Sport Therapy

Activity Report as of April 4, 2020

"I never thought that exercise could be fun and useful. Especially for us vulnerable kids, I thought it was a useless thing, and it was better to focus on something else. I was wrong. "
L.K. a young bone marrow transplant patient and Sport Therapy athlete since 2017.

Introduction

In the early years of life and during adolescence, physical activity is crucial for good development of motor skills. It is even more so for those children and young people who are forced to undergo anti-cancer therapies and therefore undergo long periods of hospitalization (often bedridden) and prolonged periods of physical inactivity.

The research project "Sport Therapy" was born with the aim of demonstrating that, through targeted physical activity administered by the sports physician in collaboration with the pediatrician hematologist, it is possible to facilitate the full recovery of these patients, avoiding the high risk of chronic diseases related to a sedentary lifestyle and allowing them to better reintegrate, once healed, in their community of origin (school, sport and social relations).

The research project "Sport Therapy" was born within the Maria Letizia Verga Center at the Pediatric Clinic of the University of Milan Bicocca, at the San Gerardo Hospital in Monza. Every year, around 80 children and adolescents with leukemia, lymphoma or blood disorders leading to bone marrow transplantation are treated here.The Sport Therapy research project is 3 years old. This report tells the story and future prospects of this initiative which was conceived and developed thanks to the foresight and support of pediatricians and people who for years have been dedicated to raising funds for the activities of the Maria Letizia Verga Center.

Today, thanks to the progress made in the early diagnosis and treatment of cancer, there are more than 300 thousand young patients in Europe who have been cured of pediatric cancer, and by 2020 there will be almost half a million. For these children and young people, having the opportunity to perform targeted physical activity during treatment plays a key role in preventing diseases due to physical inactivity, which are one of the worst and most widespread consequences for healed patients.

Children and adolescents suffering from cancer of the blood, because of the therapies to which they are subjected, suffer a progressive reduction in respiratory and cardiac capacity, as well as muscle strength. Targeted physical exercise is a possible therapeutic approach to solving their significant problems of reduced ability to perform exercise. It is possible to administer this type of therapy thanks to the synergy created by the collaboration between pediatricians, hematologists, and sports physicians.

The purpose of this study is to assess the impact of a precision training program on the efficiency of the systems necessary for the transport and utilization of oxygen (O2) in girls and boys who are undergoing treatment for hematological diseases. The experiment has a multidisciplinary approach that involves prior recommendation of the potential patient by the blood-oncologist pediatrician to the sports doctor. A sports medical check-up and an evaluation of the degree of aerobic power, strength, stability and flexibility are carried out with the sports doctor and exercise physiologists. Sustainable and individualized training is then prescribed for highly vulnerable patients and patients with fewer functional deficits. The purpose of this precision training is to maintain or improve the efficiency of the respiratory, cardiovascular and musculoskeletal systems. If there are joint hindrances and structural deficiencies that cannot be modified with training, an osteopath takes over to administer manual treatment prescribed by the sports doctor.

Pediatricians, sports physicians, exercise physiologists and osteopaths are in constant consultation and develop precision training schemes to assist in the clinical progress of the individual athlete/patient. Psychologists and dieticians also participate in the evaluation of the individual's response to the exercise regime necessary to carry out the training program. By the end of the period after taking over, the tolerance level of the individual athlete/patient to exercise is re-evaluated. The collected data is then analyzed and used for scientific purposes to validate the impact of the treatment. .

Genesis of the project

2009 pilot project, In collaboration with the Pediatric Clinic of the San Gerardo Hospital and the Human Physiology Unit of the University of Milan Bicocca, on non-invasive evaluation of exercise tolerance in children at the end of treatment for lymphoblastic acute leukemia

2015 - meeting with the medical researchers of the Pediatric Clinic and those of the Human Physiology Unit to prepare the Sport Therapy research protocol, dedicated to the use of precision exercise in children with malignant hemopathy. The head, Prof. Biondi invited Tommaso Moriggi (thesis in motor sciences), and bone marrow transplant survivor a when 3-year-old c / o the Pediatric Clinic San Gerardo of Monza, to join the Sport Therapy team

July 2016 - beginning of cost planning (equipment and materials) by the Maria Letizia Verga Committee. Preparation of the research protocol to be submitted to the ethics committee of the University of Milan Bicocca.

