Associazione Farmaceutici Industria

58° SIMPOSIO AFI RIMINI 6 • 7 • 8 GIUGNO 2018

con la partecipazione di **AFTI**, **CRS** Italian Chapter

Con il patrocinio di

FARMINDUSTRIA

ASSOBIOMEDICA

FEDERCHIMICA ASSOBIOTEC

LA PIAZZA DELLE START UP

Il trasferimento tecnologico: opportunità per le Start up nel Pharma/biotech

Mercoledì 6 giugno 12.30 – 14.00 (area espositiva)

Moderatore: • **Paola Minghetti** (AFI – Università degli Studi di Milano)

12.30 – 12.35 **Maria Luisa Nolli** (AFI – NCNBio)
Intervento di apertura

12.35 – 12.50 • **Marcella Origgi** (Johnson & Johnson)
Il valore dell'innovazione tecnologica ed il suo trasferimento nella grande azienda pharma biotech

12.50 – 13.05 • **Giuseppe Serrao** (2i3T)
Dall'idea al progetto e costruzione del valore

13.05 – 13.20 • **Anna Silvani** (Molmed)
Dal brevetto al prodotto finito in terapia genica

Presentazione progetti delle Start up (4 minuti cad.)
- **HiQ-Nano**
- **Mag Shell**
- **Visihologic**

Giovedì 7 giugno 13.00 – 15.30 (area espositiva)

Moderatore: • **Lorenzo Cottini** (AFI – High Research)

13.00 – 13.15 • **Luca Battistelli, Paolo Mariotti, Manuela Monti** (IRST di Meldola – IRCCS)
Partnership tra Texas Medical Center e IRST di Meldola: Innovation Hub per Start Up

13.15 – 13.30 • **Alexander Ehrenheim** (Laboratorio Farmacologico Milanese)
Medical Device, Start Up, Innovazione e PMI: una esperienza

13.30 – 13.45 • **Mauro Rainoni** (MEDA Pharma a Mylan Company)
Medical Device ed opportunità di business

13.45 – 14.00 • **Mauro Citraro** (SUPSI - DTI STARTUP GARAGE)
DTI Startup Garage - uno spazio ricreativo e didattico di formazione imprenditoriale

Presentazione progetti delle Start up (4 minuti cad.)
- **Keethings Italy**
- **OaCP**
- **PlumeStars**
- **React4life**
- **Stem Sel**

Venerdì 8 giugno 13.00 – 14.00 (area espositiva)

Moderatore: • **Maria Luisa Nolli** (AFI – NCNBio)

13.00 – 13.15 • **GianMario Baccalini** (Bulk&Pharma Development)
Dal Pharma tradizionale ai prodotti biotech: trasformazione necessaria

13.15 – 13.30 • **Giuseppe Tomei** (LVenture Group)
Start Up e AI: il punto di vista del Venture Capital

13.30 – 13.45 • **Giuseppe Recchia** (GSK)
Start Up per la salute oltre il farmaco: mApp, Intelligenza Artificiale

Presentazione progetti delle Start up (4 minuti cad.)
- **Esserre Pharma**
- **Protak Scientific Italia**

Comitato Organizzatore

Stefania Agostini	Direttore Palacongressi di Rimini, Italian Exibition Group Spa
Emiliano Celli	New Aurameeting
Lorenzo Cottini	AFI - High Research
Paola Minghetti	AFI - Università degli Studi di Milano
Maria Luisa Nolli	AFI - NCNBio

In collaborazione con il Palacongressi di Rimini

Associazione Farmaceutici Industria

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RIMINI 6•7•8
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Abstract relatori
Mini simposi

HOW BIG PHARMA BIOTECH COMPANIES VALUE NEW TECHNOLOGIES AND HOW THEY INTERNALLY TRANSFER/ABSORB THEM

Marcella Origgi

J&J London Innovation Center

The Open Innovation model is globally accepted as effective and acts as complementary to the in-house one.

Companies with fully integrated OI models constantly reach out to innovators in various fields and can therefore benefit from this network, not just for NME scouting. It is important to underline that innovative technologies, and their consequently internal transfers, may be applied in different areas, such as new formulation development (e.g. nanoparticles to extend drugs release), digital solutions for IT, patient support programs and clinical trial implementations, tracking systems plus smart packaging.

The current trend for J&J is a direct collaboration with start-uppers and researchers to keep pace with innovation and be able to provide more customized services. At a local level, the Italian OpCo is currently also undergoing reshaping to better capture opportunities.

DALL'IDEA AL PROGETTO E COSTRUZIONE DEL VALORE

Giuseppe Serrao

2i3T

2i3T is the Incubator of the University of Turin, company shareholders are: University of turin, City of Turin, Metropolitan City of Turin and Finpiemonte. 2i3T 's mission is to diffuse and foster knowledge transfer within the University environment in order to develop local economy creating new businesses coming out from academic research and SMEs. The Incubator started activities in april 2007 and since that time it launched 70 start ups knowledge based in the following sectors: 30% Health Science, 20% in Agrofood, Digital for 23%, 13% Social Innovation and 14% Environment Companies exploit over 34 patents and several of them involve also an industrial partner or financial investors as ventures and business angels.

