

Arab Health

The Official Magazine

Together for a healthier world



Eye on the future
Spotlight on Italy's private
healthcare industry





Gruppo
San Donato

Building the future of healthcare

**Gruppo San Donato, always at the forefront of
innovation and technological advancement**

Gruppo San Donato (GSD) never ceases to **innovate and inspire** medical advancement around the world. San Raffaele University & Research hospital, which is undeniably a model for **healthcare excellence in Europe**, has embarked on the creation of a new emergency building with the highest standards of sustainability which, goes by the name of Iceberg. The Iceberg is a 36 000 sqm emergency facility which, was designed to welcome, orientate and unite both visually and functionally all the elements of San Raffaele's articulate context. The new building will serve as a functional node creating clarity and recognition as well as being a **symbol for medical innovation and sustainability**.

The eight-story structure is built in glass with ceramic lamella shading-devices. The latter are distributed at regular intervals and covered in anti-smog paint which transforms surrounding smog into harmless mineral salts. Through several other innovative features such as CO2-reducing paint, recycled materials, anti-bacterial coating and water-saving pipeage, the building is estimated to **reduce energy consumption by 60%** compared to normal edifices of the same size. The

structure is surrounded by vegetation, filled with natural light and will house **over 300 patients**, as well as being equipped with **20 operating rooms**.

The overarching goal of the high-tech infrastructure is to increase **efficiency of treatments and comfort** for both the patient and their beloveds all within a **luxurious and well-appointed setting**. In fact, the clinical journey of the patients will be **strongly digitalized**. An application will be available allowing both the patients and their families to **monitor in real time** information on their mobile phones: visits, times and directions for hospitalization as well as allowing for a **better patient-doctor communication**. This is very important because, beyond the comfort of the rooms, the patient and the family want information and reassurance. The initiative for this new facility stems from GSD's strive towards a **patient-centred approach**. At the core of Gruppo San Donato's philosophy is the **personalized and three-dimensional care** of the patient, whereby, **physical, mental and cultural aspects** must all be taken into consideration in order to ensure **patient well-being and full recovery**.

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Eye on the future

UNiSR's CEO believes that research plays a key role in delivering better healthcare.



Anna Flavia d'Amelio Einaudi

The Vita-Salute San Raffaele University (UniSR) was inaugurated in 1996 with its Psychology course, soon followed by the courses of Medicine in 1998 and Philosophy in 2002. Anna Flavia d'Amelio Einaudi, CEO of UniSR and Head of Research and Fundraising, shares that the best way that the University, which is part of Gruppo San Donato (GSD), can continue to contribute to the future of healthcare is by combining education, research and clinical activities.

She says: "We have organised ourselves in such a way because we believe in forming doctors with an eye on the future. When you perform research activities, you can deliver better healthcare, as you are willing to find a better way to cure the patient. That's why we educate our doctors to have a research mindset."

San Raffaele is the first biomedical research institute in Italy and the University and the Hospital work together to deliver positive outcomes. The institution works on the philosophy that students need to experience first-hand what they learn in classroom. It features several laboratories so that students have access to facilities to perform research activities and fosters an environment that pushes people to communicate and interact with each other.

d'Amelio Einaudi highlighted: "We go from "bench to bed" and vice-versa, performing all paths of research. Clinicians and researchers work together for the goal of discovering better way to cure patients.

The research centre performs both pre-clinical, clinical and technological research and the different divisions include neuroscience, immunology and transplantation, infectious diseases, experimental oncology, genetics and cell biology.

Moreover, to foster clinical research, GSD has establishments such as the institute of experimental neurology, diabetes research institute, urological research institute, and The San Raffaele Telethon Institute for Gene Therapy (TGIT). Their aim is a translational push and they

act as middlemen that play an instrumental role in transferring innovation faster from bench to bed.

The clinical research centre is dedicated to conducting clinical trials. This includes the neuroimaging, cardio, onco emathology, gastro, pancreas and the intensive care centres.

"Every year about 350 new clinical trials take place and what makes us proud is that almost 60 per cent of them are investigator driven".

Moving forward

When it comes to funding the research, d'Amelio Einaudi states that the research conducted at San Raffaele is funded by Government, competitive national and international grants and collaboration with industry.

"San Raffaele is very well funded by the European Union (EU) with 66 funded projects within horizon 2020 programme," she says. "We are also financed by industries, both with sponsored clinical trials and collaboration agreements. We have 437 patents and 370 of those are licensed out or optioned."

When asked about future plans, the CEO concludes: "We are investing in advanced therapies, value-based healthcare, and digital transformation, including Artificial Intelligence and are trying to build a coherent and efficient framework to take full advantage from the new trends." ✦

The evolution of a doctor

The International Medical Doctor Programme at UNiSR has been designed to foster a new kind of doctor. d'Amelio Einaudi explains: "The programme is our flagship course, with a double accreditation that gives students the license to practice both in the EU and the U.S. The course is taught in English.

"In both our English and Italian courses, we put a lot of attention towards other aspects such as the relationship between the doctor and a patient, management and ethics and societal problems, because being a doctor today is beyond just the clinical aspects."

When you perform research activities, you can deliver better healthcare, as you are willing to find a better way to cure the patient.

The rise of big data

Information about a patient's outcomes has to be collected continuously to get a complete picture.



Elena Bottinelli

Personalised medicine has not yet become mainstream, but the future is increasingly pointing towards that direction. Soon, choosing the right treatment for a patient would be based not just on their pathology but also on their social situation and way of life. This would help physicians in creating awareness so that patients can steer clear of their problem areas and thereby make the right choices when it comes to their health.

