



THE UNIVERSITY OF MALTA  
RESEARCH, INNOVATION  
& DEVELOPMENT TRUST

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## CELEBRATING YOUR SUPPORT

ANNUAL REPORT 2019





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## THE IMPACT OF GIVING TO UM

Message from the Chairman

Since its setting up in 2011, the RIDT has seen a steady increase in donations, year after year. I am thrilled that a growing number of you are inspired to invest in our research activities. Indeed, since its inception the RIDT has financed more than 60 research projects, including 10 PhD scholarships in a wide range of areas – from cancer research to criminology, from climate change to ophthalmology. All this happened thanks to your continuous generosity and support.

A community that supports its university is a community with its priorities in place. We owe a lot to our generous donors who support the sterling work that our scientists and researchers are doing. Whether you made a financial contribution or whether you donated equipment, attended one of our fund-raising events or supported us in any other way, we are grateful for your backing. It helps us achieve our objective – to attain enduring excellence in research and education in all areas of study, for the benefit of society.

In this report you will be able to follow the progress of a number of projects that have received funding thanks to your donations. Among them there are the 6 cancer research projects that had kicked off in 2018 following a call for research proposals in this area. The University of Malta is indebted to the ALIVE Charity Foundation which has been sustaining cancer research studies since 2013 and which has to date donated over €500,000.

In its Strategic Plan 2020-2025 the University of Malta has identified a number of strategic themes that will be followed during this period. High on the strategic agenda is the theme ‘Fostering Research of Local, Regional and Global Significance’. It is my pleasure to note that the researchers at the University of Malta are amongst the most efficient in the EU based on quantifiable metrics, such as the number of quality publications per research Euro invested. In our Strategic Plan we commit ourselves to continue strengthening the quality of our research output through high-calibre academics and the provision of an enhanced research infrastructure. The RIDT plays an important role in our quest to achieve these objectives.

Whether you made a financial contribution or whether you donated equipment, attended one of our fund-raising events or supported us in any other way, we are grateful for your backing.

To everyone who gave to the RIDT this year – thank you. It is wonderful to see such an inspiring community of donors uniting behind the University of Malta’s mission. We could not be more grateful for your support.

**Prof. Alfred J. Vella**  
CHAIRMAN

The RIDT is governed by a board of trustees appointed in terms of a trust deed signed on the 18th April 2011.

**Professor Alfred Vella**  
Rector of the University of Malta – ex officio

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President of the Council of the University of Malta – ex officio

**Dr Mario Vella**  
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Permanent Secretary, Ministry of Finance – ex officio

**Mr Mario Grech**  
Appointed by the Prime Minister

**Professor Saviour Zammit**  
Appointed by the Prime Minister

As specified in Legal Notice 186 of 2010 Education Act (Cap. 327) the Board of Trustees is composed of not less than three and not more than seven members, one of which is the Rector of the University of Malta, ex officio, together with at least two of the following: the President of the Council of the University of Malta, ex officio; the Governor of the Central Bank of Malta, ex officio; the Permanent Secretary of the Ministry of Finance, ex officio; two other persons appointed by the Prime Minister from amongst the members of the Council of the University of Malta.





## RESEARCH IS HOPE

Message from the CEO

This annual report has been compiled during the height of the COVID-19 crisis that has wreaked havoc since it was first reported in January 2020. The social and economic ramifications are still to be properly measured, but the first indications show us that they will be devastating. We have seen major economies brought down to their knees, and we have witnessed scenes that reminded us of long-gone times.

Now is the time for the world to take stock and humbly come to terms with the fact that we need more than just a vaccine to ensure that our lives are better protected, and that enough resources are allocated to where it matters most.

At the same time we need to look closely at our lifestyles, our customs and at our ability to react to a crisis. Hence, if we have learnt anything from COVID-19, it is that while some of our health systems were robust and ready for a challenge of this magnitude, humankind was nowhere near prepared to take the social, economical and psychological impact that came so sudden and so unforgiving.

There is little doubt that the solutions for most of the sufferings caused by this pandemic lie with science and research. Scientists have never been in a better position to advocate for a more central role of research across the globe, because research has never been as important as today. We simply cannot afford for funds to cease.

vaccine is developed, the reality is that this virus will be with us for a long time. The same applies to the technology required to provide early diagnosis, better understanding of the data gathered from the swabs, and above all, how we can prevent this virus (or any others) from striking us hard. How can we make ourselves less vulnerable to such health threats?

All the answers for these questions can only be developed through scientific research. Universities and research centres, both public and private around the world, are conducting studies to be able to provide the answers and the solutions to these challenges.

Now, more than ever, is the time to support researchers and their projects. The Research Trust (RIDT) of the University of Malta has proved to be the interface between the researchers and the Maltese community. We have managed to create a strong trust between our donors and their beneficiaries. We will continue to rely on the generosity of the Maltese donors, and for this we will be ever grateful.

In the words of Marie Skłodowska-Curie: “Now is the time to understand more so that we may fear less.” ■

**Wilfred Kenely**  
CHIEF EXECUTIVE OFFICER



## OUR MISSION

Discovery has fascinated mankind since the dawn of our species. Our determination to ask why, what and, most importantly, what if, has sped us along the journey of evolution. Yet, discovery requires perseverance and patience.

In the rapidly-changing world, Malta must stay focused on becoming a true knowledge-based society through continued research and innovation, both to stay ahead in the global marketplace and to progress ourselves as a sustainable, forward-thinking community.

RIDT's vision is to foster this paradigm shift towards research as the main driver of Malta's growth and progress, so that the country can continue to thrive in tomorrow's world.



## WHO WE ARE

The RIDT was established in April 2011 by the Government of Malta.

The Trust's main objective is to be an integral part of Malta's established policy to bolster investment in research, innovation and development in Malta, maximising the potential of the research facilities at the University of Malta and helping to commercialise the research discoveries made there.

The RIDT is a small but dedicated team that operates out of the Valletta campus of the University of Malta. You can reach us by either sending us an email on [info@ridt.org.mt](mailto:info@ridt.org.mt) or visit our website [ridt.org.mt](http://ridt.org.mt) or our facebook page. We will be very happy to talk to you.



Wilfred Kenely  
Chief Executive Officer



Daniela Allen  
Senior Executive



Sarah-Lee Zammit  
Senior Executive

### RIDT ANNUAL REPORT 2019 - ACKNOWLEDGEMENTS

#### Copy

Laura Bonnici – Writemeanything  
Daniela Allen

#### Photography

Andrew Gauci Attard – Imagine Photography  
Joe P. Smith  
Jon Borg

#### Design

Alexia Baldacchino - DISINN

#### Print

Abbey Printers

#### Published

October 2020

## RIDT IN NUMBERS

SET UP IN 2011  
**€3,800,000**  
RAISED IN TOTAL

**€700,000** RAISED IN 2019

65 PROJECTS  
RECEIVED FUNDING

10 PHD  
SCHOLARSHIPS

850+ DONORS  
40 MAJOR DONORS  
(OVER €10K)



## CANCER RESEARCH PROJECTS MADE POSSIBLE BY THE ALIVE CHARITY FOUNDATION

Contributions from the ALIVE Charity Foundation totalling €314,818 became the financial springboard for six potentially life-changing cancer research projects launched in Malta throughout 2019.

Cancer research in Malta took a significant step forward in 2019 thanks to the generous support of the ALIVE Charity Foundation.

Following a call by the Research, Innovation and Development Trust (RIDT) at the University of Malta in November 2018, six vital cancer research projects were launched throughout 2019. These projects were made possible by multiple donations over previous years from the ALIVE Charity Foundation, a non-profit organisation that is the first local charity foundation to raise public funds with the specific aim of investing in medical research in Malta.

Although the call by RIDT, which was open to any Resident Academic of the University of Malta, initially sought proposals for cancer research projects to benefit from a total fund of €240,000, the extremely high standard of the applications received in response inspired further consideration. Of the 21 applications received before the call's closing date, six projects were selected in early 2019 following a process of assessment by an external team of expert evaluators – while discussions with the ALIVE Charity Foundation led to the final amount to be dispersed being raised to €314,818.

ALIVE Charity Foundation is a non-profit organisation that is the first local charity foundation to raise public funds with the specific aim of investing in medical research in Malta.

Each of the six projects selected had to have a duration of no more than 36 months and were awarded a maximum of €60,000 to launch, with a limit of one grant per project under this specific call. The amount awarded to each project took into consideration the relevance of the work proposed and the quality of work anticipated.

The research that took place in 2019 on these six projects has explored new and innovative avenues regarding the causes, mechanisms, diagnosis, treatment and even prevention of cancers such as colorectal cancer, chronic myeloid leukaemia, skin cancer, breast cancer, and those related to the central nervous system.

The grants made possible by the ALIVE Charity Foundation have thereby supported research that may yet reduce the incidence of cancer, improve cancer survival rates, and boost the quality of life of cancer patients across the globe. ■





Prof. Godfrey Grech



Prof. Godfrey LaFerla

## DIAGNOSING COLORECTAL CANCER EARLIER

The ‘Colorectal Cancer Risk Factors and Design of Preventive Strategy and Early Diagnosis’ project is led by Prof. Godfrey Grech from the Faculty of Medicine and Surgery, Department of Pathology at the University of Malta, in collaboration with Prof. Godfrey LaFerla.

In Malta, colorectal cancer (CRC) is the second most common type of cancer in terms of new cases and deaths. Also known as bowel cancer, colon cancer or rectal cancer, CRC is the development of cancer from the colon, rectum or parts of the large intestine.

Most CRC cases are due to age or lifestyle factors, while few are linked to underlying genetic disorders. However, the lack of early symptoms, coupled with low acceptability towards screening programmes or medical advice, means that many CRC cases are diagnosed at an advanced stage of the disease. By contrast, early diagnosis often allows for more treatment options, a better quality of life – and a higher chance of survival.

This new project from the University of Malta hopes to offer more scope for the early diagnosis of CRC, while determining the risk factors behind the disease and even designing a strategy for preventing it.

“We set out to create a fully-comprehensive, sampled prospective cohort study, where we would follow a group

of similar individuals with key differences over time, to observe how they are each affected,” explains Prof. Grech. “Our pilot project would measure microbiome profiles and plasma biomarkers, providing us with high quality data upon which to design a potential future strategy for early diagnosis.”