MOLMED: FROM ACADEMIA TO PUBLIC COMPANY AND BEYOND

Anna Silvani

MolMed

MolMed S.p.A. is a biotechnology company focused on research, development, manufacturing and clinical validation of innovative anticancer therapies. MolMed's product portfolio includes proprietary anti-tumor therapies in preclinical development, clinical development and EC authorised.

MolMed has been founded in 1996 as an academic spin-off of the San Raffaele Scientific Institute. After more than 20 years MolMed boasts two proprietary Cell & Gene therapies with one, Zalmoxis®, already authorized for the market in Europe and rewarded with valuable reimbursement price in two main EU countries.

The current MolMed structure foresees an established dual business model including the development of proprietary products and the supply of CDMO services for third parties (development and manufacturing).

Both businesses are e based on common assets, increased during the MolMed lifespan:

Competence: high skills in in Cell and Gene therapy development and manufacturing

- People: highly qualified scientist and operators
- Solid portfolio of patents: 12 proprietary patent families including 256 granted patents and 43 pending applications
- GMP manufacturing capability: two authorized GMP manufacturing facilities (almost 5000 SQM)

MolMed is now one of the largest facility in the field and it is listed on the main market (MTA) of the Milan stock exchange managed by Borsa Italiana since March 2008. MolMed is headquartered and based in Milan, at the San Raffaele Biotechnology Department (DIBIT) and has an operating unit at OpenZone in Bresso.

MolMed is the first company in Europe to have obtained the GMP manufacturing authorization for cell & gene therapies for its proprietary products (Zalmoxis®) as well as for third parties and/or in partnership (Strimvelis, a GSK gene therapy for the ADASCID). With reference to GMP development and manufacturing activities for third parties, MolMed signed numerous partnership agreements with leading European and US companies. In the framework of innovative anticancer therapies, MolMed's pipeline also includes NGR-hTNF, a therapeutic agent for solid tumors investigated in a broad clinical program, involving more than 1,000 treated patients.

MolMed Key Strenghts are:

- International leadership in Cell & Gene industry
- Two proprietary Cell & Gene therapies with one, Zalmoxis®, already authorized for the market in Europe and rewarded with valuable reimbursement price in two main EU countries
- Recognized GMP capability with the 1st facility in Europe to obtain the GMP manufacturing authorization for the market
- Value and Growth dual business model combining a proprietary pipeline with robust source of revenues

from GMP services
- Established partnerships with primary biopharma international players for both proprietary therapies and GMP products
- Corporate Governance with extensive experience from complementary fields and Scientific Advisory

SCIENTIFIC AND TECHNOLOGICAL COLLABORATIVE PROGRAM BETWEEN IRST (Istituto Scientifico Romagnolo per lo Studio e la Cura dei Tumori) AND TMC (Texas Medical Center)

Manuela Monti IRST of Meldola IRCCS

CO-AUTHORS

Luca Battistelli IRST of Meldola IRCCS

Paolo Mariotti IRST of Meldola IRCCS

IRST is an Oncological Centre of excellence whose main challenge is to be a reference point for public and private R&D, SMEs, start-up(s) and health institutions. TMC is one of the largest life sciences business accelerators in the United States (US); it operates in the world's largest medical city with eight million patients and family encounters with doctors, nurses and staff every year.

IRST and TMC agree to cooperate in order to foster the formation of Italian and US companies involved in two-way exchanges and partnerships to support Italian commercialisation of innovative medical technologies and jointly to develop the knowledge and know-how acquired in such a field in order to exploit it commercially as well. TMC and IRST have an “International Bio Bridge”, a health technology start up exchange program. This alliance brings an immediate and real opportunity for Italian's best and brightest to learn from some of the world's top health innovators on a scale we don't yet see in Italy. IRST and TMC, with the support of ASTER, AIFA, ACC, IMI2HARMONY PROJECT, CONFINDUSTRIA are initiating a program to create a global health innovation ecosystem where emerging technologies can be developed, shared and accelerated to advance patient care. TMC will provide top Italian start up(s) with access to TMC's Innovation Institute; through the program, Italian companies will be provided critical services at no costs, including legal, business planning, regulatory counselling and access to the eight million patients encounters at the TMC annually. Recruitment for the Medical Device cohort started in March 2018. TMC offers a unique learning experience for Italians to test and learn how to embed their innovation within an active, large medical centre; it's a rare opportunity to have real users involved in the co-design and co-creation process. IRST is a now working with TMC and their partners to identify and fast track a number of start up(s) and promising companies in Italy within the digital health, health technology and medical device. Over the longer term, the alliance provides the foundations for growing a bi-lateral innovation and technology transfer between Italian and the US.

MEDICAL DEVICE, START-UP, INNOVATION AND PMI (ITALIAN SMALL-MEDIUM COMPANY): AN EXPERIENCE

Alexander Ehrenheim

LFM - Laboratorio Farmacologico Milanese

Due to its highly regulated context, to bring innovation in the Medical Device area is a rather complex, long and expensive process. Medical Device innovation involves support and competence coming from the R&D or scouting (ideas/patents), technical development, clinical support, dossier writing and patenting, production and marketing just to mention the most important ones. In addition, a comprehensive understanding of the major area connections and financial impact is needed to help deciding if to invest or not. It is difficult for a PMI (Italian Small–Medium Company) to have all this knowledge at a similar or equal level. For a PMI (Italian Small–Medium Company) developing collaborations (i.e. networking) with different Partners is the only way to allow good ideas to become Valuable Innovation Opportunities. The case I will be shortly telling you about will go through the major steps LFM (Laboratorio Farmacologico Milanese), an Italian medium sized pharmaceutical company, has taken to develop and market a new Medical Device for the orthopaedic area thanks to the co-operation with different Partners.