"The eventual goal would be to guide a patient, take their data and make them choose what is good for them," says Eng. Elena Bottinelli, CEO, San Raffaele University and Research Hospital. "This would involve putting together the data of a hospital with the data of a patient and we are trying to understand how this can be achieved. We aim to put together a platform, which can host all the old information about our patients, to have safe data. This will enable us to treat patients holistically by providing multi-disciplinary care. It would also help us to not just look at a single situation but see a patient's entire journey and take care of them before and after they visit a hospital."

However, this decision will not just be taken by humans but also by machines and this is where Artificial Intelligence comes into play. "Information about a patient's outcomes has to be collected not just at the moment but all the time, so doctors can get the complete picture and understand what the best choice is. This can be achieved today through wearable technology and homecare systems and I believe this is our future," she adds.

Another important factor that has to be kept in mind is that the data collection process needs to be standardised. If the data is collected in a non-standardised way it would not be of much use. At the same time, information for instrumentation has to be collected as well, so that any new equipment that is bought would be ready for a standardised process. Also, protecting and ensuring the privacy of the patient should be of the utmost importance.

The CEO highlights: "The Lombardy region has already put up tenders to let hospitals who need data to have it shared with them. We applied and were part of the centres who won this possibility.

It is just a matter of time to translate what was on paper into reality."

When asked about how data can be shared globally and at the same time how could one personalise medicine for a single patient, she says, "At San Raffaele, we are looking at international partnerships and are trying to understand how and where we can work together to have a win-win solution. We hope to partner with specific projects. For us, it is important to have data from different countries and that is important for research itself, as it is a way of becoming bigger together. It is not a matter of just Europe or the U.S. or Asia, it is something we have to share globally to not lose time and money."

Beyond the hospital

According to Bottinelli, hospitals today need to have both physical and digital spaces. Right from wearables and Internet of Things (IoT), there needs to be continuous monitoring and people should move less towards the hospital but trust it even if they are outside the system.

She stresses: "We are starting to develop a network of facilities and want to gain the trust of the patient who should understand that they don't need to go physically to the hospital. Patients should be able to trust data. This requires a change in mentality and building an accessible facility so that when everything is set, it is just a plug-in solution. This is what we are trying to achieve." ✚

State-of-the-art facility

San Raffaele University and Research Hospital is evolving and building a new part of the hospital so that a patient visiting the hospital doesn't lose too much time moving around the separate areas to meet their requirements. For instance, high-level departments such as the Emergency and ICU would be located next to the cardiovascular area. The hospital is also constantly upgrading its technology and is in plans to develop a programme with 5G connectivity.

At San Raffaele, we are looking at international partnerships and are trying to understand how and where we can work together to have a win-win solution.

Making dreams come true

UNiSR provides exposure to research, clinical facility and academics under one roof.



Professor Enrico Gherlone

At Arab Health 2019, Gulf Medical University (GMU), Ajman, signed a Memorandum of Understanding (MoU) with Vita-Salute San Raffaele University (UNiSR), for strategic collaboration in the areas of academic and clinical cooperation as well as research.

Professor Enrico Gherlone, Rector of UNiSR and President of Dentistry School, who was present at the signing, says that this joint venture will see 20 students from GMU enrol in UNiSR's International MD Programme. These students will transfer in their fourth year and spend a year studying in Italy. They will receive a double degree upon completion and can practice in Europe as well all over the world.

Coming to study at UNiSR is a great opportunity for students in the Middle East as UNiSR has been ranked as the first university in Italy and 23rd internationally in the faculty of medicine. Professor Gherlone shares that the university aims to focus on body, mind and soul together.

At the campus, you will find students from all walks of life attending courses, right from philosophy and medicine to psychology. "Our President, Paolo Rotelli, always says that "we don't sell dreams; we make them happen." We have made important investments in building medical facilities worth over 800 million Euros, which was almost the same investment made for San Raffaele in 2012 when it was acquired by Gruppo San Donato (GSD)," Gherlone says.

The University offers an environment that provides exposure to research, clinical facility and academics. The Rector highlights that UNiSR's students of medicine have experience in real-world settings, as right from the first year they are taught a multi-disciplinary and complete 360-degree holistic approach around the patient.

He stresses that the GSD as a consortium hires its students for internships or full-time jobs at its facilities because the Group believes in providing a platform to the people its nurturing. The University is a separate entity but as part of GSD, it has close relationships with the other medical facilities and smart clinics part of the Group.

Gherlone explains, "There is a lot of synergy

in this approach. It is an educational network and upon graduation, students could get the chance to work with these hospitals. We educate and train them and they come to work for us.

"Our President's vision is to build a fulfilling campus life. The new generation brings their personal life into work life and vice versa. They need to have a student life experience, which is exciting and also very healthy. We host a lot of sports events, social activities for good, and our goal is to make our students wholesome individuals."

Excellence in dentistry

UNiSR's department of dentistry was founded in 1999 and is divided into three units – unit for public patients, unit for private patients, and the centre for oral hygiene and prevention. The department has 25 dental chairs. The bachelor's degree in oral hygiene trains students to be oral hygienists while the master's degree in dentistry prepares them to be dentists.

Gherlone highlights: "At UNiSR right from the first year, students get to associate with patients. The meeting rooms and classrooms dedicated to courses are connected with microscopes and surgical lights for students to be able to view procedures live. The doctor cures at the same time address the students."

Before graduation, each student performs at least 1,000 procedures and completes 1,500 hours of practical activity. The Professor says, "Our students are independent and each of them performs at least one cadaver dissection and would have done six of these by the end of the course. Our Phantom room is one of the most technologically advanced in the world and we have infrared detection of the movement and the teacher can see the exercise of the student."

