documentation and attach the reports, so we can provide you with a consultant based on your clinical situation. The email address to which you can send everything is segreteria@iperbaricoravenna.it.

I still welcome the opportunity to explain the general route offered to patients diagnosed with sudden hearing loss.

In the first visit we assess and evaluate any absolute or relative contraindications to treatment in a hyperbaric chamber, after this visit the standard prescription requires 15 sessions at 2.5 bar pressure of the duration of 90 minutes per session and daily frequency for 5 days a week.

After the first cycle of session it is necessary to see the ENT specialist again, to evaluate the effects of the treatment: if there is even a slight improvement then it can be proposed an extension of the cycle up to a maximum of 25 sessions in total.

I hope I was able to provide some guidance to your case.

I remain at your disposal.

Best wishes,

Dr. Andrea Galvani

Degree in Medicine and Surgery at the University Alma Mater Studiorum of Bologna.

Even with patency of oval foramen Andrea will begin his beloved apnea course



Good morning,

I would like to do a first level course in apnea. Unfortunately, I was diagnosed with the disease patency of oval foramen (POF).

My question is: can I practice apnea despite the POF?

Andrea

Dr. Luigi Santarella responds



Hello Andrea, thanks for your attention.

Your story does not suggest the kind of clinical test you undertook and what is the extent of the patent oval foramen, therefore I would kindly ask you to provide us these information for a better consultation.

However, I'm happy to tell you that overall the patency of oval foramen or POF is not a contraindication to freediving (and only in apnea). The oval foramen is a channel of 2.5 cm that we all have between the right and left septum that divides our heart into four rooms.

Normally, the channel is covered by a membrane that closes it. In the case of patency (Patency of the Oval Foramen) the membrane is lifted (mostly under stress) and let the blood pass from the right side (venous blood that comes from the periphery) to the left part (oxygenated arterial blood that goes to the periphery).

In practice, a part of the venous blood enters the arterial blood without being filtered by the lung. The extent of the problem depends on how much blood bypasses the lungs (i.e. how serious is the

right-left shunt). In order to practice scuba diving activities it may be necessary to close it.

At the hyperbaric center in Ravenna (tel. 0544 to 500152, email segreteria@iperbaricoravenna.it) we consider necessary to close it only when 3-4 criteria out of six are met:

- 1) previous cerebral ischemic accident or accident due to decompression in diving activities;
- 2) instrumental evidence (CT, MRI, PET) of ischemic brain damage;
- 3) risk of thrombophilia (positivity in homozygosity for the Factor II, Factor V, Factor MTHFR, homocysteine, protein S);
- 4) transcranial Doppler test results positive for the passage of bubbles in standard conditions;
- 5) transthoracic echocardiography test results positive for aneurysm of interatrial septum;
- 6) transesophageal echocardiography test results positive for a POF larger than 4 mm (this investigation, being invasive, is performed only in preparation for surgery of POF closure)

Concerning apnea, however, the patency of oval foramen is not a contraindication.

During the rapid ascent (in apnea), the POF represents a safety valve for the blood that was concentrated in the lungs while being in deep water (central hyperflow or blood shift). The discharge of the blood from the lungs is thus more rapid during the ascent towards the surface. Some champions of deep diving have the POF.

The Italian Federation of Sports' Doctors authorizes the release of a suitability certificate for apnea competitions for individuals with POF. On the other hand, it is a contraindication for scuba diving done with aqualung (it remains a contraindication up to six months after the closing surgery).

If you want to undergo an examination or if you want an advice from a cardiologist with experience in diving medicine, I would reference the Scuola Superiore Sant'Anna of Pisa, specifically the Master in Underwater and Hyperbaric Medicine. The director is the influential cardiologist Professor Antonio L'Abbate. A researcher and lecturer on the subject is Dr. Claudio Marabotti (head of the Cardiology Hospital of Cecina, Livorno). You can easily find their contacts online.

If you want to send your clinical documents and have a more precise opinion you can contact our office at the number 0544-500152, or email segreteria@iperbaricoravenna.it

Best wishes,

Dr. Luigi Santarella

Degree in Medicine and Surgery at the University Alma Mater Studiorum of Bologna.