MEDICAL DEVICES AND BUSINESS OPPORTUNITIES

Mauro Rainoni

MEDA Pharma a Mylan Company

The world of substances based medical devices is going through an intense period of change characterized by the increase in regulatory and quality demands.

In this historical phase, companies are called to a renewed effort to support the justification of the rational formula and the mechanism of action. In addition, all substances based medical devices Class I will have to be reclassified in the upper classes or even considered "other".

This situation plays in favor of the big companies that have money and resources available, but penalizes small businesses that must invest to keep the products on the market or find a way to capitalize through sales or other forms of collaboration with larger companies.

In this scenario, large companies will have the opportunity to invest in relatively low-risk acquisitions of known

and consolidated products on the market, having sufficient post-marketing data and a solid scientific base.

It will therefore be necessary for start-ups to propose even more innovative. It is growing, in fact, the interest in treatment support products that exploit portable technology, such as Apps and high-tech products.

DTI STARTUP GARAGE – UNO SPAZIO RICREATIVO E DIDATTICO DI FORMAZIONE IMPRENDITORIALE

Mauro Citraro

SUPSI - DTI Startup Garage

It is an enjoyable and creative place set up recently inside the Department of Innovative Technologies (DTI) at the University of Applied Sciences and Arts of Southern Switzerland (SUPSI). DTI is focusing on the sciences of applied engineering, in general within the industrial sector, and with technology and information services for both training and research.

As the "University of experience", SUPSI aims to produce, develop and disseminate knowledge and expertise to support the economic, social, technological and artistic progress of the Southern Swiss region Ticino.

Based on to the vocational model - which made Switzerland one of the best places for young people to start working - DTI *Startup Garage*'s mission is to go further in developing individual skills, such as the entrepreneurial attitude, as the basis for students to possibly become entrepreneurs. To that effect, a method was developed for scouting entrepreneurial ideas among all students who attend academic courses in different branches of DTI.

At the end of October, during the *Pingelap Day*, students can register their own business ideas. These will then be assessed by an evaluation committee and processed through a dedicated web application, used to match proposal ideas with the most suited lecturer, who is prepared to assist the so-called Idea Startupper in developing his entrepreneurial ideas further on, once selected by the committee.

Teaching staff prepared to do so for the *Startup Garage* were preliminarily listed with their core competences in a comprehensive database used to identify the best-suited *Standby Mentor* for any particular business idea. Thereafter, *Idea Startuppers* will ask the selected Standby Mentors to assist in making progress with their entrepreneurial idea. Once chosen by students, Standby Mentors will endorse the idea they have reviewed and considered viable.

At the end of every semester, a report is being presented by the entrepreneurial students on the current status of their *Startup Idea, with an add-on endorsement by their Standby Mentor*. The committee will then decide if the project will be supported further and the team will be able to maintain their status as Idea Startuppers. This process allows students to obtain and maintain exclusive access to the *Startup Garage* and all benefits derived from it, such as calling on lecturers prepared to assists them in progressing with their business ideas during their academic and vocational path.

Hall 177, is the physical location of the *DTI Startup Garage*. Therein students can put classical theoretical-scientific instruments and knowledge, they gradually obtain during their curricula, into a stimulating practical adventure. In fact, students are enabled to develop their own entrepreneurial ideas without taking the risks of real entrepreneurs but growing into dynamic people enabled to become real entrepreneurs at the end of their academic path.

BIOTECHNOLOGY – THE NEW DIRECTION IN PHARMACEUTICAL INNOVATION

Gian Mario Baccalini

Bulk&Pharma Development

Egyptians, Babylonians and Chinese used biotechnological techniques already between the 5000 and 2000 B.C. Nevertheless, the underlying principles of the first breeding techniques were elucidated only in the second half of the XVII century, when Mendel laid down the foundations of modern genetics. Hundred years later, a wave of discoveries and inventions radically changed the way we live by drawing a path through the genomic to the post-genomic era.

The impact of biotechnology in the medical and pharmaceutical fields has been particularly relevant. The raising global life expectancy registered in the last century is a direct result of new disciplines derived from molecular&cellular biology, genetics and genomics. Pharmacogenetics and pharmacogenomics have revolutionized the way we design therapeutic protocols. Not only the one-size-fits-all is obsolete but would even be considered an unethical approach. In the following decades, the possibility to intervene on the specific aetiologic molecular mechanism of each patient will bring the personalized medicine to full realization.

Similarly, a growing number of new biological entities is competing with the new chemical entities, while blockbusters are replaced by targeted treatments and chemical synthesis of medicinal products is no longer the dogma in the time of advanced therapies and regenerative medicine.

The pharmaceutical industry, the regulatory agencies and the health systems seem to be ill- equipped to react promptly to the continuous transformations but in the era of the Darwin's medicine the survival depends on the capacity to adapt to a dynamic environment.