UNiSR also offers professional courses after the degree. It has two specialisation schools in oral surgery and orthodontics. "Each year we have 10 students for orthodontics and 14 for oral surgery. Our faculty consists of top leaders from dentistry from all over the world. Furthermore, graduates can get the chance to work in 15 smart dental clinics part of GSD upon graduation," he adds. ✚

UNiSR has been ranked as the first university in Italy and 23rd internationally in the faculty of medicine.

What's trending?

A deeper dive into the development's transforming healthcare.



Professor Gianvito Martino

The future of medicine, says Professor Gianvito Martino, Scientific Director, San Raffaele University and Research Hospital, would involve people trying to avoid diseases thanks to the increased emphasis on prevention. However, if they do get ill, they would be able to use different medical devices and not just rely on chemical and/or biological drugs to regain function. "Technology should not be the final aim but should be a means because now we are putting too much emphasis on it as the end of the story," he believes. Below, the Professor highlights key trends that are set to revolutionise healthcare.

Focus on prevention

When it comes to primary and secondary prevention, the Professor stresses, there are two factors to consider – lifestyle habits and the increasing ageing population, which makes it important to provide quality to the years of life. "This is where personalised medicine will play a key role. One of the issues is to follow up on how you age and IT (e.g. telemedicine) would be a fantastic tool for this," says Martino. "If you prevent, you do it for the entire life not just for a short period."

Multi-disciplinary approach

The healthcare system in the last 20 years has gone through specialisation and nowadays doctors are not able to see the patient as a whole. He highlights that however in the future, multi-disciplinary teams would be the way to go and there has to be a holistic way of treating patients. The Professor says, "Instead of looking at things in a vertical way, neurology, cardiology, the problem should be seen in a way that if a person has cardiological issues, they could also have neurological issues."

Advanced medicine

San Raffaele University and Research Hospital, the Scientific Director says, have been pioneers in advanced drugs and procedures for over 30 years. The institute has been instrumental in bringing advancements to the fields of cell therapy, gene therapy, biological drugs, medical devices, among others. These advanced medicines are used to diagnose, prevent, monitor, treat, alleviate diseases and could also be used to correct or modify physiological functions.

"In my view, we are not investing enough in advanced medicine and that's a problem. For example, if you perform gene therapy, one session costs between half a million to one million euros. And sometimes there is not enough funding to carry out the procedure. One way to confront the issue could be "payment by the result". This is a topic being discussed widely in oncology. But when can you say the patient has achieved results in oncology – 1 year, 10 years or 20 years? How do you define that? These parameters will likely become clear in the coming years," he emphasises.

Tech transformations

Diagnostics are continuing to change rapidly with developments in the field of nanomedicine, nanodiagnostics, and nanomaterials. For instance, Artificial Intelligence (AI) – e.g. machine learning – will probably take over radiology, the Professor says. The reason behind this would be that innovative systems and machines would perform much better than doctors to analyse the volume of images.

San Raffaele University and Research Hospital have also been a forerunner in introducing the latest technology across their facility. In fact, robots are used in urological procedures and the hospital is using some of the most advanced medical devices in cardiovascular operations so that patients can undergo minimally invasive surgeries. "Probably, in a hospital like ours, companies could give us their medical devices, and we could test it for them in order to understand whether or not such devices might be considered as a credible cure to offer," he adds.

There have also been developments using brain-machine interfaces that transform thoughts into action, shares Martino. For instance, if a patient can't move their legs or arms due to traumatic lesion in the cervical cord, a microchip can be put inside their brain in the area that controls the movement of the arms. The patient will then be asked to think about moving their arms and these electrical inputs are recorded and put into an algorithm. This allows the person to use their thoughts and be able to move the mechanical arm. "This wearable exoskeleton is going to be the future because instead of putting electrodes in the brain, you can substitute it with a cap, which records the scalp electric activity. This will help people in rehabilitation much faster," he explains. ✦

Technology should not be the final aim but should be a means because now we are putting too much emphasis on it as the end of the story.

Strengthening the chain of interoperability

Policlinico San Donato's team of engineers are progressively developing models using Machine Learning to predict outcomes.



Ambra Cerri



Eng. Francesco Sturla



Eng. Marina Codari

The designation IRCCS or "Istituto di Ricovero e Cura a Carattere Scientifico" indicates biomedical institutions of relevant national interest in Italy, which drive clinical assistance in strong relation to research activities. Ambra Cerri, Research Operations Director, Policlinico San Donato, states: "Three years ago, we set up a laboratory of bioengineers with features such as 3D simulation and Artificial Intelligence (AI), and the idea behind it was to have a space that could become a facility also for hospitals of the Group in research."

Cerri highlights that Policlinico San Donato has more than 26,000 patients in its cardiovascular database. "About two years ago, we started with the restoration of this database, which was founded in 2000 and emigrated the data into our new infrastructure. Using it we have created several risk models and propensity scores and use big data in specific areas. We even have a patent on an algorithm that was created based on this database, "surgical treatment versus transcatheter aortic replacement", and some companies have expressed their interest in it. We did this on our own and hope to partner with industries to see if there is a value of this application," she says.

The team continues to work on the database with other Hospitals in the Group and believes that it will continue to get bigger with the data constantly being obtained from cardiologists and paediatric cardiologists, among others. The team is supported with the funding of GSD foundation and the hospital itself.

Initially, the database was created for use within GSD. However, the institute is part of the IRCCS network for cardiology and cardiovascular sciences that has around 18 hospitals. Policlinico San Donato is among the top three hospitals on the list because it is dedicated towards cardiovascular

sciences. In fact, the hospital's database served as an example to establish a similar database on the national level in Italy, which is supported and funded by the Ministry of Health.