4 April 2017 - inauguration of the Sport Therapy gym at the Maria Letizia Verga Center

7 April 2017 - approval of the research protocol "Individualized training in children with leukemia, during therapy. SPORT THERAPY ". Beginning of patient recruitment and activation of quarterly precision training rounds.

September 2017 - Maria Letizia Verga Committee takes charge of staff costs

June 2018 - approved amendment by the ethical committee of the University of Milan Bicocca regarding the temporal extension of the project and the inclusion of all patients treated at the cCentre. New title: "Individualized training in patients of developmental age with malignant hemopathy during therapy and / or while undergoing bone marrow transplantation. SPORT THERAPY Project "

September 2019 - inauguration of the garden outdoor gym for Sport Therapy

April 2021 - expected conclusion date of the current research protocol

Why is the reserach important

For at least three reasons:

the results of the “Sport Therapy” research project will launch precision training as one of the therapeutic weapons available to combat the consequences of hematological diseases in childhood;

by increasing the physical capacity of children and adolescents with malignant hemopathies during the phases of cancer treatment, we will reduce the heavy legacy left by treatment, thus bridging the gap regarding their disadvantage towards healthy peers and ensuring their full reintegration into their communities (school, sport, social relations);

a standardization of the methodology for using precision exercise in hospitalized children and adolescents will facilitate the monitoring of the progress of these type of interventions at the international level and the data from the “Sport Therapy” project will allow governments and concerned bodies not to further postpone the establishment of strategies necessary to improve the health and welfare of people cured of cancer diseases.

Innovative aspects of research

At the end of the research project “Sport Therapy”:

new strategies will be available to combat cardiopulmonary and skeletal muscle damage resulting from anticancer therapies;

it will be definitively demonstrated how, from the very beginning of the disease, physical exercise can be a therapeutic option and not just a decorative element in the critical process of caring for children and adolescents suffering from oncological blood diseases, from the beginning of the disease;

the possibility of introducing new technical figures in the hospital context will be clear. Sports medicine physician and exercise physiologists will be part of the multidisciplinary team that connects the hospital environment to the territory;

the future perspective, once the experimentation has been completed and the effectiveness of the precision training intervention on the psycho-physical health of children and adolescents suffering from cancer has been demonstrated, will be to make “Sport Therapy” a permanent care service during the treatment of patients of developing age.

https://www.instagram.com/p/CDn0N7no1Wm/

Patients treated

(from April 2017 until March 2020)

Each training cycle lasts for 11 weeks ("round"). Up until today, 8 rounds have been held. The ninth round is currently underway (until April 7, 2020). A total of 13 rounds are planned for the duration of the current research project. Patients can join more than once, even if not consecutively, if the conditions for enrollment to a subsequent round exists (possibility of further improving one's physical performance and / or inability to reintegrate into the community of peers). The recovery period between rounds is 1-2 weeks.

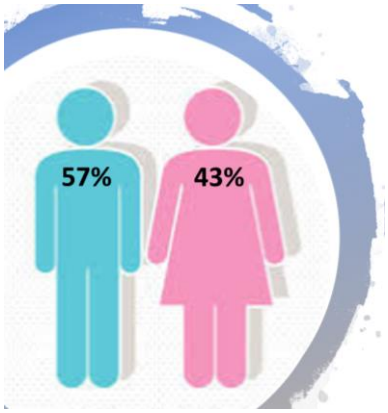
The total number of patients on the "early" lists from April 2017 to March 2020 was 282. Of these, all patients above > 3 years of age were considered r eligible: 224. Those reported by their pediatrician colleagues and joined the project were 147 patients, and they were mainly oncological patients.