START UP E AI: IL PUNTO DI VISTA DEL VENTURE CAPITAL

Giuseppe Tomei

LVenture Group

Artificial intelligence is changing the fundamental structure of every industry in many different areas: AI startup investment rose 141 % in '17 compared with '16, attracting more than $15bn investments globally.

AI for Healthcare is becoming a major proving ground for AI capabilities, with both startups and VC investors recognizing the enormous potential that AI solutions can offer.

However, the field of AI is evolving rapidly and is very difficult tracking progress, and it is worth providing an overview of the state of the art in terms of VC investments, international competition, and main trends for the future.

DIGITAL THERAPEUTICS, PREPARING FOR TAKE-OFF...

mApp, Devicse, Artificial Intelligence

Giuseppe Recchia

Fondazione Smith Kline

The goals of medicine are to save and prolong life, to promote and maintain health, to alleviate pain and suffering (1), through preventive, diagnostic, therapeutic and rehabilitation interventions. Alongside the pharmacological therapy, the convergence of technology and biomedicine now allows *Digital Therapy* to emerge as a new opportunity supporting the achievement of these goals.

Digital Therapeutics are a new category of apps that help treat diseases by modifying

patient behavior and providing remote monitoring to improve long term health outcomes. Depending on the disease, *Digital Therapeutics* can encourage patients to stick to diet and exercise programs or help them adhere to drug intake regimes (2).

The major difference with the existing hundreds of wellness apps is that *Digital Therapeutics* implement treatment programs tailored to specific ailments, especially major chronic diseases like diabetes, heart disease, high blood pressure, and pulmonary diseases like COPD. Because patient behavior is so crucial in preventing and limiting the severity of these life-threatening illnesses, the early evidence is that these digital health programs, often combined with human coaching/interaction, can make a significant difference in health outcomes (2).

Improved outcome results are one reason why health systems and insurance firms are so interested in the leading startups. Mobile app based digital treatment programs can be delivered at massive scale and low cost, and by helping to prevent disease progression, can potentially save insurers billions of dollars (2).

Another reason of interest about the potential of mobile delivered health programs is data. With precise regimes and daily monitoring, *Digital Therapeutics* can offer a large amount of data that can potentially provide doctors unprecedented insights into patient behavior and create feedback/optimization loops for individual patients. Enabling patients to take greater control over managing their chronic illnesses and preventing disease progression could yield huge cost savings throughout the entire healthcare system (2).

Some *Digital Therapeutics* is meant to entirely replace medication with behavioral based treatment, others are designed to work in conjunction with medications by helping patients better manage their treatment regimes. Companies that have taken this approach are Amiko (3) and *Propeller Health* (4), which make a sensor that attaches to inhalers used by people who suffer from chronic asthma and COPD. The sensor monitors inhaler usage and provides feedback via a mobile app. Propeller has partnered with GlaxoSmithKline to create a digital therapy platform to guide patients in using its asthma medications.

Digital health programs, which can be tailored and optimized for individual patients and delivered at scale via mobile, may represent a transformational development in healthcare, leading to a "*third phase*" of medicine, after small molecule drugs and protein biologics.

A major issue for the development of *Digital Therapeutics* regards the regulatory pathways for their approval and prescription. Among different objectives, the 21st Century Cures Act, aimed at accelerating the discovery, development and delivery of life saving and life improving therapies and transforms the quest for faster cures, emphasizes the need to remove this regulatory uncertainty for the development of new medical apps (5). Regulatory uncertainty has slowed the development of medical apps that generate real time patient data. These apps hold tremendous promise for improving healthcare—saving time, money, and lives. The 21st Century Cures Act provides more certainty for app developers, clarifying their regulatory path moving forward and will speed the creation and deployment of these innovative health tools (5).

The development of Digital Therapeutics may represent an opportunity for therapeutic R&D in Italy and for startups. While drug research and development depends on huge investments and technology transfer from academia to industry, discovery and development of Digital Therapeutic requires a different level of resources. Expertise in AI technology and drug development, supported by clinicians, patients, healthcare and institutions, must be aligned to the common goal of developing a new class of therapeutics.

References

1. Hasting Center Report. The Goals of Medicine. The Forgotten Issues in Health Care Reform
2. Natanson E. Digital Therapeutics: The future of Health Care will be app-based. Forbes 2017
3. http://amiko.io/
4. https://www.propellerhealth.com/
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Abstract Start up

HIQ-NANO

Relatore: **Mauro Moglianetti**

It is well known that antioxidants are a major indicator of a healthy lifestyle. Antioxidants help fighting oxidative damage, which is usually accelerated by stress, cigarette smoking, alcohol, and poor diet habits. Traditional antioxidant assays involve multiple steps, require expensive reagents and instrumentation, and they need to be used under controlled conditions. As a consequence, they are expensive and not portable. iBlue is the first point-of-care, home-testing kit that enables to measure the total antioxidant level of a variety of samples, in only 5 minutes. The technology behind iBlue is based on a strong know-how and two patent applications have been deposited. Several colorimetric tests are in the final

stage of R&D process whilst two of them are on the early field trails. More details can be found at the website: www.ibluelab.com

MAG SHELL (POLITECNICO DI MILANO)

Relatore: **Marco Ferroni**

Mag Shell is a research project and prospective spin-off of Politecnico di Milano. Its ultimate purpose aims to develop a biodegradable device, injectable into the posterior chamber of the eye for the treatment of retinal pathologies, such as age-related macular degeneration, and able to release precise drug doses at predefined time intervals. Age-related macular degeneration (AMD) is a chronic and progressive disease of the central retina. It is the leading cause of vision loss among people over 50 years old in developed countries and its prevalence increases with age. AMD is characterized by early/untreatable and late/treatable stages. For the late case, two forms are present: the neovascular/wet form and the atrophic/dry one.