Feasibility studies

The laboratory's aim, says Eng. Francesco Sturla is to exploit different types of clinical imaging, which also includes 3D imaging such as from computed tomography. It can perform numerical simulations as well as uses innovative techniques such as 3D printing, to assess the feasibility of procedures, for example in congenital heart diseases. The goal is to translate what is already a part of clinical imaging and obtain more information for effective diagnosis. The laboratory works with a small cohort of patients as well as on a single specific patient to avoid possible perioperative complications.

"Currently, we have a big database from the outcome of previous experiences," he says. "Our idea is to predict what can happen. Thanks to the machines we have available, we are focusing on the possibility of using non-invasive imaging. For example, we are focusing on the possibility to drive velocity flow dynamics directed from magnetic resonance to provide better care without using radiation."

He gives the example of an old female patient, who had a difficult clinical scenario due to congenital disease and it seemed that it would not be possible to have a safe intervention with surgery due to her age and other comorbidities. The research team decided to perform a perioperative analysis, starting from patient-specific imaging and built a 3D printed model to assess the feasibility of the procedure in the cath lab and the results turned out to be promising. Furthermore, the team used augmented reality to provide clinicians with a detailed impression of the clinical scenario,

therefore, enabling them to be ready for intervention. Permissions were also secured from the Ministry of Health as a custom-made stent was used in the intervention.

“The operation was a real success because in a few days the lady was walking and willing to start dancing again,” Sturla adds. This experience was also published in the *Journal of the American College of Cardiology* within its Imaging section.

Eng. Marina Codari, researcher of Politecnico di Milano based in Policlinico San Donato, adds that the team is working towards developing a generalised model that will allow them to obtain precision medicine and decision-making. In the above-mentioned case study, the team used the existing database and fused it with the imaging data of the patient that was already available to predict the outcome. “It is a little complicated because most of the time patients with completely different scenarios have the same outcome and patients that have the same parameters have different outcomes,” she adds.

The team is also working on prevention, specifically for women, because they reportedly form a part of the population that benefits less from the advancement in cardiovascular disease prevention.

Codari stresses: “Reportedly, about 33 per cent of women in North America die from cardiovascular diseases. However, hormones prevent cardiovascular disease in the fertile period of life, so pre and post-menopause women have a different incidence of this disease.”

The team of medical doctors and bioengineers is trying to learn from the huge data that is derived from mammographic screening to prevent cardiovascular disease because there are certain signs in the image that could allow prevention of the disease. Moreover, there is huge attention towards this topic in literature and the team is looking into using machine learning to see if they can create a model that would allow them to stratify women according to the intermediate and high level of cardiovascular disease. People who are in the high-risk category might have already been treated but those facing an intermediate level of risk might not get to know about it until it is too late. “We are working towards this and are spending a lot of time and effort to develop a solution,” she adds.

Data sharing hub

A hospital can be seen as a giant data set that includes both structured and unstructured data. Some trends are indicating that imaging is one of the biggest producers of data, however, this

information is not structured. This data has to be reviewed in order to derive knowledge from it.

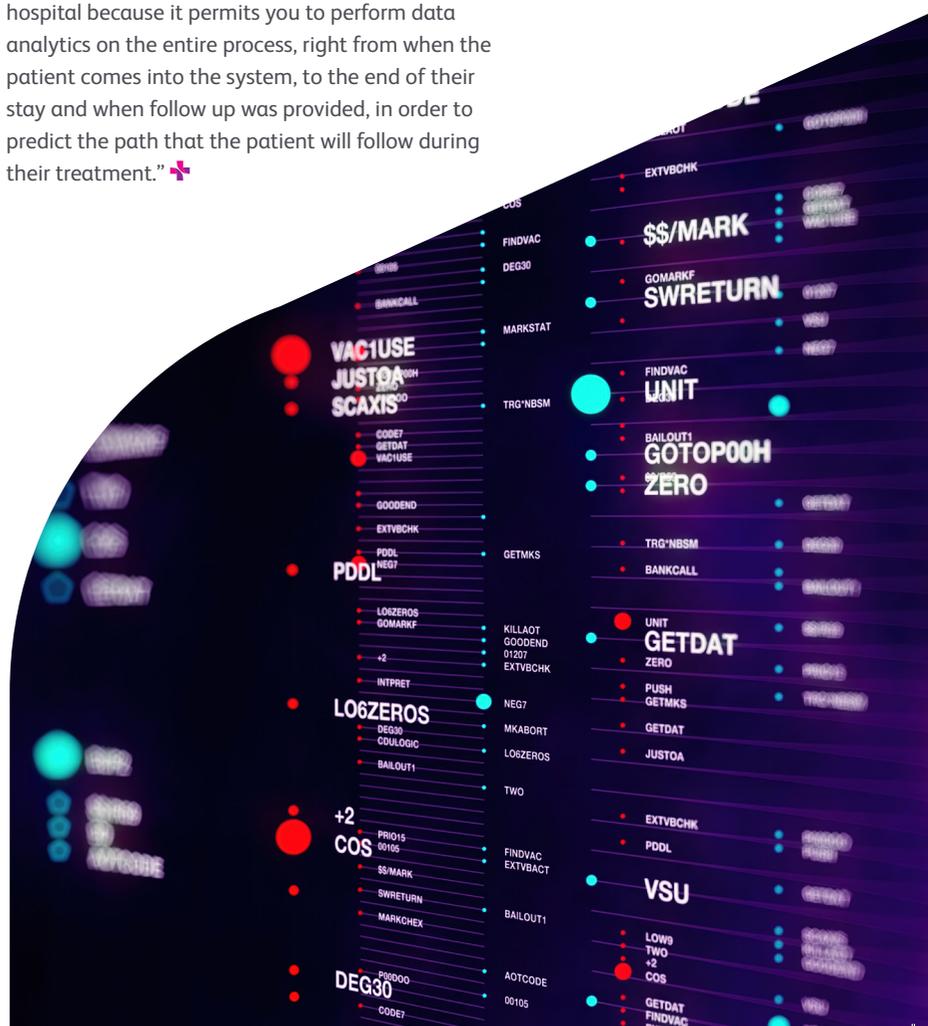
Codari expresses that Policlinico San Donato is trying to fuse both structured and unstructured data at different levels. She explains that adequate infrastructures are needed to share the data according to any privacy policies, along with laws that allow the data to be shared, keeping any restrictions in mind.