The discovery of a blood test that offers early detection of CRC may have significant impact globally. It may inspire a wider acceptability for screening, which increases the chances of establishing more effective treatment outcomes for the patient.

Meanwhile, previous studies have shown a correlation between gut bacteria composition and colorectal cancer. With this connection in mind, the project has also been designed to associate gut microbiota with specific dietary intake and compare these findings alongside the progression of disease.

“The balance of gut bacteria is highly affected by diet. Their diversity and abundance have a major role in gut lining

integrity, complex metabolism of dietary components, and inflammation and immune function,” Prof. Grech elaborates. “Since microbiota composition can be measured as part of a screening process utilising a faecal sample, understanding the correlation could mean understanding how the disease progresses – and diagnosing it earlier.”

Preliminary studies involved collection of dietary information and staining of fixed tissue with proliferation markers. Through this process, the team noticed that a certain proliferation marker was increased in the early stages of the disease, which was associated with a high fat, high protein, low fibre diet. The finding prompted the team to explore other forms of proliferation markers in plasma samples, to record their effects.

In addition, a blood sample was taken from consenting individuals to isolate exosomes in blood to investigate the possibility of an increase in proliferation markers.

“The use of blood-derived exosomes could be a potential method to screen this change originating from tissues,” continues Prof. Grech. “We have shown that exosomes can be isolated from metastatic CRC patients and that gene amplification found in cancer tissue is measured in blood-derived exosomes.”

Once microbiota data is analysed and the results originating from plasma correlated with dietary findings, the project is set to join a more international effort against CRC.

“This project will provide the basis of a prospective study in collaboration with the International Agency for Research on Cancer (IARC-WHO), which established and coordinates the large EPIC (European Prospective Investigation into Cancer and Nutrition) cohort,” concludes Prof. Grech. ■

The discovery of a blood test that offers early detection of CRC may have significant impact globally. It may inspire a wider acceptability for screening, which increases the chances of establishing more effective treatment outcomes for the patient.



**THIS PROJECT  
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RESEARCH  
GRANT.**





Prof. Mauro Pessia, Dr. Sana Mubashir, Ms. Eleanor Harold-Barry

## CONSIDERING DEX AS GBM TREATMENT

The Dexamethasone in Glioblastoma Multiforme Therapy cancer research project is led by Prof. Mauro Pessia from the Department of Physiology and Biochemistry at the University of Malta, in collaboration with Dr. Maria Cristina D'Adamo, Prof. Mario Valentino and Lorena Coretti.

### PROJECT 2

Glioblastoma multiforme (GBM) is the most common, malignant and invasive type of any tumour related to the central nervous system. These glial tumours rapidly grow and often spread into nearby brain tissue. A GBM diagnosis tends to have an extremely poor prognosis, with an average survival rate of around a year. Coupled with a consistently high number of global cases and deaths, GBM remains a crucial public health issue.

Over the past six decades, this incurable brain tumour has most commonly been treated with dexamethasone (DEX), although its mechanisms are not yet fully understood.

Recent reports regarding DEX therapy have found that it has both beneficial and detrimental effects, but none have yet been able to clarify its complete role in the treatment of GBM or has fully investigated the possibility of DEX withdrawal.

“This project looks into the possibility that DEX withdrawal

boosts GBM cell increase, migration and aggressiveness, both in vitro and in vivo,” explains Prof. Pessia. “Through a multidisciplinary approach, we aim to clarify how DEX works when used to treat GBM, as well as test drugs (such as Navitoclax) that are predicted to abolish the negative effects of DEX on GBM cells.”

In fact, the project’s overarching goal is to demonstrate that DEX must be withdrawn from GBM therapy, as it reduces the life expectancy of patients by increasing the risk of GBM reappearance. However, it may also find that DEX may still be prescribed, but in combination with a drug that abolishes its tumorigenic effects.

The project has already yielded notable results throughout 2019. Studies carried out on cell cultures obtained from tumour biopsies of GBM patients showed that, in vitro, DEX treatment lowers GBM cell proliferation and migration. In vivo, meanwhile, administering DEX effectively reduced tumour growth.

Despite these temporary beneficial effects, when the DEX dosage was discontinued or reduced an unexpected withdrawal phenomenon developed. Here, researchers noted enhanced cell proliferation, as well as migration and activation of specific potassium channels.

“To further support the evidence that increasing a particular anti-apoptotic protein may be key to increasing GBM cell aggressiveness when DEX is discontinued, we are in the process of testing Navitoclax (ABT-263), which is currently prescribed to treat cancer,” continues Prof. Pessia.

Meanwhile, the project team is also testing whether the DEX treatment, in vivo, heightens GBM malignancy by enhancing tumour growth in the brains of rodents.

“Our findings could yet demonstrate that ceasing DEX therapy may be detrimental to patients, while substantiating the urgent need to reconsider the prescription of DEX in GBM therapy,” concludes Prof. Pessia. ■

The project has already yielded notable results throughout 2019. Studies carried out on cell cultures obtained from tumour biopsies of GBM patients showed that, in vitro, DEX treatment lowers GBM cell proliferation and migration. In vivo, meanwhile, administering DEX effectively reduced tumour growth.



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Dr. Lorena Coretti, Dr. Maria Cristina D'Adamo,  
Dr. Ehsan Nematian Ardestani





Dr Marion Zammit-Mangion



Dr Lucienne Vassallo Gatt

## USING MALTESE PLANT EXTRACTS TO TREAT LEUKAEMIA

The 'Differentiation-inducing Effects of Phenolic Compounds from Maltese Plant Extracts on Chronic Myeloid Leukaemia' project is led by Dr Marion Zammit-Mangion, Senior Lecturer at the Faculty of Medicine and Surgery in the Department of Physiology and Biochemistry at the University of Malta and Dr Lucienne Vassallo Gatt.

### PROJECT 3

Chronic myeloid leukaemia (CML) is a type of cancer whereby the bone marrow produces too many immature white blood cells known as myeloid cells, leading to a reduction in the number of other blood cells. CML tends to gradually progress over years and is caused by a genetic mutation in the stem cells produced by bone marrow.

Accounting for 20 per cent of adult leukaemias and 14 per cent of all leukaemias overall, CML can occur at any age, but is most common in older adults, with the majority of patients living for more than five years following diagnosis. The introduction of tyrosine kinase inhibitors such as Imatinib, which stop cancer cells growing and multiplying, has provided a far better outlook for those diagnosed at any age, increasing the chances of a seven year survival rate from 40 per cent to 90 per cent – particularly if CML is diagnosed early. Yet, in certain cases this treatment has been linked to severe adverse effects.

This new project, led by the Faculty of Medicine and Surgery in the Department of Physiology and Biochemistry at the University of Malta, aims to explore if phenolics from Maltese plant extracts may offer CML patients an equally effective, yet far more comfortable, alternative treatment.

Phenolics from Maltese plant extracts have, in a separate project, been tested at preclinical level for their effect on acute myeloid leukaemia cell lines (AML). "This work yielded positive and promising results, showing the potential of the group of compounds as differentiation-inducing agents. In the next part of our research we were interested in testing whether these phenolics were also active on other types of leukaemia," explains Dr Vassallo Gatt. "In the past two decades, the use of Imatinib as a tyrosine kinase inhibitor has revolutionised CML treatment – and although Imatinib has been pivotal in improving survival, around 33 per cent of patients have shown Imatinib resistance. For this reason, the search for novel products as alternatives to Imatinib for the treatment of CML are in demand."

The novel project, which launched in 2019, has begun the process by investigating the effects of phenolics from Maltese plants on CML cell lines and analysing the cell cycle following phenolic treatment. The team has also successfully carried out morphological analysis of changes at cellular level and differentiation marker analysis, before determining the mode of action of these compounds through RNA sequencing.

"We have already gathered a host of useful data from the project, with more yet to achieve," concludes Dr Zammit-Mangion. "These results can offer a firm foundation in the future to ascertain if these compounds might become an effective part of an alternative treatment for CML, potentially improving the outlook for CML patients across the globe."

"In the past two decades, the use of Imatinib as a tyrosine kinase inhibitor has revolutionised CML treatment"

Dr Lucienne Vassallo Gatt



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Prof. Charles Sammut



Mr Gordon Caruana Dingli

## FIGHTING BREAST CANCER WITH HEAT

Hyper4B (Microwave Hyperthermia for Breast Cancer) is a research project led by Prof. Charles Sammut from the Faculty of Science, Department of Physics at the University of Malta, in collaboration with Mr Gordon Caruana Dingli, Clinical Chairperson, Surgical Outpatients Department at Mater Dei Hospital, Dr Iman Farhat, Scientific Officer with the Electromagnetics Research Group (EMRG) in the Department of Physics and PhD student Jeantide Said Camilleri.

### PROJECT 4

Breast cancer is the most common type of cancer and the leading cause of cancer-related mortality for women across the globe. In Malta during 2018, 15.4 per cent of all cancer patients had breast cancer, resulting in a mortality rate of 6.8 per cent.

Selecting a treatment for breast cancer depends largely on the stage at which it is diagnosed and other complications. Standard clinical treatments remain surgical resection, chemotherapy (CT), hormone and radiotherapy (RT), or a combination of these. Despite the global prevalence of breast cancer and the effectiveness of these methods of treatment, they also bring with them a host of unwanted physical and psychosocial side effects.

The Hyper4B project from the University of Malta aims to address breast tumour therapy specifically by enhancing the effectiveness of RT and CT.

“It has been shown in recent studies that microwave hyperthermia (HT), which is the heating of a region on the body by means of non-ionising electromagnetic fields to temperatures up to of 45 degrees Celsius, significantly improves the effectiveness of CT and RT,” explains Prof. Sammut. “Hyper4B proposes a novel microwave breast HT system, whereby breast tumours are selectively heated using an antenna array operating at microwave frequencies (typically below 3 GHz). This study is the first of its kind in Malta, and its findings have the potential to offer long-term benefits to cancer patients everywhere. By enhancing cytotoxic effects on targeted tumours, lower CT and RT doses are possible, thus reducing side effects from these modalities.”