The wet form accounts for 90% of AMD-associated acute loss of vision even if it is less prevalent. Studies report an increase of prevalence in the next years, with 17 million of late-AMD and 240 million of early-AMD cases at 2040. A potent angiogenic factor, the vascular endothelial growth factor (VEGF), is the trigger of choroidal neovascularization associated with wet-AMD. The most effective treatment strategy is currently represented by repeated intravitreal injections of anti-VEGF drugs: vision can be maintained in over 90% of patients and improvement can be achieved in 25-40%. On-label VEGF inhibitors are administered monthly until maximum visual acuity is achieved and/or there are no signs of disease activity followed by monitoring and as-needed treatment.

They are injected in the affected eye every month for three consecutive months followed by one injection every two months. Literature review concluded that outcomes were superior with monthly dosing and that treatment outcomes were better when more frequent injections were used. Nevertheless, repeated treatments and activity assessment represent a significant burden for patients, caregivers and physicians, with several high costs associated and quite low patient adherence to the treatment (40% of patients does not follow the treatment). To solve this problem a sustained anti-VEGF delivery system to the back of the eye would be ideal and its use would reduce the burden of repeated treatments for patients, caregivers and physicians, cutting the therapy overheads and increasing the patient compliance.

So, Mag Shell aims to become a medical device able to drastically reduce the number of yearly intravitreal injections from avoiding all the risks associated to the recurring injections (i.e. infections, complications), social issues and clinic-management bothers, due to its unique behavior of monthly and autonomous releasing. It is made of biodegradable magnesium layers separated by drug doses. Drug will be released at therapeutic times after the magnesium shells erosion.

Mag Shell will be completely autonomous and totally bioresorbable by the human body. It will reduce the distress of monthly injections to patients and the burden to clinicians and to the Health System. Mag Shell will cover a long period therapeutic need with a single injection, increasing the number of patients not leaving the cure and so dramatically reducing the costs sustained by the Health System. Nowadays, only the wet-form of the age-related macular degeneration can be treated, with an annual cost of 2000 € for each patient. If we consider the amount of the Italian patients, the National Health System has to cover 40 million € and 70 million € for drug and extra-drug costs, respectively. Mag Shell will cut down the main part of the extra-drug costs, which can be estimated equal to 50 billion € per year on a worldwide scale. Mag Shell is a patent of Politecnico di Milano, invented by Prof. Federica Boschetti and Dr. Marco Ferroni of the Department of Chemistry, Material and Chemical Engineering “Giulio Natta”, and Dr. Matteo Cereda, MD, retinal specialist.

The idea was born at the Laboratory of Biological Structure Mechanics of Politecnico di Milano as innovative solution to the current clinical problem. After two years spent in developing math and strong method behind the implementation of the first prototype, Mag Shell is now transforming this idea into a medical device to be used in clinical practice. The promising results obtained with in-silico and material characterization tests in ophthalmological field proved the need to produce the first prototype for the proof of concept phase. Mag Shell received 25000 € grant from the Italian Society of Ophthalmology in November 2016 and was a finalist

in the Switch2Product 2017 competition. The combined approach proposed by the team has been awarded in different congresses from 2015 to 2017.

VISIHOLOGIC (POLITECNICO DI MILANO)

Relatore: **Omar Antonio Pappalardo**

Percutaneous procedures are techniques to treat mini-invasively pathologies of the human body. When compared to standard surgical interventions, percutaneous procedures provide fewer complications, less pain and a shorter hospital stay for the patients. Thanks to these advantages, the number of percutaneous procedures is growing faster and faster every year. Despite these stabilized advantages, clinicians have to perform the procedures "almost blind" without a direct view of the site of interest: as a consequence, they strongly rely on intra-procedural imaging data to guide catheters towards their target. However, nowadays, intra-procedural imaging such as fluoroscopy and ultrasound is often difficult interpret and may expose patients to unnecessary radiations and contrast agents. This is particularly important since the human body is strongly 3-dimensional, dynamic and also characterized by high anatomical complexity and variability, forcing the operator to abstract from 2D to 3D throughout the whole procedure. Moreover, the number and the complexity of minimally-invasive devices are growing, increasing the need of specific tools for the training and teaching that can merge an accurate anatomical description with ease of use. A precise procedural planning is therefore essential to prepare each case and improve the outcomes of the procedure. Critically, no technologies at the moment can adequately support percutaneous procedural planning or training.

For these reasons, Visihologic offers an innovative solution to jump out of the screen using holograms. Visihologic develops specific software solutions for the holographic rendering of patient specific anatomies: with advanced proprietary algorithms we can accurately reconstruct 3D dynamic models giving the clinicians an intuitive, immersive and enhanced view of its pathological target.