However, it is important to consider that the data should be collected according to standardised protocols because data quality strongly impacts on the model’s performance.

The team has participated in Italy’s Lombardy region to create a hub for sharing data among different hospitals. This hub comprises public and private hospitals, pharma companies, technology companies, universities, and its goal will be to eventually help in sharing the data inside the hospital among different departments such as pathology and imaging, but also to allow for inter-sharing among different hospitals. The hub will be owned by the partners of the consortium. According to Sturla, sharing is mandatory because without sharing parts of the model it would be incomplete and unsuccessful.

Codari concludes: “Machine learning may be a powerful tool to improve the efficiency of the hospital because it permits you to perform data analytics on the entire process, right from when the patient comes into the system, to the end of their stay and when follow up was provided, in order to predict the path that the patient will follow during their treatment.”

Machine learning may be a powerful tool to improve the efficiency of the hospital because it permits you to perform data analytics.



From research to therapeutic advances

Gene therapy is an example of personalised medicine that has great potential for the future.



Luigi Naldini, Director,
SR-Tiget

Currently, researchers across the globe are overcoming various technical challenges to make personalised medicine treatment options such as gene therapy a practical approach to treating disease. The procedure is, for example, performed for genetic diseases that affect the haematopoietic system or metabolic enzyme defects that affect tissues that can be reached by haematopoietic cells. The rationale is that blood stem cells can be taken out of the body and genetically corrected or –enhanced, respectively, with advanced technologies. After the therapeutic gene has been put in and the patient has received a form of preparative chemotherapy, the cells can be transplanted back into the patient recreating the whole blood system, now producing the therapeutic protein potentially for a lifetime.

One of the pioneers in performing ex vivo gene therapy is Italy's San Raffaele Telethon Institute for Gene Therapy (SR-Tiget). Founded in 1995 as a joint-venture between Ospedale San Raffaele (OSR) and Fondazione Telethon, the institute conducted the first successful trial in ADA-SCID (severe combined immunodeficiency) worldwide that showed correction of defects in patients.

Since its establishment, SR-Tiget has introduced several state-of-the-art technologies in the field. Dr. Bernhard Gentner, Group Leader, SR-Tiget, Haematologist, shares: "This includes the use of lentiviral vectors instead of retroviral vectors as a vehicle to introduce genes into the stem cells. This has two advantages. First, it is safer, as a lentiviral vector has a favourable integration profile and reduced genotoxic risk. Also, in retroviral gene transfer you have to bring cells into cell division, which is a longer procedure and the cells need to be stressed to get them to accept the genetic load. The lentiviral vector allows this to be done more quickly while minimally disturbing the stem cells."

This development has opened doors for clinical trials that the institute is conducting – Metachromatic Leukodystrophy (MLD), Wiskott–Aldrich Syndrome (WAS), Beta-thalassemia and Mucopolysaccharidosis type I (MPS-I) or Hurler's disease.

Radical research

SR-Tiget has created an infrastructure that helps it navigate the passage from pre-clinical science to bringing the therapy to patients. The institute has an

in-house lab where pre-clinical toxicology and bio-distribution testing can be performed. This is crucial as the requirements by regulatory authorities are quite stringent.

Unfortunately, the cost of these therapies is extremely high that is why it is necessary to include the industry in the process, emphasises Dr. Gentner. "At SR-Tiget, our model is to run the first proof of concept as an academic trial and then we have a partner who can buy into the platform and take over the Phase 2 or 3 study, for bringing this therapy into the market," he says.

The first gene therapy product that was developed at SR-Tiget is Strimvelis™, an ex vivo gene therapy drug for the treatment of ADA-SCID, which was brought to the market under the alliance among Fondazione Telethon, Ospedale San Raffaele and GlaxoSmithKline. The development started over 20 years ago and took a long time to go from the mouse model to market authorisation.

Dr.ssa Maria Ester Bernardo, Project Leader, SR-Tiget, Pediatrician, says, "The drug has been approved by the European Medicines Agency (EMA) and is now available for patients. It has been on the market for over a year and has received a positive response."

Moreover, says Dr. Gentner, Strimvelis™ is based on the old retroviral platform, yet has proven safe. "We monitored this quite closely and there has been an excellent safety record with more than 30 patients being treated without a single incident. Now the use of lentiviral vectors offers an even safer and more efficient platform," he expresses.