During her three-year PhD project, Ms Said Camilleri will be designing and testing a prototype antenna system through extensive computer simulations and experiments on breast phantoms. She started during 2019 by gathering and analysing literature concerning existing microwave hyperthermia systems and the potential application of combining microwave HT with CT and RT for breast cancer therapy. She is now in the initial stages of antenna design, with the objective of focusing the microwave field on breast tumours while leaving the surrounding healthy tissue relatively unaffected. This is the major challenge of the project.

As a final year BSc (Hons) student of physics and mathematics, Jeantide’s final year research project resulted in a peer-reviewed paper in the EuCAP 2020 conference.

“In her paper, she successfully reported on the measurement of the concentration of red blood cells in the human blood by using a novel concept, developed by the EMRG. She measured the dielectric properties of human blood samples taken from volunteers and then trained an artificial neural network (ANN) to associate these measurements with red blood cell concentration. Her results were surprisingly accurate, and this led us to submitting other research proposals,” said Prof. Sammut. ■

“This study is the first of its kind in Malta, and its findings have the potential to offer long-term benefits to cancer patients everywhere.”

Prof. Charles Sammut



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Prof. Josianne Scerri



Prof. Carmel Cefai



Dr Michael Galea

## IMPROVING QUALITY OF LIFE FOR CANCER PATIENTS

The 'Effectiveness of a Physical and Psychosocial Intervention on Quality of Life in Adult Cancer Patients' project is led by Prof. Josianne Scerri, Associate Professor and Head of the Department of Mental Health in the Faculty of Health Sciences and Member of the Research Ethics Committee at the University of Malta, in collaboration with Dr Michael Galea and Prof. Carmel Cefai.

### PROJECT 5

Offering palliative care to adult cancer patients, which is designed to improve the quality of life of both them and their families as they tackle their life-threatening condition, needs to address a variety of physical and psychosocial issues.

This level of patient care should not only offer relief from pain and other associated symptoms of the illness, but should also integrate other quality of life domains including psychological, emotional and spiritual aspects, while encouraging the patient to live as fully and actively as possible within their individual prognosis.

At present, cancer patients undergo a standard treatment of compression bandaging and exercise. This project aims to explore if, in addition to this standard treatment, manual lymphatic drainage in individuals with lymphoedema – a chronic condition that causes swelling in the body's tissues due to a failing lymphatic system – may further improve the quality of life of adult cancer patients.

"While exploring whether lymphatic drainage makes any discernible impact upon cancer patients, the project aims to go even further," explains Prof. Scerri. "We will also address the psychosocial and emotional issues being experienced by palliative care patients. Innovative concepts will be introduced into an intervention that consists of sessions on the use of mindfulness, cognitive behavioural therapy, resilience skills, expressive arts and critical and creative thinking skills. Meanwhile, training modules and the implementation of standard treatment care are also planned as part of the project."

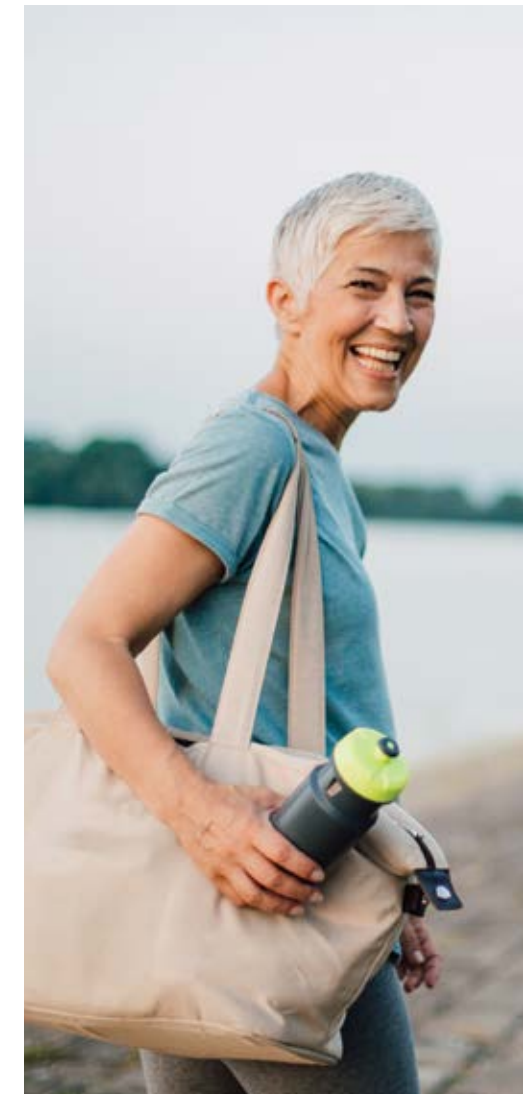
The project kick-started with the setting up of a clinic that is equipped to deal with lymphoedema cases, while training a physiotherapist to be able to provide specialised treatment for lymphoedema at Hospice Malta. Interviews were then conducted with males who have suffered from lymphoedema due to their cancer and who are being treated for lymphoedema, with verbatim transcripts of the interviews afterwards being analysed. Upon completion of this ongoing interview process, superordinate themes and sub themes will also be extracted from the data compiled.

Although the project team had planned to commence Phase 2 of the study in 2020 – an intervention previously agreed upon with Hospice Malta management and administrators – the global COVID-19 pandemic has impacted progress.

"As the nature of the study is psychosocial in nature, there have been some inevitable delays due to the COVID-19 situation," concludes Prof. Scerri. "Recruitment of patients willing to participate in the study was set to be exclusively from Hospice Malta, however patients were not attending since Hospice Malta was required to halt various face-to-face services due to the pandemic. Therefore, additional approvals had to be obtained to enable recruitment of participants from Sir Anthony Mamo Oncology Centre." ■

"Innovative concepts will be introduced into an intervention that consists of sessions on the use of mindfulness, cognitive behavioural therapy, resilience skills, expressive arts and critical and creative thinking skills."

*Prof. Josianne Scerri*



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Dr Owen Falzon



Prof. Kenneth Camilleri, Dr Owen Falzon, Mr Jean Gauci

## SEEKING EARLY DETECTION OF SKIN CANCER

The Combined Thermal and Visual Imaging for Early Detection of Skin Cancer project is led by Dr Owen Falzon, Senior Lecturer at the Centre for Biomedical Cybernetics at the University of Malta, in collaboration with Prof. Kenneth Camilleri, Dr Lawrence Scerri, Mr Jean Gauci and Dr Dillon Mintoff.

### PROJECT 6

Malta's number of skin cancer cases has doubled over the last two decades, with one in eight cases resulting in death. To challenge this sobering statistic and increase the effectiveness of treatment, early detection is vital.

"Most skin cancer cases are curable if diagnosed and treated early enough," explains Dr Owen Falzon. "If skin cancer is diagnosed early and surgically removed, patients both in Malta and across the globe have a far better chance of survival."

The Combined Thermal and Visual Imaging for Early Detection of Skin Cancer project was launched to explore rapid, non-invasive, and more reliable detection methods to assess skin moles, that can potentially save lives.

"We proposed a computer-aided diagnosis method that combines dynamic thermography with visual dermoscopic data for the detection of skin cancer," continues Dr Falzon. "By studying thermal and visual characteristics of the human skin, we hope to quickly distinguish between healthy and pathological skin regions."

The project plan included looking at the application of advanced image processing, machine learning and data analysis techniques such as deep learning algorithms applied to the acquired dermoscopic and thermographic data.

Following the project's official launch in 2019, the team began by preparing a data collection protocol that covered both the clinical assessment of patients, as well as the image acquisition procedures from thermal, visual and hyperspectral imaging modalities. The ethical considerations of the project were also approved by the relevant bodies and institutional consent received from Sir Paul Boffa Hospital to proceed.

To enable the collection of data, clinical equipment was then procured, such as dermatoscopes for digital image acquisition and specialised ultraviolet lamps for skin diagnosis and analysis. Fortunately, the imaging equipment required for the project, including thermal and hyperspectral imaging devices, was already available for the project's use at the University of Malta's Centre for Biomedical Cybernetics and thus no additional purchase was necessary.

Meanwhile in 2019, a general call for a research support officer to join the project team was prepared and issued, with the interview process for applicants ongoing into 2020 until the selection of a suitable candidate.

Although the team planned to introduce the data collection phase of the project in early 2020, the outbreak of the COVID-19 pandemic halted the project's data collection process, with the new research support officer's engagement being delayed until a more stable situation that would allow for the safe collection of data from patients is reached. ■

"By studying thermal and visual characteristics of the human skin, we hope to quickly distinguish between healthy and pathological skin regions."

Dr Owen Falzon



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From left - Mariia Gorodetska, Teal Patterson, Jennifer Porter, Sharneil-Lauren Lewis

## CONSERVATION PROJECT OF D'ALECCIO'S GREAT SIEGE WALL PAINTINGS CONTINUES

Launched in October 2018, a project to complete the conservation of a cycle of wall paintings depicting the Great Siege of Malta by Matteo Perez d'Aleccio advanced throughout 2019.

The project is being conducted by the Department of Conservation and Built Heritage of the University of Malta, led by Prof. JoAnn Cassar, together with wall paintings conservators and academics Jennifer Porter, Dr Chiara Pasian, and Ms Roberta de Angelis.

This three-year project focuses on conserving one third of the extensive painting cycle, since two thirds of the cycle were already conserved between 2001 and 2005 by the Fine Arts Academy Dresden. Recent examination of the areas treated by Dresden indicates that they remain stable and are not currently in need of further conservation.



Discussing observations of the painted surface

## Historical significance

The wall paintings cycle, located in the Grand Council Chamber of the Grand Master's Palace in Valletta, illustrates key events of the 1565 Great Siege of Malta. The paintings were executed by the Italian artist, Matteo Perez d'Aleccio (1547-1628), who was invited to Malta in 1577 by Grand Master Fra Jean de Cassiere (1572-1581) – a Great Siege veteran himself – to depict the historic events of the Great Siege.

As a result, D'Aleccio produced the most detailed, important and historically accurate visual document of the Great Siege, drawn from eyewitness accounts and written narratives. The four-month siege is depicted in the cycle in a narrative sequence across 12 episodes interspaced by allegorical figures.