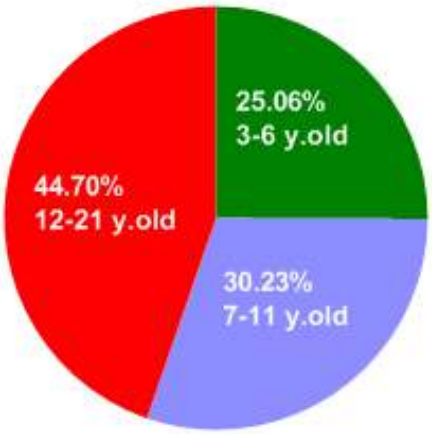
In addition, 84 off-therapy patients with varying degrees of functional deficit have been reported and recruited (for example, in the presence of osteonecrosis in the active phase or in outcomes or reduced joint mobility from GVHD, scleroderma type).

The Sports Therapy project therefore recruited 231 patients, of whom 28% underwent TMO.

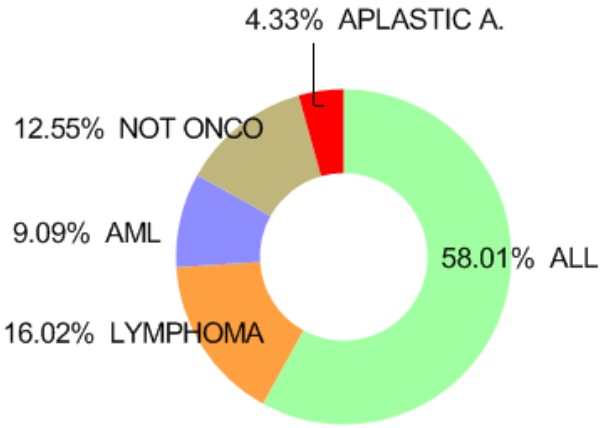
In fact, 66 patients with malignant hemopathy (oncological and non-oncological) who underwent bone marrow transplant (TMO) have been reported and taken care of. Of these, 49 were followed by the first week of the TMO procedure performed in CTMO

Rapporto maschi femmine ed età

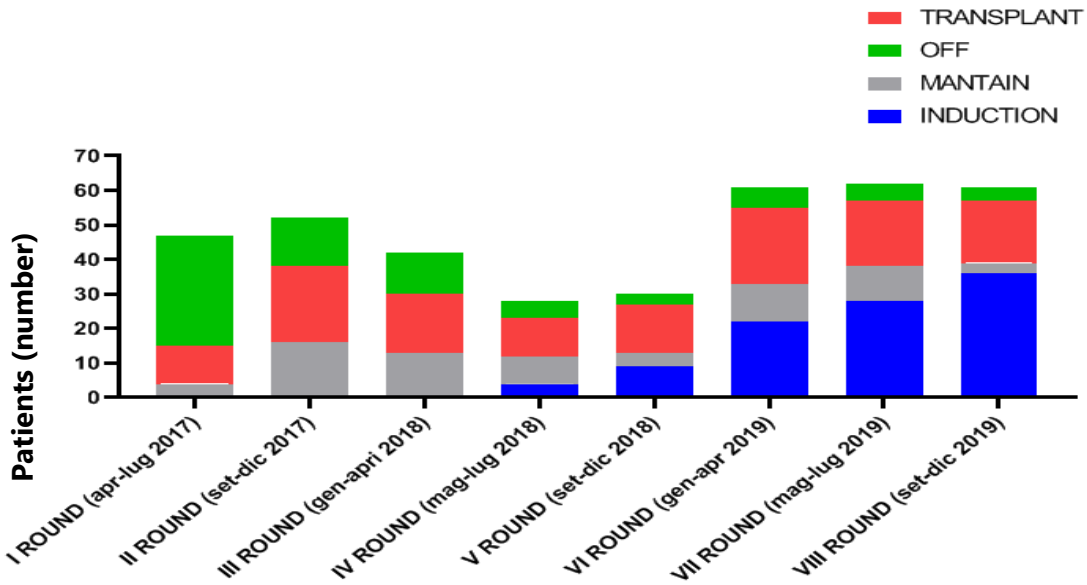




Diagnosi di malattia



Total=231



Weekly activities

The training takes place in DH, in the hematology department and CTMO, in the gym (indoor and outdoor) for about 10.5 months per year.

6058 training sessions were carried out from April 2017 until March 2020.