The gene therapy trials for other diseases are also going along the same path. Dr. Bernardo highlights that the lentiviral-based gene therapy for the treatment of MLD will be hopefully available in a year, while the one for the treatment of WAS will be available in two years. ✚

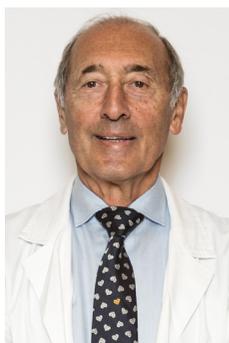
Centre of excellence

OSR is one of the biggest centres in Italy for stem cell transplantation. The stem cell program has 35 beds and uses these for doing routine stem cell transplantations and gene therapy, both in adults and children. It performs more than 150 cell therapies per year. The institute receives referrals from all over the country and the rest of the world and is well-equipped to assist the patients and their families to make them feel at home.

At SR-Tiget, our model is to run the first proof of concept as an academic trial and then we have a partner who can buy into the platform.

Centre of excellence

Adopting innovation and knowledge sharing are important considerations for GSD.



Professor Alessandro Frigiola

The rate of mortality in congenital diseases has reduced consistently in developed countries. In fact, at Gruppo San Donato (GSD), the mortality for adults is two and a half per cent in congenital diseases and four per cent in neonates, as compared to 70 per cent in the 1970s.

Professor Alessandro Frigiola, Director of Cardiac Surgery for Congenital Diseases in Children and Adults, Policlinico San Donato, part of GSD highlights that the hospital has established itself as a centre of excellence and provides treatment for adult cardiology, paediatric cardiology, electrophysiology, and cardiac rehabilitation. It carries out various procedures such as thoracoscopic and endoscopic surgery, as well as perform 3D construction.

“In our cath lab, we can change the heart valve without extensive surgery. We have been able to achieve this because the structure has become more perfect and the technology and machines are more up to date. The open-heart operation itself is much easier to do today thanks to this, especially the extracorporeal circulation machine. Previously, it used to be a huge machine that would occupy a whole lot of space but now it has been condensed into almost the size of a suitcase,” he says.

The ventilator or the infusion pump is not as important as the extracorporeal circulation machine, the Professor explains. Today, the machine sends out an alarm if something is not working properly, for example, if the brain is not getting enough oxygen or if the kidney is not receiving blood.

“We also have the extracorporeal membrane oxygenation (ECMO) and we can keep the patient for 10-20 days on this machine and it will work as heart transplantation. However, it is important to note that even though a centre requires upgraded machines, it needs experienced and skilled doctors to provide the best outcomes with these,” he adds.

Knowledge sharing

Today, the best of technology is available to treat patients, but, unfortunately, these cannot be present in 90 per cent of centres around the world, the Professor stresses.

Frigiola says: “We have an international operation of knowledge sharing. We aim to teach

doctors to contribute to the construction of a cardiac care centre wherever they work. We started in 1992 and have trained doctors from Peru, Venezuela, Africa, Iraq, India, and China, among others.

“Currently, we have a project with the government of Romania asking us to reorganise the current state of their paediatric and cardiac surgery. We are also present in Egypt and have taken charge of educational programmes there. We have trained 67 doctors from Egypt. We also had three Chinese doctors who trained with us for two years and now provide services to around 50 provinces in China.”

GSD also undertakes missions in countries that need help the most. For instance, every month a team visits a country and evaluates around 300 patients, mostly children, where 90 per cent of them are dying. The team performs operations and catheterizations, interventional procedures, schedule other operations for them, or ensure that they are brought to Italy for further treatment.

“We are also building centres of excellence in countries such as Nigeria, Morocco, Senegal, Cameroon, Ethiopia, Tunisia, for example. In the future, we would want to export the latest technology upgrades to these countries. In these countries you will find that most of these centres are managed by staff who have been trained here,” he shares.

Furthermore, the Professor says that thanks to telemedicine there is now a possibility to create a big network with different countries.

He says: “We are currently working on creating a school for doctors, which is very important in Africa and the Far East. But you cannot create doctors overnight; it takes at least five to 10 years. San Donato is one of the most experienced in this sector and are ready to afford this challenge and want to offer an important solution in the possibility to treat patients.

“We have two possibilities. One is to train 50 doctors overseas but for a short period. The other is to select the doctors and bring them to Italy. The training is completely different because here they have to stay for at least 6 months or one year. A young cardiac surgeon would have to stay for two or three years. The doctors can come into the operation theatre and see the procedures and when they are trained, they would get the chance to do the operation as well, under our responsibility.” ✦

We have an international operation of knowledge sharing. We aim to teach doctors to contribute to the construction of a cardiac care centre wherever they work.

The road to defeating diabetes

The path is fraught with challenges however innovations could assist in battling the disease.



Professor Lorenzo Piemonti

Our world currently faces an all-out war with diabetes. If a solution is not found to solve it, the disease will kill the society in the next 100 years in terms of cost and sustainability, says Professor Lorenzo Piemonti, Director of Diabetes Research Institute (DRI), San Raffaele University and Research Hospital.

Diabetes is a chronic lifelong disease that impacts almost every clinical situation and can cause additional issues such as cardiovascular problems or osteoporosis. According to the Professor, the disease could be tackled by having a patient-centric system. Moreover, it is not only the endocrinologist but also the cardiologist, nephrologist, neurologist, among others who have to be part of the treatment process. There is also a need for educators and patient networks for nutrition, as well as a model for telemedicine, to have the possibility to be in touch with the patient beyond the hospital.

He says: “You have to track what happens because what you are doing now will be relevant 10 years later. There needs to be a predictive model to understand the risk to the patient and the outcome. There is a need to have the data collected from these models and for biological samples to be put together. Artificial Intelligence (AI) could then be applied to obtain algorithms that could give an insight on trends and prediction for the natural history of the disease. One of the problems is to understand which patients would survive without too many problems and lead a long life, and who would develop issues in a few years. At this time, we can’t predict this.”