“The paintings constitute an extraordinarily important historical document,” explains the project's lead conservator, Jennifer Porter. “As a department, we have always revered the d'Aleccio painting cycle. It is truly unique, from the incredible detail it offers regarding one of Malta's most famed historic events, to the painting techniques and materials used to create it.”

To better understand the physical history of the paintings, which serve as an enduring symbol of Maltese identity and a threshold in the history of art in Malta, the project has undertaken extensive archival research.

This research, which considers events since the cycle was painted such as previous restorations or war damage, has significant implications for the paintings' ongoing interpretation and conservation.

In 2019, the project team also took part in the National Library of Malta's public lecture series showcasing recent research in Malta's archival collections, where some of the results of the project's research into the physical history of the Throne Room and painting cycle were presented.

## Conservation process

The project team has now completed full documentation of the paintings using a combination of multispectral imaging – photography under various combinations of visible, infrared and ultraviolet lighting – and photogrammetry. This has resulted in a dimensionally correct, to-scale record of the paintings that allows investigators to detect, distinguish between and often identify original painting, restoration and deterioration materials.

The project's non-invasive survey of painting technology carried out in 2019 will also be used to further understand the materials and methods used by the artist to create the painting cycle, while the accompanying survey of the current condition of the paintings will enable the stabilisation of the paintings to prevent further deterioration.

The information gathered during these investigative phases of the project is now being used to inform conservation decisions for the cycle. Interventions are expected to focus mainly on the removal of extensive past restoration materials (primarily coatings and overpaint) which have significantly altered the paintings over the years.



Detail of the arrival of reinforcement troops from Sicily at the end of the Great Siege



## A team of current and future conservation experts

The conservation project is the result of a partnership between the Department of Conservation and Built Heritage of the University of Malta and Heritage Malta, under the auspices of the Office of the President of Malta.

The project's important works are being managed and supervised by professional wall painting conservators from the Department of Conservation and Built Heritage, while Heritage Malta curators are advising on its historical and art historical aspects.

"We had been dreaming of the possibility of undertaking this project for some years and are thrilled that we have managed to make it happen, with the support of a number of prestigious organisations who are contributing towards the conservation of this important piece of Malta's heritage," continues Ms Porter.



Prof. JoAnn Cassar

**THIS PROJECT WAS ABLE TO COMMENCE THANKS TO A GENEROUS DONATION OF €75,000 FROM THE GASAN FOUNDATION TO THE RIDT IN 2019. THE RIDT HAS SECURED ANOTHER €75,000 FOR THIS PROJECT THROUGH THE PLANNING AUTHORITY'S DEVELOPMENT FUND.**

The conservation works taking place through the project are also an essential component of the Master's programme for students following the M.Sc. in the Conservation of Decorative Surfaces at the Department of Conservation and Built Heritage.

The project team expanded further in 2019, with a Research Support Officer working full-time on the project, while two interns from other institutions and training programmes, supplementing the Department's staff and students, also participated in various aspects of the work. Another professional Research Support Officer will soon join the team, ensuring that the project moves ahead smoothly, even while the students and staff are concentrated on other academic commitments.

## Project plans

The investigative phase of the project is ongoing, currently consisting of state-of-the-art instrumental analysis – carried out as much as possible on-site using the Department's recently-acquired portable non-invasive analytical equipment – to further the team's understanding of painting materials and deterioration. Design and testing of conservation interventions will begin in mid-September 2020 and actual treatments will start in late 2020. These will then be executed by the team consisting of the professional conservators of the Department, the Master's students and the project conservators.



The project uses a number of non-invasive methods for studying and documenting painting technique and deterioration, many of which rely on photographic methods



LifeCycle Chairperson Dr Shirley Cefai presented the donation to Prof. Alfred Vella. From left Alan Curry, Nestlé Senior Category Manager Charlene Ellul, Alfred J. Borg, Prof. Jean Calleja Agius, Prof. Emanuel Farrugia and RIDT's CEO Wilfred Kenely.

## LIFECYCLE MALTA - KIDNEY RESEARCH

In November 2019, the sum of €25,000 was presented to the RIDT by LifeCycle Challenge Malta to boost research on kidney disorders. The funds were part of the 2019 title sponsorship from Nestlé's signature brand Nescafé 3in1 to LifeCycle (Malta) Foundation.

LifeCycle Founder Alan Curry had said that, following talks with the University of Malta and Mater Dei Hospital, LifeCycle was advised to support a research programme in polycystic kidney disease. Since 2014, LifeCycle has made this its mission to further support research programmes at the University of Malta. Thanks to Nescafé 3in1 brand, together with previous sponsors, they have been able to do this.

A team of researchers from the University's Department of Anatomy and Cell Biology, in collaboration with the Division of Nephrology of the Department of Medicine and Mater Dei Hospital, namely Prof. Jean Calleja Agius, Prof. Emanuel Farrugia, Dr Edith Said and Dr Graziella Zahra, will be investigating polycystic kidney disease (PKD).

PKD is an inherited disorder in which clusters of cysts develop primarily within the kidneys, causing the kidneys to enlarge and lose function over time. The disorder may be present in childhood and adolescence if it is severe, or later on in life if symptoms are mild.

The clinical presentation is very variable as well as the disease progression. PKD can be inherited in a dominant (ADPKD) or a recessive (ARPKD) manner.

"Patients with ADPKD in Malta have so far been diagnosed clinically and the genetic aetiology of this condition is, as yet, not fully defined. The research project aims to determine the underlying genetic defect in patients with ADPKD in Malta and to offer proper genetic counselling to families with individuals with ADPKD," said lead researcher Prof. Jean Calleja Agius.

The full study is expected to be spread over three years and will result in the analysis of most families with ADPKD in Malta. In the first year, at least 50 patients over the age of 18 years that have a positive family history of ADPKD will be involved.

LifeCycle (Malta) Foundation, the only NGO that raises funds to support patients suffering from kidney failure, covers three principle areas: awareness, treatment and research. To achieve these goals, the Foundation works hand in hand with the medical staff at the Renal Unit of Mater Dei Hospital and the RIDT of the University of Malta. ■





## OF BRAINS, HOLES, AND MITOCHONDRIA...

Mitochondria are rod-shaped organelles, roughly the size of bacteria, found in the cytoplasm of nearly all cells. Despite their tiny size, however, mitochondria can pack a mighty punch; they are the powerhouses of the cell, harnessing energy from the oxidation of food molecules in the form of adenosine triphosphate (ATP).

Healthy mitochondria are especially critical for the proper functioning of specialised cells of the brain and spinal cord, called neurons. When mitochondria fail, neurons die. That is why Professor Neville Vassallo, at the Department of Physiology and Biochemistry and the Centre for Molecular Medicine of the University of Malta, believes that mitochondria might hold the key to understanding the molecular underpinnings of brain neurodegenerative disorders.

Two of the most common neurodegenerative diseases are Alzheimer's disease (AD) and Parkinson's disease (PD), which afflict millions of people around the world. AD causes a progressive and relentless loss of memory and, ultimately, identity of the individual. In PD the impairment is primarily motor, featuring a tremor at rest, slowness or even absence of voluntary movement, and a festinating gait.

"AD and PD were first characterised pathologically by Dr Alois Alzheimer (1864-1915) and Dr Friedrich H. Lewy (1885-1950) respectively, at the Psychiatric Clinic of the University of Munich in the early 1900s," Prof. Vassallo explains.



Prof. Neville Vassallo

When these eminent neuropathologists peered down their microscopes to look at histological sections obtained from brain autopsies of their patients, they saw abundant plaque deposits and widespread degeneration of neurons. Since then, the search has been on to understand exactly how neurons might be killed by the toxic clumps (also known as oligomers) of protein deposits. "Answering this basic question," says Prof. Vassallo, "will be essential for development of effective, potentially disease-modifying therapies for these devastating diseases."

Several years of intensive research along an often tortuous investigative pathway by Prof. Vassallo and his collaborator Dr Ruben Cauchi and their teams, have resulted in the recent publication of two key papers that may shed new mechanistic insights into the neuronal degenerative process. Perhaps not surprisingly, mitochondria lie at the heart of this mechanism. Prof. Vassallo and his co-workers have discovered an intriguing process that occurs when healthy mitochondria organelles are exposed to toxic oligomeric structures of  $\alpha$ -synuclein and tau proteins, which form the deposits in the brains of individuals with AD or PD.

Essentially, oligomeric clusters of  $\alpha$ -synuclein and tau proteins drill nano-sized holes in the lipid membrane envelope of mitochondria, and since the mitochondrial membrane is the site where generation of ATP occurs, the poration of mitochondria leads to a bioenergetic crisis of the neuron, the outcome of which is ultimately cell death.

In their research papers, the UM scientists have observed several indicators of mitochondrial damage, including swelling of mitochondria and release of death-signalling molecules such as cytochrome c. Furthermore, using highly sensitive electrophysiological equipment, they actually measured the disruptive currents created by the anomalous flow of ions through the nanopores in the mitochondria.

Interestingly, these latest research findings tie in nicely with earlier work from Prof. Vassallo's laboratory, showing that the membrane-activity of  $\alpha$ -synuclein and tau oligomers is linked to the presence of cardiolipin, a signature phospholipid of mitochondrial membranes that plays a central role in mitochondrial bioenergetics.

A direct implication of these studies is that mitochondrial damage may potentially be inhibited by developing small-molecule compounds that are able to prevent

toxic  $\alpha$ -synuclein and tau clusters from forming pores in mitochondria, hence ensuring survival of the neuron.

Indeed, in close collaboration with research groups at the German Centre for Neurodegenerative Disease Research in Munich, Germany, and the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany, Prof. Vassallo and his group succeeded in attenuating mitochondrial damage using a potent anti-aggregator molecule called 'anle138b'. Patented by the German biotech company Modag GmbH, anle138b is currently in clinical trials as a potential treatment for Parkinson's disease. Prof. Vassallo hence underscores the importance of fundamental research in developing effective cures for AD and PD: "It is only by knowing the fundamentals that one can develop effective therapeutic strategies to treat patients. Our aim is to keep alive the hope of those suffering from neurodegenerative diseases, and their families, for a better cure."