Gym activities for groups (also outdoors)

Sport Therapy athletes/patients from 7 to 18 years of age are trained 3 times a week, for 60 minutes. Since November 2018 they have been divided into different groups according to immunological impairments

: - Transplanted (within 6 months of transplant or more if not admitted to the community);

- Aplasia (in aplasia and / or not admitted in the community); - Outsiders (in therapy and readmitted in community + out of therapy).

Sport Therapy athletes/patients from 3 to 6 years of age are trained twice a week for 30 minutes and divided into different groups according to immunological impairments:

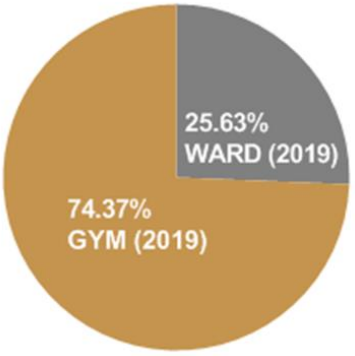
- Little kids aplasia;

- Little kids outsiders.

The total time devoted to these activities is 11 hours per week. There are sports physician, motor scientist and osteopaths and sports technicians on 2 weekly shifts.

Individual ward activities

Sports Therapy athletes/patients are trained individually 3 times a week, for 20-30 minutes in the DH rooms (patients in isolation or in long daily therapy), and in those of hematology and CTMO.



The total time devoted to this activity is 12.5 hours per week. There are the sports doctor, the motor scientist and osteopaths and sports technicians on 2 weekly shifts.

In 2019 a quarter of the workouts were delivered in the room

Sports medicine specialist activities

Recruitment: sports medical visits are carried out for the research project and certifications given for non-competitive sports. The total dedicated activity is 5 hours per week.

Research Activities

10 hours are devoted to the verification of experimental protocols, data analysis, writing of funding requests and research, dissemination and dissemination collaborations.

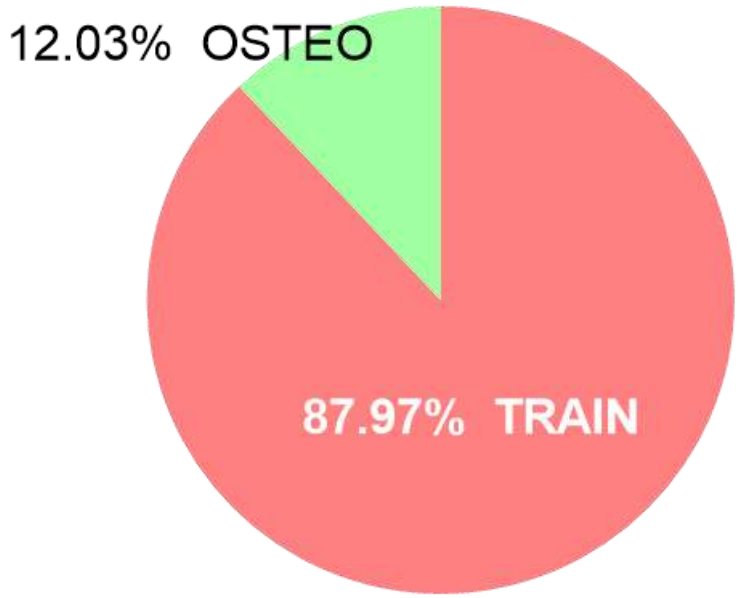
Osteopathy

Osteopathic treatments are limited by conditions in which precision training alone has no effect, as required by the research protocol.

Osteopathic assessments provide information about joint angle movement levels and are used to monitor any joint deficiencies such as during joint GVHD / scleroderma-shaped or in functional recovery before and after surgery for osteonecrosis.

Federico Bouquin is a member of the osteopathic physicians team of Sport Therapy, transplanted at the age of 12 to the San Gerardo Pediatric Clinic of Monza.

Total training and osteopathic treatments (April 2017 – March 2020)



Total number of services: 6885

Technical training schemes

There are 4 technical training schemes that have been chosen with flexibility to adapt the workloads to both very vulnerable/weak patients and patients with higher performance levels. The technical training schemes also provide variation in the type of training offered which helps motivate athletes to adhere to precision training.