Currently, GSD has several state-of-the-art therapies available to treat Type II diabetes and are involved in testing new drugs that are not yet available on the market but are going through final testing before being launched.

“For Type II patients who are also obese, we can provide all the approaches for bariatric surgery. We have the possibility to do diagnosis in the field of genetic diabetes because almost 5 per cent of diabetes is genetic, especially in countries where

the population is more consanguineous. We can also do population screening for the risk of Type I diabetes by using biomarkers. This is in practice in the North of Europe where there is more incidence of Type I diabetes,” he adds.

The Professor highlights that some treatments will be available in the next five years that could provide the possibility of preventing or delaying Type I onset. Some strategies that could help in the future include cell therapy – the possibility to have new cells that can produce insulin to replace what is lost.

He says, “This can be done with somatic therapy. With new technologies available in bioscience that includes stem cells, gene editing, gene therapy, you can build these cells in a lab and then transfer it to the patient. This is something that is currently under investigation. GSD is part of an international consortium and was involved in the first transplant implantation in Europe of embryonic stem cells in November last year. We implanted three different patients in Brussels. It is a phase one trial, and the aim is to understand if these cells can survive. If this is confirmed, then we will start an efficacy trial to see if it has clinical relevance.”

For Type II diabetes, there are markers to understand the risk of diabetes. One of the ways in which it can be diagnosed is by measuring the glucose level in a fasting condition. “There is a grey zone where you are not diabetic but could also be at the risk of developing it and this is called intolerance. These are pre-diabetic patients and the questions that will need answers is that who will develop it and how you can prevent it,” he adds. ✚

Currently, GSD has several state-of-the-art therapies available to treat Type II diabetes and are involved in testing new drugs.

AI to help humanity

GSD has an on-going collaboration with IBM to leverage Artificial Intelligence (AI). A platform has been built and trials will start in Italy first that will involve 1,000 subjects who will be evaluated for three years and will be followed for five years in terms of disease incidence and all this data will be put together to build a predictive model.

Innovation to the rescue

Breakthrough treatments are turning out to be a handy tool in combatting obesity.



Prof. Alessandro Giovanelli

Despite the growing recognition of the problem, the obesity epidemic continues to rise, and its rates are increasing around the world. The World Health Organization (WHO) has termed the phenomenon as globesity. While the World Obesity Foundation has said that by 2025 the world will have 1.9 billion overweight people. Shockingly, today there are over 55,000 deaths per year related to obesity that are not disease-related. Furthermore, in countries with a low economic profile, there has been an evident increase in obesity. Even in a developing nation such as Italy, almost 10 per cent of young women are overweight and the number is increasing day by day.

Prof. Alessandro Giovanelli, Director of National Institute of Obesity Treatment (INCO), GSD, stresses that if there is nothing done to treat this epidemic in the coming years, the number of obese people will become unsustainable for the world.

He says: "First, one needs to understand the definition of what it is to be overweight and obese. Some of us who are overweight today could end up being obese tomorrow. The second thing to remember is that obesity is a real disease. It is not a psychological or emotional condition and it is important to understand that. People, society and even the scientific community sometimes misunderstand and think that obesity is only a lifestyle disease. If we want to treat obesity, we have to approach it in a multi-disciplinary way."

The Professor explains that obesity is not just a gastro or psychological or metabolic problem, but a complex multi-disciplinary disease, where the metabolic, psychological, social, endocrinological situation may have a role in its development.

The only way out, he expresses, is to have a strong focus on prevention. To deal with the disease head-on, GSD has established a programme to control the habits of children. Referred to as the "Eat Programme", the Group is working to prevent obesity in younger people in Italy.

Giovanelli says, "At GSD, every time a patient arrives, they are evaluated by a physician, and go through a pathway programme where different specialists analyse the situation. Sometimes the patients don't understand the disease also because the society says that "you are the cause". We have to constantly motivate them to change their lifestyle, control their diet, and require strong compliance by the patient to do that."

Treatment options

Currently, worldwide there are some drugs in the market that can treat obesity. However, these can be used only for a lower obese situation and can treat those with a BMI of up to 35 with comorbidities but every time up to 40. When drugs and counselling don't work, surgery is suggested.

Today, Bariatric Surgery has become one of the most effective procedures and helps in the long-term management of weight loss. The number of these procedures are increasing because these are now being performed with less invasive systems.

Giovanelli highlights: "The complication and death rate in these cases is quite less. But of course, these need to be carried out in excellence centres. In this regard, GSD is now at the top of this treatment in Italy and has become one of the first group's in the country highlighting the control of obesity surgically with more than 4,000 operations carried out in a year. In my team, we treat about 1,600 patients. IT systems can help us to further develop our activity better. The future is that such high-volume centres will need Artificial Intelligence (AI) to deliver the best outcomes."

Other procedures carried out include gastric bypass, sleeve gastrectomy, and gastric band, among others. Patients are studied before the treatment and provided with a strong counselling programme before the operation so that they understand exactly what is going to be done. This is important to permit the physicians to collaborate with the patients to get the best results. Moreover, post the surgery there might be some scars and the team at GSD effectively approach the post-bariatric situation.

The Professor explains, "There are also complex procedures being carried out where weight can be controlled by reducing absorption. There are hormonal operations, where the stomach or the bowel can be treated to change the metabolic system of the patient. For example, there now exists a surgical treatment of diabetes. With this operation, we change the pathway of food. This increases the modification of the encryption of some gut hormones and controls the metabolic disease.

"The drugs protocols and control of the pain are one of our goals because with good drugs management we can discharge the patients and they will be able to resume their normal activities a day after being discharged." ✚

People, society and even the scientific community sometimes misunderstand and think that obesity is only a lifestyle disease.