Members of Prof. Vassallo's research team who have worked on this project include Dr Angelique Camilleri, Dr Stephanie Ghio, and Dr Mario Caruana. ■

THE RESEARCH RECEIVED  
FUNDING FROM THE  
MALTA COUNCIL FOR  
SCIENCE & TECHNOLOGY  
R&I PROGRAMME, THE  
UNIVERSITY OF MALTA,  
AND THE AX FOUNDATION  
THROUGH THE RESEARCH,  
INNOVATION AND  
DEVELOPMENT TRUST  
(RIDT) AND THE NATIONAL  
LOTTERIES GOOD CAUSES  
FUND, ALSO THROUGH  
THE RIDT.





## THE MORPHEUS PROJECT EXPLORES PAIN RELIEF FOR CHILDREN THROUGH VIRTUAL REALITY

Using a combination of virtual reality and artificial intelligence, an application being developed at the University of Malta in a project funded by the Vodafone Foundation through RIDT aims to improve the lives of young patients around the world.

The Morpheus project makes use of distraction as a pain management technique, through a cutting-edge adaptive technology to reduce pain without the use of medication in children undergoing painful, high-stress hospital procedures.

The project is being led by Prof. Alexiei Dingli from the Department of Artificial Intelligence, in collaboration with a team that brings multi-disciplinary experience including Prof. Vince Briffa from the Department of Digital Arts. The application itself is being built by Mr Luca Bondin, a research support officer at the Department of Artificial Intelligence, and Fabrizio Cali from the Department of Digital Arts.

Distraction as a pain management technique is an idea that has already been explored in many case studies, in which it has been proven to reduce pain perception by up to 50 per cent.

### Using distraction against pain

Distraction as a pain management technique is an idea that has already been explored in many case studies, in which it has been proven to reduce pain perception by up to 50 per cent.

These studies focus on how pain is generated in the body, finding ways to interrupt the message by sensory receptors to the brain that creates the sensation of pain. While the pain itself does not diminish, distracting the brain's resources used to acknowledge it with virtual reality (VR) may help to alleviate it.

"VR has already been used to help treat burn patients; by putting them mentally in a snowy environment, this counteracted the burning sensation of their daily change of dressings," shares Prof. Alexiei Dingli. "I came across this concept following another case study at Stanford Medical School in the US, whereby VR sets are used to distract children while routine painful procedures and treatments such as intravenous (IV) injections, vaccinations and anaesthesia administration are carried out."

There are also medical advantages of using VR instead of medical painkillers to reduce pain, as Prof. Dingli highlights. "Most methods of pain relief currently involve medicines that have side effects, while also carrying the risk of the body getting used to them. The Morpheus application, however, will offer instead a safe, long-term method of reducing pain."

### The concept of Morpheus

The Morpheus project aims to take the Stanford study even further, by enabling the virtual reality environment to adapt and change in real time according to the level of anxiety by the patient.

The ever-evolving games being played by the patient within the VR environment, such as infinite runner games, offer a constantly changing world with a path that never ends, so that patients will never know what to expect.

Monitored using biometrics collected through non-invasive, wearable devices (such as a smartwatch), the heart rate of the child will determine whether he or she is experiencing fear or pain in real time – and will thereby influence an artificial intelligence (AI) mechanism to adapt the graphics, action, and even the tempo of the background music of the VR game.

"The game will change and adapt to what the patient would be feeling at that moment. If a child is bored, for instance, the game will become more exciting. If they are excited or anxious, it will slow down and become more calming," elaborates Prof. Dingli. "Since we are customising our application to the needs of the user, we are hoping it will have an even better result in pain management."

### Creating Morpheus

The three years of the project are split into three separate stages, the first focusing on the development of the application, then iteration of prototyping and validation of the work done, before finally analysing the final product.

Following the project's launch in 2019, the team began by validating their choice of creating an 'infinite runner' game (a linear action game with no end, pauses, stages, or changes of levels). Twenty children aged between five and 14 were invited to take part in an experiment in which they were asked to play three different types of games: an infinite runner, an open world and an on-rails game. The children were asked which game they preferred, while the team monitored their physiological signals to ensure that results were not influenced by external factors.

"Most methods of pain relief currently involve medicines that have side effects, while also carrying the risk of the body getting used to them. The Morpheus application, however, will offer instead a safe, long-term method of reducing pain."

*Prof. Alexiei Dingli*

"Through this experiment we determined that the on-rails game was in fact the game that was preferred by the children," explains Luca Bondin. "In line with these results, we re-thought our strategy and moved forward with the development of an on-rails game. It is important that children playing the game feel as engaged and comfortable as possible during gameplay, so that they will be distracted from pain – so this experiment was crucial to ensure that we set off on the right foot."



After building a working prototype of the application, the team then considered how to start distributing the game to patients at Sir Anthony Mamo Oncology Centre, for its first feedback and to garner how the application will be received when the final product is officially rolled out.

Before distribution, however, an additional experiment was carried out to fully ensure that the game is safe to be used as a pain coping mechanism. Several participants were asked to put their feet into cold water first without playing the game and then while playing the game.

“Our assumption was that while playing the game, people would be so distracted that they would not feel the pain that is caused by the cold water,” elaborates Mr Bondin. “So far, the results we have obtained have confirmed this, and we aim to carry out more such experiments to further ensure that our approach is validated. These experiments and the work done in the past year put us on solid foundations in terms of the research project and more importantly, puts us on track to delivering an effective tool to be used by children to hopefully improve their lives.” ■



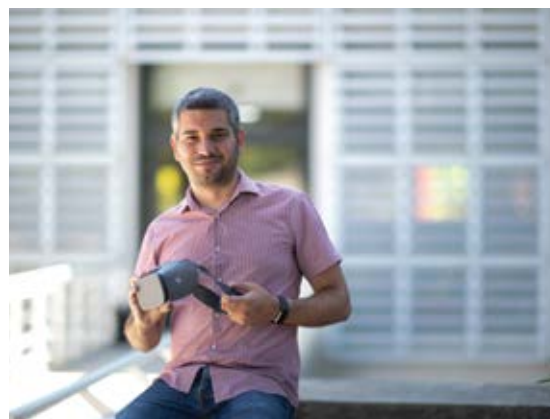
Mr Dylan Seychell



Mr Luca Naudi



Prof. Alexei Dingli



Mr Mark Bugeja

THIS PROJECT  
WAS MADE  
POSSIBLE THANKS  
TO A GENEROUS  
DONATION  
OF €113,000  
FROM THE  
VODAFONE MALTA  
FOUNDATION TO  
THE RIDT.



Dr Mark Abela

## THE BEAT IT PROJECT CONTINUES TO PRODUCE LIFE-CHANGING FINDINGS

Lunched during the 2017-2018 scholastic year, the BEAT IT project invited Maltese adolescents to undergo cardiac screening in schools, aiming to identify individuals at risk of harbouring heart disease linked to sudden cardiac death. The project is being led by cardiologist Dr Mark Abela, who has a special interest in sports cardiology and inherited cardiac conditions.

“Young people who may be genetically susceptible to heart disease could rarely succumb to sudden cardiac arrest, despite otherwise appearing fit and healthy,” explains Dr Abela. “It is unusual to suggest that youths could still succumb to natural life-threatening conditions such as SCD. Although rare, data from athletic cohorts suggests that young athletes are at an even higher risk due to their higher-than-average exercise habits. Good cardiac screening and thorough medical check-ups can help identify young individuals at risk.”

Throughout 2018, significant and life-changing data already started to emerge from the project. A total of 2708 students in schools enrolled, undergoing screening with a questionnaire and electrocardiogram (ECG).

The findings highlighted the importance of ECG screening in young individuals. One in 27 of those screened required referral for further evaluation. Most of these

referrals (90.2%) were due to an abnormal ECG, while only 20% had symptoms. Screening of family members was also carried out in certain cases, again identifying individuals who needed long-term surveillance or were diagnosed with heart disease.

### Making a difference in 2019

2019 was again a productive year, highlighting new concepts that can change clinical practice and producing a wealth of data that has the potential to make a real difference on the international scene.

Fifteen young individuals (0.6%) were diagnosed with heart disease, equating to 1 in 180 students. Nine (0.3%) of these were diagnosed with a condition linked to sudden cardiac death, while two have undergone an invasive procedure since being enrolled in the programme.

Meanwhile, family screening remains an important pillar of the programme and is one of the project’s most important achievements in 2019.

The resulting data has allowed physicians to better understand disease behaviour in a family, since most heart-related conditions tend to be hereditary. In some instances, positive cases in family members have even



helped to confirm or refute pathology in the original case. Family screening was very important in participants who presented with a pathological ECG pattern. A total of 73 relatives were screened. A significant proportion (18%) needed further evaluation due to borderline findings or a clinical diagnosis at the preliminary evaluation.

A further 21 family members related to participants who harboured an ECG abnormality that is thought to be related to pubertal development were also screened. Individuals with this ECG abnormality are presently referred for a full evaluation, since there is currently insufficient research to justify a conservative approach. As expected, none of the family members were found to have heart disease, supporting our hypothesis that this ECG abnormality is likely to be benign. This novel data was presented at a prestigious international conference and was shortlisted for a prize.

### Delving deeper into ECG patterns

Two main ECG patterns were investigated: Juvenile ECG pattern and the PR interval.

A Juvenile ECG pattern describes ECG changes that are thought to take place due to puberty. These rarely mimic potentially lethal heart disease, so close follow-up is advisable as per current guidelines. Statistical analysis confirmed that female athletes are more likely to have this ECG pattern – a finding never reported in official literature, but one that nevertheless corroborates what is routinely noted in clinical practice.

Due to this pattern, ECGs were then repeated for several teens. Most ECGs (83%) normalised at the next screening, supporting the hypothesis and again highlighting that this ECG pattern is likely of no clinical concern. These novel findings were presented and selected for an award at the recent EuroPrevent conference.

For each ECG, investigators also analysed the PR interval. The PR interval is the time needed for electricity to flow from the top chambers to the bottom chambers of the heart. Traditionally, young physically active individuals have a longer PR interval as a result of cardiac adaptation to exercise. A short PR interval is however thought to be very prevalent in young individuals. There is currently no data available on the clinical relevance of an isolated short PR interval in young individuals. The project reported that 15% had a short PR interval, with a predilection in females and

in non-athletes. Male athletes doing power sports had a shorter PR interval compared to those practicing skill, endurance and mixed sports. This difference was not observed in females, possibly suggesting a gender and sport specific adaptation.