The technical training schemes are part of the weekly workload planned by the precision training team as calculated for each individual patient.

The training is carried out twice a week and the operators conduct 8 monthly sessions of 5 hours each. The technical training schemes take place both in the department and in the gym under the supervision of the sports doctor and the exercse physiologists.

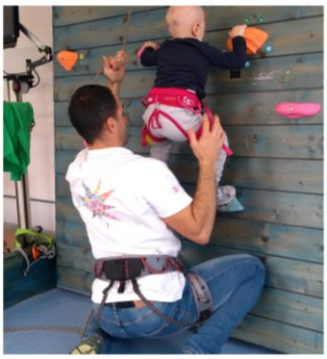
The technical training schemes currently scheduled are:

✓ golf (Maestro, Matteo Bellenda) from September 2017;

✓ climbing (Alpine Guide, Massimiliano Gerosa) from January 2018;

✓ football (Inter Campus Technical Instructor Roberto Redaelli) from May 2018;

✓ yoga (Instructor Nadia Besana) from January 2020.



Results

For further information on the research results, see the publications submitted which are available upon request.

Data analysis for the eighth round is currently underway and data for the ninth round will be available for analysis in April 2020. The current trend of the data shows that:

- precision training improves aerobic performance, strength, flexibility and balance for athletes who participate in training with participation > 64% (22 workouts / 33);

- training + osteopathic treatment improve the degree of articulation where there is a deficit;

- the quality of life improves both from the perspective of the children / teenagers and that of the parents;

- the level of satisfaction of this intervention, according to the VAS scale (0 = "I am not satisfied at all" and 10 = "the maximum possible satisfaction"), is very high (see table below).

ROUND	partecipante					genitore				
	Sport T	Osteo	Golf	Arramp	Calcio	Sport T	Osteo	Golf	Arramp	Calcio
I ROUND (apr-lug 2017)										
II ROUND (set-dic 2017)	9,22	10,00				9,72	10,00			
III ROUND (gen-apri 2018)	9,37	9,03	7,73	7,32	8,08	9,63	9,37	8,18	8,84	9,00
IV ROUND (mag-lug 2018)	9,10	9,12	7,14	8,46	9,09	9,65	9,30	8,03	9,24	9,02
V ROUND (set-dic 2018)	9,15	8,38	7,30	9,18	6,96	9,54	9,27	8,68	9,45	7,95
VI ROUND (gen-apr 2019)	9,32	9,19	8,28	9,18	8,81	9,85	9,81	9,49	9,87	9,31
VII ROUND (mag-lug 2019)	9,63	9,45	8,29	8,33	8,98	9,42	9,58	8,56	9,05	8,55
VIII ROUND (set-dic 2019)	8,98	8,28	8,54	7,60	7,52	9,09	9,00	8,19	7,88	7,46

TABLE NOT TRANSLATED

The future research perspective is to evaluate longitudinally, homogeneous subgroups of the population, through non-invasive methods of muscle oxidative metabolism, using the following working hypotheses:

1) the variation of exercise tolerance according to the therapy phases. In particular, we want to understand if precision training reduces the tolerance deficit for the exercise, even years after the end of cancer treatment;

2) the use of precision training to counteract the pathologies of remodulation of the metablism of bones (osteonecrosis) and joint rejection pathologies (GVHD).

Dissemination

Participation in conferences

50 Congress SIOP, Kioto 2018. Tailored exercise improves physical function in children with hematological malignancies. The SPORT THERAPY research project. F Lanfranconi, M. Jankovic, A. Balduzzi, F. Nichelli, L. Pollastri, S. Radaelli, T. Moriggi, E. Villa, W. Zardo, A. Biondi

XLIV AIEOP National Congress, Catania 2019. The research project sport-therapy: precision exercise in children and adolescents with leukemia or lymphoma and undergoing transplantation. F Lanfranconi, M. Jankovic, W. Zardo, E. Villa, F. Nichelli, L. Pollastri, T. Moriggi, G. Redaelli, F. Paoletti, E. Bottes, A. Biondi, A. Balduzzi.