Visihologic solution will be key to innovate in patient education, operators training and procedural planning. Also, thanks to the possibility to carry our holograms in the hemodynamic room during the procedure, our innovation will help decreasing the dose of radiations and contrast agents for the patient, reducing time and costs of the whole percutaneous procedure.

KEETHINGS ITALY

Relatore: **Giovanni Raffaele Gargiulo**

Keethings redesigns the User Experience in the Life Sciences Operations: we deliver an innovative Conversational Platform which accelerates the factory digitization by simplifying the communication between machines, applications and humans.

Through an intuitive interface designed for the workforce, based on messages and natural language interactions, Keethings allows users to manage all their activities from one point of access:

- guiding in the execution of activities through workflows, tasks and execution functionalities;
- providing contextual information that help deciding and acting better and faster;
- enabling interaction and collaboration in real time with colleagues, machines, sensors and applications.

Keethings is the only collaborative execution platform available in both Cloud and On Premise, specifically designed for the industrial world and completely customizable and adaptable to customer needs and processes.

The main components of Keethings are:

- ***Simple & single UI enabling real-time interactions***

Use Instant messaging and rich cards to easily add comments, collaborate and assign tasks. Break barriers between departments and shifts, follow your factory in real time, and simplify your day-to-day operations by focusing on important task.

- ***Workflow to manage people and processes***

Simply configure workflows to automate faster decisions based on data from applications, machines and workforce. Optimize operation time and cost by collecting available, precise and relevant data from each user involved in the processes

- ***Bots to integrate & communicate automatically***

Transform every Company asset in a "talking object", simplify interactions with complex processes and machines data, automate the decision making using our distributed intelligence framework

- ***Knowledge base to solve problems in real time***

Quickly find solutions by sharing employees' expertise and company knowledge. Create easily "frequent questions database" to faster solve recurring issues that affected equipment and providing real time support by our

manufacturing assistant “Smarty”.

We enable our customers to dramatically improve their margins by managing operations in real time, optimizing the workforce and lowering cost and time of their manufacturing processes.

OACP

Relatore: **Enrico Di Oto**

OACP S.R.L. is a company that was conceived in 2015 as a project within the Bologna University Entrepreneurship program called LaunchPad.

“We decided to create the company as the driving tool for commercialising and bringing to market, the technological developments realised from the project”.

Initially, the company was called DoMo Genetics and won the first edition of the Launchpad program and enrolled into the TVLP. Co mindset program in Silicon Valley (Menlo Park, SF).

During this 20-days program, our company was awarded one of the best projects.

One year later, OaCP was official incorporated and was selected to take part in the RebelBio Accelerator Program in Cork. We have an aggressive and strategic growth strategy that has seen us securing distribution agreements with companies in Japan, South Korea, Latvia, Australia, New Zealand and India within the first 4 months of incorporation. Our company is headquartered in Ireland with an R&D dept. at the Bologna University, where we enjoy not only their world-class equipment and facilities but also maintain key industrial partnerships and collaboration with the university and research groups.

We provide chemical reagents that create a rapid and more cost-effective genetic diagnostic system that reduce the test time for cancer diagnosis from 3 days to just 2 hours and the costs up to 50%.

With our reagents the labs don’t need to change protocols, other reagents or to train additional personnel.

Our objective is to provide oncology diagnostics laboratories and research institution with solutions that will disrupt cancer diagnosis times and cost.

We believe that quality of work in molecular biology is fundamental in delivering a rapid and cost-effective solution to a world that is demanding that answers be delivered accurately and quickly. Our mission is to reduce test time, eliminate cancer misery and save patients’ lives. To achieve this mission, we count on key values: Quality, Competence, Accuracy, Teamwork and Integrity, shared by our teams.

In OACP we believe that LESS time for Diagnosis is MORE time for LIFE.

PLUMESTARS

Relatrice: **Francesca Buttini**

PlumeStars s.r.l., founded in September 2013 as an innovative start-up, is nowadays a SME specialized in drug delivery for rare diseases. The first product in pipeline is an antibiotic powder for inhalation prepared by spray drying process based on a patented technology claiming the molecular deposition of fatty acids on drug microparticles. The powder has remarkable respirability and high drug content and administered with a dry powder inhaler for local treatment of lung bacterial infections in Cystic Fibrosis (CF) patients. CF patients are prone to chronic infections by *Pseudomonas aeruginosa*, associated to deterioration of lung functions, frequent hospitalization and worsening of the prognosis.

Cystic fibrosis affected approximately 70,000 patients in the major pharmaceutical markets in 2010. The cystic fibrosis market supports expensive products such as tobramycin, an antinfective drug used by approximately 15,000 patients. The annual treatment costs is approximately US $20,000 per patient. The cystic fibrosis pharmacotherapy market is estimated to grow from $1.08 billion in 2010 to $1.93 billion by 2015. The antibiotics systemically used for lung infections reveal important adverse effects. In case of their direct lung administration, drug is concentrated at the site of action, reducing dosage and systemic exposure, with an overall decrease of side effects.