The BEAT IT project also reported major developments in genetic testing.

“Following genotyping of all cases suspected of having an inherited cardiac condition, a pathogenic mutation was identified in 20%,” shares Dr Abela. “This was even higher in those without a clinical diagnosis at baseline (30%) – potentially helping clinicians identify adolescents who are more likely to develop disease in the future.”

These ground-breaking findings were also presented at the latest EuroPrevent conference and selected for an award.

Genetic testing of family members continues to be a major part of the BEAT IT project, while future plans also include surveillance and routine follow-up of family members, evaluation of more ECG patterns, relaying data to participating schools, and addressing AED facilities and CPR training in schools. ■

**THE BEAT IT PROJECT IS BEING FINANCED THROUGH A GENEROUS DONATION BY CHERUBINO LTD THROUGH THE RIDT, TOGETHER WITH OTHER DONATIONS MADE BY THE MALTA HEART FOUNDATION.**

**ADDITIONAL FUNDING IS STILL REQUIRED TO FULFIL THE PROJECT'S POTENTIAL. THE STUDY IS BEING FACILITATED THROUGH THE COLLABORATION OFFERED BY THE MINISTRY OF EDUCATION AND MATER DEI HOSPITAL.**



## THE NEXT EVOLUTION IN SOLAR

Seeking to harness solar technology from the water, ‘Solaqua 2.1 – Economically and Technologically Viable Floating Solar Development’ is the third of a series of projects bearing the same name (Solaqua and Solaqua 2).

Solaqua 2.1 is led by Prof. Luciano Mule’ Stagno, Director of the Institute for Sustainable Energy at the University of Malta, in collaboration with Ing Ryan Bugeja, Mr Guillaume Poirier and Ing Martin Grech, with the support of Mr Terence Cilia. The project has been funded by the RIDT through a grant by REWS (The Regulator for Energy and Water Services) at the end of 2018 and is set to continue to the end of 2020.

### Taking solar out to sea

Solar technology, while decades old, had started seeing exponential growth around the mid-2000s. The first recorded installation on water was made in Japan as an experimental installation and in California on the grounds of a winery around 2008. In both cases, the motivation was to avoid using land to harness solar power, when that land could be used for other purposes. In Japan, the experimental installation was on a small lake, while in California it was installed on an irrigation pond – and many more systems have since been installed on (fresh) water bodies around the world, including large commercial systems.





The foray into offshore solar technology by the University of Malta began in 2011. “It is understandable to anyone living in Malta to look towards the sea for large expanses of ‘land’. A 10 MW solar farm, for example, will occupy close to 100,000 m<sup>2</sup> of land – difficult to find in Malta,” explains Prof. Luciano Mule’ Stagno. “The advantages of floating solar technology on bodies of water are many. They reduce algae growth and water evaporation, they stay cooler and cleaner, and, most importantly, they do not occupy precious land that can be used for other purposes. While the first reasons do not apply to offshore systems, the rest do, and this reality applies both to small densely populated islands as well as to large coastal cities where building a solar farm within the city is impossible.”

In the first project funded by the Malta Council for Science and Technology, Prof. Mule’ Stagno and his team assessed the technological and economic feasibility of a floating system in open sea. They achieved this by launching and testing various prototypes as well as modelling. The launch of the first prototype in 2014 was the first test of a PV system in open sea anywhere in the world. The project, which continued through 2016, not only proved that floating offshore solar was a realistic target, but also enabled the team to establish the best type of platform to use. This design was finalised and simulated in the second project funded by the 2017 Maritime Seed Award.

### Testing the waters

The Solaqua 2.1 project bridges the last gap in the process. By finalising the design of the prototype and building scale models to test in wave tanks, it aims to reassure that the design that performed well in modelling also performs well in the real world. Meanwhile, the project team worked to improve the power output through active cooling of the panels using the infinite supply of sea water upon which they float.

Two wave-tank sets of tests were planned, with the first in the easily accessible small wave-tank in the Mechanical Lab of the Faculty of Engineering and the second in a larger, full-size wave-tank. While the design was being optimised and the scale models built before starting tests, contacts were made with various wave-testing facilities around Europe. While not normally used for this purpose, contact was also made with the Malta Film Studios, which has a very large sea water tank already equipped to generate various effects for movies, including waves.



“The advantages of floating solar technology on bodies of water are many. They reduce algae growth and water evaporation, they stay cooler and cleaner, and, most importantly, they do not occupy precious land that can be used for other purposes.”

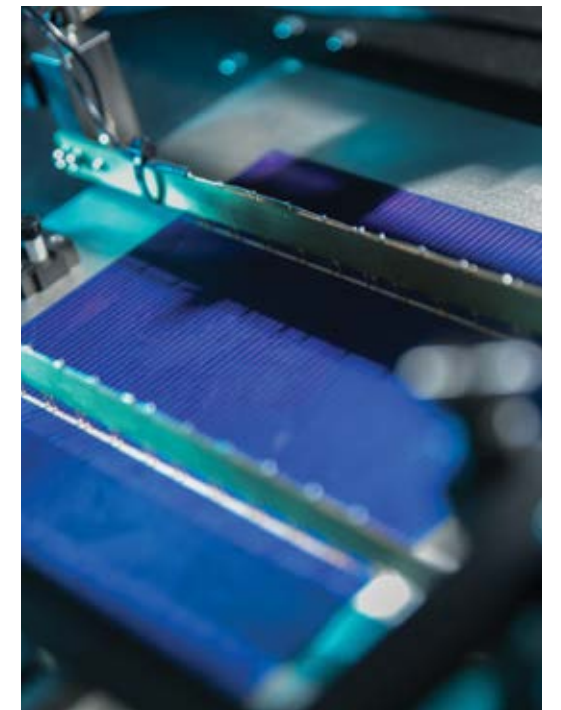
*Prof. Luciano Mule’ Stagno*

“The people at the Malta Film Commission could not have been more gracious and cooperative and we ended up deciding to test the quality of the waves in their facility,” continues Prof. Mule’ Stagno. “After acquiring and rigging the necessary equipment, the test was performed in February 2020 and proved successful. We had, in the meantime, built the larger scale models for this test and planned to perform the tests in April 2020 – now postponed to October due to the COVID-19 pandemic.”

### Heading to open sea

The wave-tank tests performed at University of Malta have already validated the simulation results, but the tests carried out with the Malta Film Commission will provide further validation and the confidence to move to the next step, namely a full scale launch of a prototype in open sea in 2021-2022.

“We have also been working diligently on improving the power output of the system through cooling, and with the support of the Knowledge Transfer Office at the University of Malta, are in the process of applying for two patents – one on cooling and one on the platform design,” Prof. Mule’ Stagno concludes. “We are already in talks to fund the next phase – ‘Solaqua 3’ – in which we hope to launch and test a sizable (50-100kWp) system in open sea. Following the lessons learned from that project, we would be ready to partner with major suppliers to install the first large solar farm at sea. Several large PV companies have already expressed interest and are following our progress closely.” ■



THIS PROJECT  
WAS MADE  
POSSIBLE WITH  
THE GENEROUS  
SUPPORT OF  
THE REGULATOR  
FOR ENERGY  
AND WATER  
SERVICES  
(REWS),  
THE MALTA  
COUNCIL FOR  
SCIENCE AND  
TECHNOLOGY  
AND TAKE OFF.



## RIDT DRIVES RESEARCH THROUGH AWARDING PHD SCHOLARSHIPS

Thanks to the generous support of various sponsors, RIDT has been able to award PhD scholarships to several students, enabling them to pursue their unique research goals.



**“THE RIDT SCHOLARSHIP IS NOT ONLY A PRIVILEGE TO HOLD, BUT ALSO A RESPONSIBILITY THAT I AM PROUD TO UNDERTAKE SINCE THE UNIVERSITY HAS INVESTED AND BELIEVED IN ME TO DELIVER AND CONTRIBUTE TOWARDS MEDICINE.”**

*Dr David Agius*

Dr David Agius is a medical doctor currently specialising in the field of ophthalmology. His part-time PhD study, enabled by a RIDT scholarship, is entitled ‘The prevalence of visual impairment and common eye diseases in Malta and Gozo: The Malta Eye study.’

“After graduating as an MD at 22, I worked in various medical fields before starting ophthalmology specialist training at the age of 24. Since then my exposure in clinics and theatre, as well as my studies, have enabled me to develop clinical and surgical skills in managing eye diseases. Supervised by lead researcher and ophthalmologist Mr Francis Carbonaro and public health specialist Prof. Julian Mamo, in 2019 I took the academic post within The Malta Eye Study; a nationwide epidemiology study that aims to estimate how common vision-impairing conditions are on the island. My work so far has involved planning the methodology and the smooth running of the project that is incorporating 2000 clinical assessments, a high volume of work and data to be collected – which, we hope, will produce results that will lead to improvements in the national eye care service. Some of the best moments so far have included the launch of the study, with the positive feedback that was evident during World Sight Day in October 2019, as well as the numerous encouraging and grateful comments we received from attendees during the pilot study’s assessments. To me, this has been a window of opportunity into the world of academia and research, which goes hand-in-hand with my clinical work. The Malta Eye Study has been made possible thanks to the funds that have been made available from The Malta Community Chest Fund through RIDT. RIDT has not only supported The Malta Eye Study financially but has also been informational and instrumental in setting up and promoting participation in the study – and for that, I am so grateful.”





**“PURSUING A PHD IS GENERALLY A FULL-TIME COMMITMENT THAT COMES AT A TIME WHERE ONE IS LOOKING TO START A NEW CHAPTER IN LIFE. THE RIDT SCHOLARSHIP ALLOWED ME TO FURTHER MY STUDIES AND MAKE A DIFFERENCE - WHILE PAYING MY HOME LOAN.”**

*Dr Jeanesse Scerri*

A RIDT scholarship afforded biomedical scientist Dr Jeanesse Scerri the opportunity to further her studies in a PhD that investigated resistance to Herceptin(R) in breast cancer.