XXV Congress European College of Sport Sciences ECSS, Sevilla 2020. Precision exercise in children and adolescents with haematological malignancies. Lanfranconi F, Zardo W, Moriggi T, Villa E, Radaelli G, Pollastri L, Jankovic M, Biondi A & Balduzzi A

Journal articles

Sport therapy: Precision exercise training from diagnosis to the end of treatment in children / adolescents with malignant hemopathies. Francesca Lanfranconi, Adriana Balduzzi, William Zardo, Emanuele Villa, Tommaso Moriggi, Andrea Biondi, Momcilo Jankovic Quaderni acp - 2019; 26 (6) - 251-253

Precision exercise in children and adolescents with haematological malignancies: the 'Exercise is Medicine' challenge has definitively commenced. Lanfranconi F, Zardo W, Moriggi T, Villa E, Radaelli G, Radaelli S, Paoletti F, Bottes E, Miraglia T, Pollastri L, Vago P, Nichelli F, Jankovic M, Biondi A & Balduzzi A. Submitted to Scientific Report, January 2020

Osteopathic manipulative evaluation and treatment in children and adolescents with malignant hemopathies. Barbieri M, Zardo W, Rivolta C, Frittoli C, Valdata V, Bouquin F, Passignani G Jankovic M, Biondi A, Balduzzi A, Lanfranconi F. In submission to the Journal American Osteopathic Association, April 2020

Thesis

William Zardo. "Can personalized training improve resilience in children with leukemia or lymphoma? The sports therapy research project ". University of Milan School of Sport Science Master of Science, Technique and Didactics of Sport. AY 2016/17

Stefano Radaelli. "Supporting the resilience of children with leukemia and lymphoma through personalized training." University of Milano-Bicocca Department of Medicine and Surgery Single Cycle Degree Course in Medicine and Surgery. AY 2016/17

Federico Paoletti. "Supporting the resilience of children with leukemia and lymphoma through personalized training." University of Milan-Bicocca Department of Medicine and Surgery Single Cycle Degree Course in Medicine and Surgery. AY 2017/18

Erica Bottes. "Precision training improves oxidative metabolism and exercise tolerance in children with malignant hemopathy: the sport therapy research project." University of Milan-Bicocca Department of Medicine and Surgery Single Cycle Degree Course in Medicine and Surgery. AY 2017/18

Emanuele Villa. "Precision training in children with malignant hemopathy: new horizons for the master's degree in physical sciences". University of Milan School of Sport Science Master of Science, Technique and Didactics of Sport. AY 2017/18

Tiziana Miraglia. "Precision exercise in children and adolescents affected by malignant hemopathy: the sport therapy research project". University of Milan-Bicocca Department of Medicine and Surgery Single Cycle Degree Course in Medicine and Surgery. AY 2018/19

Tommaso Moriggi. "Precision exercise in adolescents with malignant hemopathy as an inclusive teaching tool: the SPORT THERAPY research project". E-Campus Telematic University ". Faculty of Psychology Degree course in Sport Sciences for well-being and health. AA 2018/19

COVID19 special

During the COVID19 emergency, in agreement with the blood-oncologist colleagues, the activity was continued. Training was performed only for hospitalized patients and for those who had to carry out daily therapies in DH. The activity was therefore rescheduled for 3 days instead of the previously adopted l 4 days.

In order to communicate with athletes/patients at home, a special social channel (Instagram) has been set up: Centro Maria Letizia Verga_Sport Therapy.

The activities include:

- Tutorial video posts with exercises already known to the athletes/patients to be carried out at home under the supervision of parents;

- Live broadcast of the training carried out in the gym with the possibility of interacting with the sports doctor and the motor scientist.

THE SOCIAL ACTIVITY OF THE SPORT THERAPY RESEARCH PROJECT HAS BEEN ADVERTISED IN COLLABORATION AND WITH THE EXTRAORDINARY SUPPORT OF THE COMMUNICATION DEPARTMENT OF THE MARIA LETIZIA VERGA COMMITTEE.

We are famous for our TikTok.

For the Sport Therapy team,

Dr. Francesca Lanfranconi, Professor Adriana Balduzzi and Dr. Momcilo Jankovic

END