Skin grafting and bed sore: Marco was involved in a serious accident, eight months later he is still not healed



Hello,

I write to ask if the oxygen therapy may be useful to accelerate my recovery. I have been fighting with a heel bed sore for over five months. The tissue growth is extremely slow and this is slowing down my rehabilitation significantly.

Eight months ago I was hit by a bus, that, passing on my legs, broke my left femur and right tibia and fibula. With the tire, it also took away the back of the right foot (skin, muscle, fat under the skin and probably nerve endings). After eight months, the bones are almost healed. Paradoxically, the greater discomfort is given by this scourge on the heel occurred after two months of complete stillness. No one in the hospital department took preventive measures for it.

Currently, the plastic surgeons who performed the skin grafting used to close my foot are also taking care of the bed sore. I see them twice a week to disinfect and clean the wound and they are trying to stimulate the re-epithelisation with fibrin removal and application of gauzes.

My question is: is it possible that there is no other therapy to speed up the healing process? Might hyperbaric therapy be useful to me?

Maybe also for the development of new blood vessels and new subcutaneous tissue in the area of the implanted skin graft, where the skin is very adherent to the underlying bone and it creates water retention.

I hope to have been clear enough and I thank you a lot! Marco

Klarida Hoxha, nursing coordinator, responds



Dear Marco,

I feel sorry for your situation and I hope to be able to give some useful answers to your question.

At the Difficult Wound Care Center (CCFD) situated at the hyperbaric centre of Ravenna we successfully treat many cases similar to yours.

Before any other treatment, it would be useful to know the situation of your ulcer in terms of infection, even if not visible from the outside. We approach this type of traumatic injury through an ad hoc routes defined during the first visit and a medical evaluation made by experts in wound care.

In addition to the medications you are already taking, you can do other advanced therapies, such as the use of a platelet-rich gel, bioengineered skin graft, Negative Pressure Therapy (NPT) and, in case of delayed healing, even hyperbaric oxygen therapy (HOT). It would also be possible to have a free consultation with a physiatrist who visit our centre, in order to make a rehabilitation plan for the articulation immobility problem that arose during the period of convalescence.

This problem is very important too: the most you can move your articulations the better the blood circulates, oxygenating the wound. In this way the healing time can be reduced.

I invite you to contact us for a first visit to our office number 0544/500152. A team of experts will help you find a quick solution to your problem.

Best wishes, Klarida Hoxha.

Livedo vascularis and breast ulcers: the HOT will help Imma to get better



Hello,

I am a woman of about 35 years. Recently, some wounds that look like ulcers appeared on the low part of my breast.

I must start by saying that about 15 years ago I had a mastopexy. After the surgery, some capillaries appeared in the area under my nipples. The surgeon explained me that the formation of these capillaries is due to a disconnected tissue.

To try to heal from this injury I was visited by a dermatologist who suspects I'm dealing with livedo vascularis.

I looked for information on this disease and I saw that it mainly concern the lower limbs, and that's why I wanted more information from your staff.

Sincerely, Imma



Dr. Claudia Rastelli responds

Good morning Mrs. Imma,

I'm sorry you're going through this problem and thank you for writing to us and for your trust in us.

The Livedo vascularis is a condition where the skin appears mottled and spotted with bluish areas and telangiectasia (highlighted capillary plot). Most commonly, it affects the lower limbs but there have been documented cases in which it occurs in other regions of the body.

It is due to a generalized alteration of blood flow with a consequent reduction of the level of oxygen presents in the blood (especially in the periphery), this leads to the appearance of the characteristic purple colour of the skin, that appears as a sort of net design, and can degenerate with formation of skin ulcers. This event occurs with vasoconstriction due to low temperature and decreases with the heat.

It is not always possible to determine the cause of this disease, however, it is essential to ruled out that it is a manifestation of an autoimmune disease, of a blood disease or that it was provoked by the use of certain drugs. I would advise then to perform specific blood tests to highlight or exclude the diseases that may be the cause of your livedo vascularis.