“I have been employed as a biomedical scientist with the Pathology department at Mater Dei Hospital since I graduated in 2011. After a year working at the Histopathology Laboratory, I moved to the Laboratory of Molecular Genetics, while simultaneously reading for a MSc in Biomedical Sciences on a part-time basis. I applied for the RIDT scholarship after seeing an advert. What I first dreaded and later appreciated about the position was that the research question was not yet defined, so I had a direct input in its formulation. After I was awarded the scholarship and formulated my research proposal, the project evolved over the years. RIDT was crucial for the success of my PhD because high-quality scientific research depends on the use of expensive equipment and consumables. Furthermore,

without this scholarship, I would not have had the opportunity to visit other research laboratories abroad and present my work at prestigious international conferences, such as those held by the European and American Associations for Cancer Research (EACR, AACR). I feel very honoured and humbled to have been awarded a RIDT scholarship, especially since my scholarship funds had been raised by the ALIVE Charity Foundation, which each year organises long cycling marathons across Europe to raise funds for cancer research. I like to compare a PhD journey, with its ups and downs and numerous challenges, to their tenuous trek. One can only reach the finish line with perseverance and the support of teammates and loved ones.”

## FUNDRAISING AND OUTREACH EVENTS



### Superhero with One Euro

In September 2019, the RIDT launched an innovative fundraising campaign directed at children's health and supporting scientists at the University of Malta in their research in autism, sudden cardiac death in young athletes and in meningitis.

The 'Superhero with One Euro' campaign aimed to create awareness while raising much-needed funds to support research into the life-threatening diseases that every year affect thousands of children around the world.

Continuing until late 2019, the campaign took place in collaboration with Café Cuba and Vecchia Napoli outlets. There, clients were informed that, with just a €1 donation on top of their bill, they would be investing in research that would effectively help children.

“The whole idea behind the campaign was that fundraising should not be a burden to any one person or group of people,” explains RIDT CEO Wilfred Kenely. “Hence, by adding all the €1 donations of everyone who contributed, collectively they would make a big difference. This is the ‘superpower’ of each person who donated through the campaign – with just a single Euro, they became a child’s ‘superhero’.”

Following the success of the first round of the 'Superhero with One Euro' campaign, the RIDT initiated discussions with other outlets that have shown interest in adapting the fundraising model to their own businesses. Unfortunately, the onset of the COVID-19 pandemic in the first part of 2020 has necessitated that these plans be put on hold, but the RIDT looks forward to being able to relaunch the campaign once the health crisis is over.

More information about the 'Superhero with One Euro' campaign may be found online at [www.researchtrustmalta.eu/superhero-with-one-euro/](http://www.researchtrustmalta.eu/superhero-with-one-euro/).





## Mvintage

Mvintage, a renowned Maltese jewellery designer brand, donated 50% of profits from their Pink October Collection sold during the month of October towards breast cancer research through the RIDT. At the end of the campaign, the sum of €2,000 was presented to the RIDT. Mvintage expressed their wish to the RIDT to support women who make a difference in the fight against breast cancer, directly referring to the scientists and doctors who are committed to researching early detection tools, methods of classification and possible cures; the women who wake up every day ready to fight their own battle with cancer – and win; and the ones who are always there, ready to offer support and encouragement to loved ones going through the challenging process of therapy.



Photo: Krystle Penza, Managing Director of Mvintage, presenting a €2,000 donation to RIDT CEO Wilfred Kenely



## 'A Splash of Pink'

A collective art exhibition in aid of the RIDT was held at Gallery 23 Malta. Over 40 artists donated one of their paintings towards this cause. Proceeds from the sale of the paintings were donated to the RIDT to be used for breast cancer research within the University of Malta. The paintings, which ranged from landscapes to still life and nudes, were characterised by the use of the colour pink. The initiative was one put forward by one of the participating artists, Michelle Gialanze, in support of breast cancer research through the RIDT.

Paintings exhibited at Gallery 23 with proceeds going towards the RIDT for breast cancer research.



## St Joseph School

Sliema (Primary) breast cancer awareness

Professor Godfrey Grech, a cancer research specialist from the University of Malta, addressed staff at St Joseph School Sliema (Primary) about breast cancer research. The talk was part of a school campaign to raise awareness on breast cancer during the month of October. A donation was also presented to the RIDT by both students and staff.

Photo: Prof. Grech addressing staff at St Joseph School Sliema (Primary) about breast cancer research.

## Europa Donna Malta

Europa Donna Malta President Gertrude Abela presented €12,000 to RIDT's CEO Wilfred Kenely during the annual Hilda Schembri Memorial Lecture held in October. This donation was the first part of a three-year bursary being donated to the RIDT to finance a postgraduate scholarship in breast cancer research. Europa Donna Malta is a non-profit organisation that supports individuals and their families going through breast cancer.

Photo: Gertrude Abela, President of Europa Donna Malta, presenting €12,000 to RIDT's CEO Wilfred Kenely during the October annual Hilda Schembri Memorial Lecture.



Artist Silvio Agius (left) at the launch of his art exhibition - Retrospective



## RETROSPECTIVE

RETROSPECTIVE, an art exhibition by Silvio Agius, was set up in aid of the RIDT. The exhibition, which was held during the month of October and November last year, was held at the Emmanuel Fiorentino Hall, Zabbar Sanctuary Museum in Zabbar. Proceeds from the sale of the collection of paintings were donated to the RIDT in aid of breast cancer research.



## The Marigold Foundation – Malta

The RIDT received another donation towards breast cancer research from The Marigold Foundation. The €20,000 donation was made following a record sum being raised during the Foundation's 2018 Pink October Malta Campaign towards cancer research.





## MORE FUNDRAISING EVENTS

### Oral health awareness

A number of students were given educational talks about oral health together with a free dental check-up. These included students from the Mater Boni Consilii St Joseph School Paola and students at Chiswick House School in Kappara. The awareness initiatives were carried out with thanks to The Mobile Dental Clinic at the University of Malta, dentists and dental students on board the clinic, together with the school administration and students. The Mobile Dental Unit was launched in 2015 through the Faculty of Dental Surgery at the University of Malta with the funds raised through the RIDT.



Photos: 2019 Oral Health Awareness events organized by the RIDT and the Mobile Dental Unit at Mater Boni Consilii St Joseph School Paola and Chiswick House School in Kappara.

### Brain awareness

During the month of March students from St Joseph School Sliema (Primary) marked Brain Awareness Month by wearing a hat to school and participating in lessons and activities throughout the day that promoted brain awareness.

Photo: Children at St Joseph School Sliema (Primary) wear a hat to school to mark Brain Awareness month and raise funds for the RIDT.



### Illum ma' Steph

Stephanie Spiteri, TV producer and presenter of Illum ma' Steph, during one of her programmes announced to RIDT's CEO Wilfred Kenely that together with her friends she raised funds for the RIDT during her birthday celebrations. These funds will be used for cancer research.



### Chiswick House School's donation to RIDT

Every year Chiswick House School chooses to support various charities and good causes. For two consecutive years Chiswick House School has supported the RIDT and in 2019 contributed the amount of €6,360.

Photo: Mr Wilfred Kenely, RIDT CEO, receiving the generous donation from Chiswick House School at the end of 2019.



## MUSIC FOR RESEARCH

On Sunday 17 November 2019, to a full house at the Manoel Theatre in Valletta, internationally renowned violinist Carmine Lauri and classic guitarist Simon Schembri together performed a recital with proceeds going towards the RIDT – the University of Malta's Research Innovation and Development Trust.

The programme, entitled 'Virtuosi', included timeless pieces by the greatest musicians; Vivaldi, Piazzolla, Paganini, Sarasate and Giuliani.

The RIDT believes that lives change for the better as a result of various research projects being financed. Indeed, this was not the first fundraising concert organised by the RIDT in which music was partnered with scientific research for such a good cause. In fact, the RIDT has regularly held high-level fundraising concerts.

The 'Virtuosi' concert was an immense success and the musicians left all those who attended in awe as they performed their repertoire – a repertoire for which they received a standing ovation and cheering from the mesmerised audience. It was indeed a night to remember.

The recital was supported by APS Bank as main sponsors, together with Air Malta, M Demajo Group, The Phoenicia Hotel and Teatru Manoel. The RIDT began its fundraising journey

when it was launched nine years ago, quickly managing to kindle a small fire that continues to support researchers in their vital work at the University of Malta. The RIDT is committed to keeping this 'fire' burning, to support the researchers who are working tirelessly behind the scenes to provide solutions to today's challenges, whether health-related, environmental, technological or otherwise.

Carmine Lauri was born in Malta and has performed extensively worldwide including performances in the presence of HM Queen Elizabeth II and other Heads of State. He is co-leader of the London Symphony Orchestra and his distinguished talents were acknowledged by his country by bestowing upon him the National Order of Merit – M.O.M. (F'Ġieħ ir-Repubblika).

Simon Schembri started playing the guitar at the age of six and at nine he was already giving concerts. He was awarded the licence of the Royal Schools of Music of London (LRSM) when he was 14. He has won international competitions and is a member of the Yehudi Menuhin and George Cziffra Music Foundations. The Malta Classical Music Award has also paid tribute to his career and legacy to the Maltese music scene.



## MEET OUR SUPPORTERS

The RIDT is indebted to its supporters. To those of you who donated financially, to those who have donated equipment and to all of those who have attended our fundraising events during 2019 in particular, we only have one word for you – GRAZZI! Your generosity helps us achieve our objective: to attain excellence in research for the benefit of society.

Here is what some of our supporters had to say about why they chose to donate.

### GERTRUDE ABELA

President, Europa Donna Malta

Gertrude Abela is Europa Donna Malta President and a breast cancer survivor. Europa Donna Malta was set up to bring about an awareness of breast cancer and the importance of breast care in Malta. In 2004 the group was affiliated with Europa Donna, the European Breast Cancer Coalition, which advocates for optimal breast cancer treatment for all women in the European Union. The NGO has, over the years, made significant donations for breast cancer research, including a three-year PhD scholarship, announced in 2019.



“As a breast cancer survivor and Europa Donna Malta President, I am happy to support ongoing research into breast cancer, as are my colleagues. It is important for us patients that further research may find a cure, to the benefit of all.”