Plumestars applied its proprietary technology to the production of two products: tobramycin and amikacin dry powder for inhalation. The drug will be administered using a dry powder inhaler (DPI). The product is constituted by 99% of pure active. The novelty of our production process consists in the use of an adjuvant able to protect the product from the environment humidity and to provide a high respirability for antibiotic deposition into the lung. This excipient and the manufacturing technology used let to avoid the addition of other adjuvant which would be inhaled with the drug product. Finally, the limited powder mass to inhale let the fill of the entire dose in a single capsule, limiting the number of patient maneuvers to take the dose.

The company obtained the orphan designation for amikacin DPI by EMA (EU/3/14/1397) and FDA. The orphan designation guarantees a period of marketing exclusivity following the marketing approval (10 years in EU; 7

years in US) and fee reduction during development. Moreover, the protocol assistance, i.e. the list of experiments required to get the marketing authorisation, has already been discussed and approved by EMA.

REACT4LIFE (R4L)

Relatore: **Maurizio Aiello**

React4life (R4L) provides technological solutions able to emulate portions of the human body in the laboratory obtaining 3D healthy/disease models in vitro, currently not available on the market.

In detail R4L has produced a "Multi-Organ on Device" – MOOD which recapitulates the clinically relevant size of human organs and the fluidic connection among them, finally obtaining lower cost, faster and more accurate results than with standard in vitro and in vivo tests. Portfolio of R4L at the moment comprise MOOD device, a breast cancer tumor model and neuroblastoma tumor model (patents filed).

The application sector is multiple: pharmaceutical companies/CRO for preclinical drug testing, cosmetic companies, agrifood industries, as well as research laboratories.

The Business model envisages three lines of development:

(i) realization and sale of the disposable MOOD device for research.

(ii) realization of disease models for in vitro testing, and selling of a KIT composed by fluidic device and tissue models themselves

(iii) selling of medical device for personalized therapy (biopsy culture).

The reference market is that of testing substances and drugs. In the pharma sector, the market is that of animal experimentation adopted by research laboratories, Pharma and CRO companies. In the biotech sector, in general, the market is that of companies that perform testing activities.

Global oncology drug market is 111 B$ expected in 2020 with a CAGR of 7,1% (2014-2020). The R&D preclinical development market was 10 B$ in 2015.

Achievements: Technical and functional validation of the device. Industrialization in itinere, first marketing actions limited to the cosmetic sector, patent filed of core technologies and tumor models

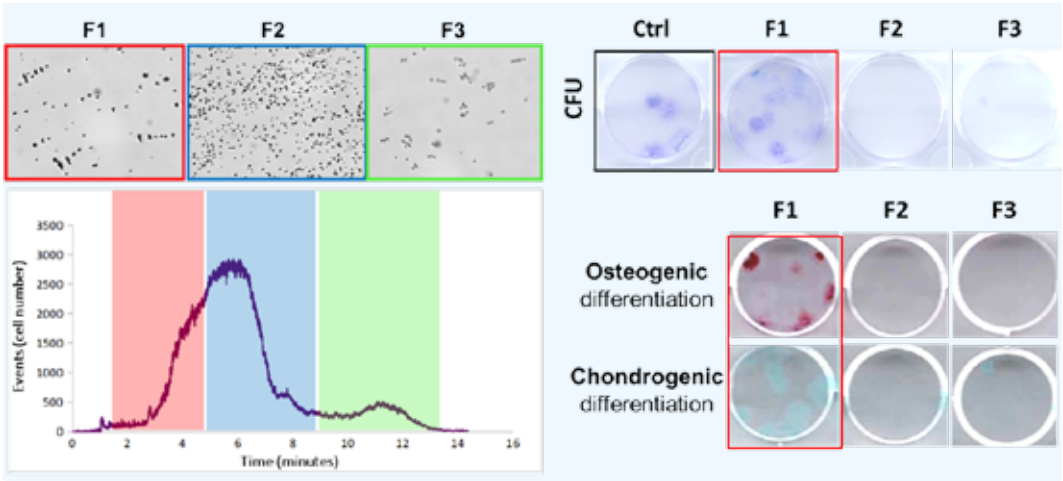
Milestones: industrialization and packaging completion of, pricing strategy and defined marketing strategy, marketing actions, recruiting agents in Italy, identification of distributors in Europe, R&D tumor model validation, PoC of sensorized MOOD fluidic device.

Strengths points: multidisciplinary (bioengineering, material science, cellular biology) team, patent protection of technology and tumor models, high gap between the cost of our solution and that of a mouse model (xenograft), networking capacity, value proposition, strategic vision. Moreover, we are partners of a project Future emerging Technology (FET), which is an extension of present MOOD device concept and is related to a model of metastasis: 400Kuro financing and technology exploitation on the market rights.

STEM SEL

Relatore: **Ilaria Vigliotta**

Stem Sel is an academic spin-off of the University of Bologna, Italy, founded in 2013. The first developed product (Celector®) is a **patented** instrumentation for the **separation**, **isolation**, real-time **microscopy** and **collection**



Separation, collection, and further cloning/differentiation of living, multipotent stem cells from human bone marrow concentrate.

of **living cells**, as they were molecules in **chromatography**. Celector® **tag-less separates** cells solely based on their native physical properties. The absence of immuno-tagging is the unique feature of Celector®: it avoids possible **cell** alterations, keeping the native physiology and, in the case of stem cells, the regenerative power. On the screen of Celector®, you can also see the cells floating during their separation, and **tracked by a camera** like the frames of a movie. Alongside the **separation movie**, you can also observe a single frame, with the screenshot option, where the target cells are separated from the other cells, to be further studied when frames are saved in a library. Celector® (and relevant consumables and disposables) will be **commercialized from mid. 2018** for different applications to cell biology/biotech, particularly to **multipotent, living stem cell analysis**, from cell therapy in Regenerative Medicine to *in-vitro* cell tests for drug discovery and development.