At the Hyperbaric Centre of Ravenna and at the Difficult Wound Care Center, after researching the causes of the formation of the wound, we proceed with a personalised medication of the injury. For your case, in particular, it might be useful to undertake a telethermography test in order to study the vascularization of the affected areas (that will be performed by Dr. Fontana at our centre). You can then associate hyperbaric therapy if indicated.

The hyperbaric oxygen therapy is useful in case the medications alone are not effective in healing the wound. HOT boosts the tissue reparation and as it increases the peripheral tissue oxygenation and it stimulates the regeneration of the skin cells.

If you wanted to proceed with a first visit, you can call our office at the number 0544- 500152 or email us at segreteria@iperbaricoravenna.it

We remain at your disposal for further clarification

Best regards

Dr. Claudia Rastelli

Degree in Medicine and Surgery at the University of Florence

Arterial and venous ulcer: how to eliminate the burning sensation



How can I eliminate the burning sensation that I feel in the area around the arterial and venous ulcers?

I am treated with a product called "ALGINATO" and it gives me a strong burning feeling.

Thank you, Mario

(-10 years to be centenarian, currently 90 years old!)

Serena Giannini, nurse, responds



Dear Mario,

Ninety years are certainly a great milestone, and sometimes it can happen to have to deal with skin ulcers that may occur for multiple reasons.

It is important to first understand the problem, which means to define the type of wounds, the size, the degree of arterial and venous insufficiency, the wound appearance and the type and amount of exudate it generates.

The Alginate is an optimal dressing for a type of wounds that, when in contact with the exudate, creates a moist environment ideal to the granulation and thereby to the healing of the wound. However, ideally the wound has to be clean from fibrin and infection. It is important to associate the correct medication to the wound so that it does not worsen.

The pain can be caused by many factors such as incorrect medication, presence of infection, level of arterial disease (circulation). Everything depends on the assessment of the injury. At our centre, this aspect is evaluated with an anaesthetist specialist, in order to define the best drug therapy, analgesic or antibiotic, depending on the needs, as the endurance of pain contrast the healing process.

In order to provide a concrete help, I invite you to come to our centre to proceed with a specific evaluation based on your case.

For more information or to make an appointment please contact our office at the number 0544 500 152.

I take this opportunity to wish you happy holidays.

Kind regards, Serena Giannini

Monica, physiotherapist, is seeking a cure for her patient with knee lymphedema



Hello,

My name is Monica and I am a physiotherapist. I was wondering if the hyperbaric chamber may be useful for a patient with primary lymphedema that was not treated for over a year. The lymphedema gives to my patient an extreme debilitating pain to her left knee, which is not injured otherwise.

The patient wander from an orthopaedist who tells her she cannot do anything about it, and a vascular surgeon who says she has nothing!

I ask your advice on this case and if you deal with these issues or, alternatively, if you can indicate me a team that can follow my patient.

The leg pain is so strong that the patient cannot even lay on the bed for 15 minutes.

Thank you so much for your answer, Monica

Paola Mengozzi, physiotherapist, responds



Hello Monica,

Thanks for writing us. I carefully read your question and I can tell you that the hyperbaric chamber is very useful in cases of primary lymphedema, like the case of your patient, because it serves as a refill of small lymphatic vessels.

At the Hyperbaric Centre of Ravenna we follow this procedure:

-the patient is visited by doctor of the Hyperbaric Centre who needs to confirm the diagnosis of primary lymphedema,

-our physiatrist, Dr. Fontana, proceeds with an ultrasound test to see if the lymph nodes are open

-the we proceed with a cycle of 20 sessions of hyperbaric chamber at 2,5 bar of 90 minutes each: these session will be associated with 20 lymphatic drainage Vodeder massages in addition to pressure therapy.

For more information and eventually to make an appointment with the doctor of the center, you can contact our office by calling the 0544 500152.

I remain at your disposal for further information.

Regards, Paola Mengozzi



Centro Iperbarico Ravenna

via A. Torre, 3 - 48124 Ravenna (RA)

Tel 0544 500152 – Fax 0544 500148

Email segreteria@iperbaricoravenna.it

www.iperbaricoravenna.it - www.iperbaricoravennablog.it