Broadening horizons

GSD's International Business Development department has grown 50 per cent year-on-year.



Supplied pic: Christine Lagarde, President of the European Central Bank with James Georges

The Gruppo Ospedaliero San Donato's (GSD) model is defined by the interaction between clinical activity, higher education and scientific research aimed at putting the patient's well-being at the centre of attention and ensuring the longevity of its leading position in the healthcare sector in Italy as well as abroad.

James Georges, Head of International Business Development, GSD, has been tasked to make the Group an internationally recognisable healthcare brand and to spread its message as a hospital of the future that offers the very best of treatments as well as exceptional academic courses, globally.

His role is to establish GSD's presence in the Middle East, Russia, CIS countries, as well as the rest of the world. In addition, Georges has to liaise with colleagues from the Italian Ministry of Health, Ministry of Tourism, and private healthcare companies, along with the embassies and consulates of different countries. His responsibilities include finding new markets for business development, increasing medical tourism, and emphasising on the quality of care international patients will receive. This involves constant coordination with different departments and taking into account the varied communication, feedback, and indicators GSD receives, in order to incorporate them successfully into the business model and keep it growing.

The International Business Development department handles four key activities – services for international patients; international cooperation – helping other countries develop their healthcare systems and provide treatment not currently existing in these countries; international marketing to create awareness of the brand internationally; and focus on international projects and the expansion of GSD abroad.

Georges says: "We have almost 2,000 international patients in a year with different profiles. From this, majority of the patients come to us from goodwill missions and we charge them what the state charges local patients, which is the very basic price. We also get VIP patients and work with international insurances such as AXA and Alliance. Our turnover is currently between 8 to 9

million Euros. Our aim is to have 2 million Euros for the very private, out-of-pocket patients.

"The private patient is the future. We are the only department in the Group witnessing a 50 per cent increase year-on-year. Each year we double the team and the space because each year we double the turnover. We started four years ago and have already reached great heights. This growth gives you an idea not just about how exceptional the team is but also about the President of the Group who has this exceptional vision."

He highlights that most of the out-of-pocket patients come from Russia and Middle East. When the activities started it was focused on surgery or interventional procedures, but now they also get a lot of people looking for a second opinion and ambulatory visits. "We get around 100 patients from Romania, around 400 from Tunisia, we had 50 patients from Morocco but this number is increasing very fast, as well as patients from Montenegro and Botswana. We get around 100 patients from the UAE and around 250 from Libya," he adds.

Presence in the UAE

In January 2017, GSD Healthcare, the UAE arm of GSD International, opened its first office in the UAE in Dubai Healthcare City. There are three different areas of business in which GSD Healthcare operates. This includes Training & Education, which has two aspects: one, is the clinical training that seeks to improve the efficiencies of participating clinicians and physicians, the quality of care offered, and which leverages on the Group's expertise in this area; while the second is management training that is offered through its partnership with the SDA Bocconi School of Management, a top ranked business school in Italy.

Consulting is the second core area of business and this includes providing consultancy services for medical devices companies, hospitals, healthcare authorities, etc., and can be on diverse topics like purchasing, clinical pathways, policy making, operations, and so on. GSD's goal is to take its excellence outside of Italy, and successfully transfer its knowledge to the UAE, right from policy making to outpatient clinic management. ✚

Each year we double the team and the space because each year we double the turnover.

The Leading Italian Hospital Group

Gruppo San Donato (GSD) is the largest Italian private hospital group. With 5300 doctors, 5500 beds, 7600 nurses & care-workers GSD treats over 4.7 million patients per year. GSD's **medical excellence** stems from its **unique approach** defined by the combination of clinical activity, higher education and scientific research. With this three-dimensional approach GSD is able to provide for the highest degree of expertise, **constant development and innovation**.

Scientific Research & Innovation

With its **3 research hospitals and 750 ongoing trials**, GSD is constantly **pushing the boundaries** in the medical field by creating **new treatments and procedures** as well as developing **avant-garde** medical equipment that do not exist anywhere else in the world.

Education & Training

GSD's professionals deliver **high-quality, focused training** to doctors and healthcare professionals in various medical fields, including hospital management accredited courses. For students, San Raffaele Vita-Salute University integrates **Philosophy & Psychology** courses to the Faculties of Medicine, offering future physicians a **global and in-depth understanding of the individual** not only physically but also mentally.

International Patient Services

According to **Bloomberg's 2019 Indexes**, Italy is recognized as the **2nd healthiest country in the world**, having the **4th most efficient healthcare system globally**. Thus, it is no wonder that GSD attracts patients from around the world seeking specialized medical care not readily available in their home country. Through our **International Patients Program** you can receive personal assistance throughout every step of your visit; including **tailored meal plans**, a comfortable and **luxurious stay** & even personalized tours to the beautiful Italian cities.

Personalized Medical Care

A person's cultural heritage, sentiments and experiences make up a complex entity that GSD considers as a whole. The check-up, diagnosis and treatments are **tailored to the patient's personal requirements** as to ensure their full comfort, well-being and complete recovery. GSD always puts their patient's well-being first.

International Cooperation

AISPO and *Bambini Cardiopatici nel Mondo* are just two of the non-profit organizations that GSD is in partnership with. They share the same goal: **delivering & ensuring accessible high-quality healthcare** in some of the most underdeveloped & difficult to access areas of the planet. Together, they help **underprivileged communities** with hospital constructions, renovations as well as providing high-quality equipment. Thanks to its **clinical know-how**, GSD provides local staff training & scholarships in order to **advance healthcare delivery and save lives**.



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