The core application of Celector® is seen in the field of **cell biology/biotech**, such as Cell Therapy. As with standard drugs in standard therapy, cell therapy applications require rigorous **Quality Control** of the used cells.

A **chromatography-like method** able to separate, profile and collect different cell populations present in such complex samples **does not exist** yet. Celector® is the **new solution** to be implemented in the QC lab platform: **no immuno-tags** are required, so **fully viable** and **non-manipulated cells** can be **profiled** and **collected** for further characterization or **stored/cultured/amplified/injected**.

ESSERRE PHARMA

Relatrice: **Alessia Doria**

Esserre Pharma, a nutraceutical startup, was established in 2013 with the intent of bringing the evidence-based principles, typical of pharmaceutical research and production system, to the nutraceutical industry. This model aims at guaranteeing: quality, safety and openness, even though it is not required by industry regulations. On this basis, a new term has been coined "NutracEtico"- the italian word for "NutracEthical". This concept explains, through specific standards, the path from research to production. Esserre Pharmas' main research focus is "Inflammation" with special attention to the following areas of the human body: central nervous system, cardio-metabolic and gastro-intestinal systems. Products have been subjected to clinical studies, that have been published in cooperation with research centres, and registered as patents. These products are made in Italy under strict "Good Manufacturing Practices" and all the ingredients used in them come from Italy. The willingness to find solutions to one of the most serious and important problems in today's society, both in terms of health and economic data, led to the development and research of nutraceutical products to cure chronic diseases. This new approach could be considered as a new tool to promote a paradigm shift: from treatment to prevention, that could also help containing the expenditures of NSS (National Sanitary Service).

A new process that is based on innovation, finding new answers that will improve life quality for patients and increase the number of healthy people. These concepts are well represented by the "Bergamot Case". This citrus, that is well known within the perfume industry, has recently been considered by the nutraceutical industry because of the richness polyphenols, found in its juice, which have anti-inflammatory, hypoglycemic and lipid-lowering effects. Colber ®, an innovative dietary supplement, has highly concentrated bergamot flavonoides: its formulation combine innovative ingredients with the synergistic mechanism of action on cholesterol, triglycerides and blood glucose levels. Bergamot juice extract is produced in Calabria, Southern Italy, and obtained from fresh bergamot fruits through an eco-sustainable and highly technological patented process using only natural and food grade solvents.

The clinical studies performed, show that Colber is a safe and effective product for the management of the main modifiable risk factors for cardio-metabolic diseases. Hence, starting from organic natural components, Esserre Pharma is in search of innovative phytocomplexes that can better act against chronic diseases, with first class products, and placing patients at the center of the attention. Thereby a valuable network has been formed around patients, in order to achieve shared, ethical and quality results. This represents a structure that is consolidating over time and is based on three principles: research, innovation and connection. Moreover, the latter has been converted in a digital concept: within a closed group on FaceBook, addressed to nutritionists, we are developing a collaborative scientific communication project in order to give them constant news, updates and scientific contents. We believe in the importance of actively contribute to the diffusion and production of scientific contents used as tools to prevent and fight chronic diseases at 360 degrees.

PROTAK SCIENTIFIC ITALIA

Relatore: **Angelo Amodio**

Enzyme indicators for HPV decontamination validation and VHPH cycle development.

Enzymes – plainly the most important biotechnology of our era.

We no longer have to wait 7 days for a biological indicator result – enzyme indicator gives results instantly. Public Health of England (PHE) developed and keeps on developing the technology based on the thermo-

stable Adenylate Kinase (tAK) enzyme. It is a energy regulator in thermophile Sulfolobulos Acidocaldarius (SAC) cell structure. It is manufactured with very high yield fermentation process. PHE was really concerned with CJD (Creutzfeldt-Jakob disease) about 15 years ago and and so it looked for the technology that could be a surrogate measure for prionic inactivity. The process consists to pair tAK with a conventional luciferin/luciferase reagent set (ATP and ADP), and read the bioluminescence emitted by the enzyme.

A reel to reel manufacturer process, designed by a company call BIODOT, is used to product the enzyme indicator strips. Through this process we are able to apply tAK in a very control way getting consisted manufacturing with less 5 % CV. The strips are about 5 mm wide per 50 mm long. The bound between the tAK and the carrier is really hardest. A luminometer, wich is manufacturer by a company called Berthold in Germany, is used to read the residual tAK activity in Relative Light Unit (RLU). We know from the existing studies there is correlation between enzyme indicators and biological indicators and in fact the inactivation profile of tAK and Geobacillus stearothermophilus is the same. We can read a test every 60 seconds and deliver it on a custom platform called ATHENA. This piece of software is able to correlate the data come out the enzyme indicators and biological indicators.