### NICKY CAMILLERI

Chairperson, ALIVE Charity Foundation

Nicky Camilleri is President and co-founder of the ALIVE Charity Foundation, which has raised more than €500,000 for cancer research since 2013. The Foundation is home to a number of cyclists who, through the yearly cycling challenges it organises, raise substantial funds for cancer research in Malta while emphasising the importance of practicing a sport to lead a healthy lifestyle.

“Unfortunately, cancer can strike any one of us, at any time – it has no boundaries and neither should we. Since 2013, the ALIVE Charity Foundation has been working closely with the RIDT and has donated over €500,000 towards cancer research at the University of Malta. We are indeed proud to have been the first Maltese NGO to raise funds and donate them for cancer research.

Since our inception we have financed a number of PhD scholarships and since 2019 we are also financing six new cancer research projects, following a call for proposals and an evaluation process conducted by the RIDT.

We have managed to do all this thanks to the determination and the hard work of all our participating members who, through our cycling challenges, have managed to push physical and logistical barriers. We also owe it to our sponsors who have supported us throughout this mission and to the Maltese community that has understood our message and contributed towards our cause.”

### SAMUEL ATTARD

Chairperson, Malta Heart Foundation

Samuel Attard is the chairperson of the Malta Heart Foundation. He is a medical doctor working in Mater Dei Hospital, specialising in Surgery. Over the years the Malta Heart Foundation has worked hard to fight heart disease locally. In recent years the MHF has, together with other donors, supported a local screening and research project named ‘Beat It’, with the aim of identifying young people with congenital health disorders.

“At the Malta Heart Foundation, we work towards fighting heart disease with the aim of increasing awareness, donating equipment and funding research in cardiac disease locally. Since our relaunch in 2016, we had been striving to find a research project that will have a positive impact on the Maltese population.

Together with RIDT we funded ‘Beat It – Sudden cardiac death in the young’, a research project that has been successful in diagnosing cardiac problems in our younger generations, thus working towards our aim of fighting heart disease. Also, through funding in cardiology research, our aim is not only to help heart disease patients but also to develop the expertise of local and international professionals within the field, ultimately improving patient care and awareness.”





## MICHELLE GIALANZE

Artist and Educator

Michelle Gialanze has extensive experience within the field of education and art. Her professional research studies have focused on the way people change their practices. In addition, Michelle is a professional artist and has exhibited in London, UK and Malta. She gained her PhD from the University of Nottingham. In 2019, she coordinated a group of 34 artists who donated proceeds from their collective exhibition towards breast cancer research.

“Over the past years I have had several very close friends who have struggled with breast cancer; some were lucky and managed to win the battle, others not so fortunate. Breast cancer resides silently in the chest of these mothers/women and turns its ugly head to catapult them into a fight for their life. It mutilates them and scars all: it is a horrific disease. If there was anything that could be done to fight it, it has to be done.

Being fortunate enough to be able to paint and part of an artist community who are all so generous, I really had no option but to organise ‘A Splash of Pink’. All 40 artists participated in this initiative so willingly – it was amazing. Together, we contributed to help fight breast cancer by assisting RIDT.”

## CHRISTOPHER BUSUTTIL DELBRIDGE

Managing Director, Evolve Ltd.

Christopher Busuttill Delbridge built Evolve Ltd within the Attard & Co Group from scratch, offering services such as designing, equipping and maintaining scientific workspaces, as well as training industry professionals. Mr Busuttill Delbridge has been a pillar in supporting Malta’s industry switch to higher technological ventures like the production of pharmaceuticals, state-of-the-art technology in healthcare and semiconductors. Since it was established, Evolve Ltd has supported the University of Malta in its research activities, mainly in the fields of neuroscience and chemistry.



“Evolve is associated with anything scientific. This field relies heavily on the use of expensive equipment, maintenance and high cost of consumables, not to mention specialist human resources. Research underpins every discovery we have made and all the advancements in science, technology and the arts as a human race. It is a very privileged position to be in when a company can, in any way, assist in making all this more reachable.

Over the years we have donated hundreds of thousands of Euro to our Alma Mater, the University of Malta, through the RIDT, as a sign of recognition for the formation of most of Evolve’s employees, the continued contribution to Malta’s society, as well as part of our Corporate Social Responsibility. Ex-students are now managers in top local companies, others moved to pursue their studies at higher levels and others still have published internationally acclaimed research. The greatest satisfaction is knowing you were part of it.”

## HOW YOU CAN HELP

The RIDT is carving a path that calls for individuals, business, and corporations to move beyond incremental benevolence and to dare, to dream and to design a whole new way forward for Malta.

It is a unique catalyst for partnership across public, private and social sectors offering donors the opportunity to invest in the betterment of our society.

As a trusted broker of collaborative relations, the RIDT mobilises financial and human resources from individuals, grantmaking foundations, socially responsible corporations and social investors.

Our success depends on the involvement of the community we serve. All of us can get involved, today, by becoming part of the exciting journey to shape the future.

It’s easy to get started – one can contribute individually, rally one’s business, advocate our cause, donate equipment, or become a sponsor of specific events. No donation is too small, and each effort is gratefully acknowledged.

All of us have an important role to play this unique grassroots movement, as we transform our future through research.

### MAKE A DONATION

One can make a donation either online, via [ridt.org.mt](http://ridt.org.mt) or by transferring funds to this account:

UNIVERSITY RES INNOVA AND DEV TR, Central Bank of Malta

MT37MALT011000040360EURCPE50001, MALTMTMT

Alternatively, one can send cheques by mail to:

RIDT, University of Malta, Valletta Campus, St. Paul’s Street, Valletta, Malta

### OFFER ONGOING SUPPORT

Regular donations from individuals or companies, either in cash or in kind, are also very welcome. Please contact RIDT for more details of how to set this up.

### LEAVE A LASTING LEGACY

Leaving a lasting legacy – one can remember RIDT when drawing up a will, or make a donation towards research, in memory of a departed loved one.

### JOIN THE UNIVERSITY STAFF CONTRIBUTION SCHEME

All members of staff of the University of Malta, whether academic or non-academic, can contribute any amount from their salary. Such contributions are deducted before tax, which means they would cost the person making the contribution less.

Details are online at [ridt.org.mt](http://ridt.org.mt).

The University of Malta Research, Innovation and Development Trust

## Management Accounts December 2019

## Income and Expenditure

	2019	2018
<b>Income</b>		
Donations - Unrestricted	88,081	63,017
Donations - Specific	577,766	570,678
Capital Grant	109,428	108,587
Commission	57,342	51,669
	<b>832,617</b>	<b>793,951</b>
Specific endowments	533,766	570,678
Write-off	44,000	-
	<b>577,766</b>	<b>570,678</b>
<b>Expenditure</b>		
Salaries	93,673	72,983
Marketing	21,463	25,234
Fund raising expenses	512	1,504
Communications	1,165	1,158
Hospitality	1,592	1,839
Stationery	777	729
Transport	293	-
Other	15	15
Professional Fees	4,800	-
Conference	3,446	2,635
Memberships	287	264
Depreciation	109,428	108,587
	<b>237,451</b>	<b>214,948</b>
<b>Net Income</b>	<b>17,400</b>	<b>8,325</b>

The University of Malta Research, Innovation and Development Trust

## Management Accounts December 2019

## Balance Sheet

	As at 31/12/2019	As at 31/12/2018
<b>Assets</b>		
<b>Non-current assets</b>		
Investments	169,496	183,924
Donated equipment (in use by beneficiaries)	169,496	<b>183,924</b>
<b>Current assets</b>		
Accrued income	71,030	<b>120,400</b>
Bank Balance	2,964,560	2,396,156
	<b>3,035,590</b>	<b>2,516,556</b>
<b>Total assets</b>	<b>3,205,086</b>	<b>2,700,480</b>
<b>Reserves and liabilities</b>		
Specific Endowments	<b>1,218,628</b>	864,127
Capital account	800,000	800,000
Deferred Capital Grant	<b>169,496</b>	183,924
Reserves	(776,060)	(793,459)
	1,412,064	1,054,592
<b>Current liabilities</b>		
Owed to University	<b>1,793,022</b>	1,645,888
	1,793,022	1,645,888
<b>Total reserves and liabilities</b>	<b>3,205,086</b>	<b>2,700,480</b>



# WE THANK OUR SUPPORTERS WHO HAVE KEPT US GOING OVER THE YEARS

The Malta Freeport  
Terminals Ltd  
**E.J. Busuttil Ltd**  
Cherubino Ltd  
**Suratek Ltd**  
Rahuma International Ltd  
**Bart Enterprises**  
GlaxoSmithKline Malta Ltd  
**Express Group**  
Evolve Ltd  
**Riverdream Ltd**  
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**ISL Ltd**  
Loqus Ltd  
**APS Bank plc**  
Hotjar Ltd  
**Modern Refrigeration Ltd**  
Adpro-Instruments Ltd  
**BPC International Ltd**  
Atlas Insurance Ltd  
**FIMBank plc**  
Ixaris Systems Ltd  
**3a Malta Ltd**  
Bit 8 Ltd  
**Alegria Dance Company**  
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**Technoline Ltd**  
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**The Alfred Mizzi Foundation**  
ALIVE Charity Foundation  
**Action for Breast Cancer  
Foundation**  
Lifecycle Malta Foundation  
**The Malta Community Chest  
Fund**  
ALS Malta Foundation  
**Europadonna Malta**  
HSBC Malta Foundation  
**ADRC Trust**  
The Marigold Foundation  
**AX Foundation**  
Youth for the Environment  
**Gasan Foundation**  
Vodafone Foundation  
**Malta Heart Foundation**  
P. Cutajar Foundation  
**Anna Maria and Paul Borg**  
Joseph and Rose Attard  
**Jose L. Ribera**  
Janatha Stubbs  
**Martin & Lucilla Spillane**

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**Guzeppi Theuma**  
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**Juanito Camilleri**  
Francis Gregory  
**Nicholas Sammut**  
Stephanie Kotes  
**Gertrude and Tony Abela**  
Alessio Magro  
**David Attard**  
Jackson Said  
**Godfrey Baldacchino**  
Jonathan Shaw  
**University Futsal Team**  
Philip Attard  
**Christine Zerafa**  
Tonio Casapinta  
**Anne Cadle & friends**  
Marcelle Abela  
**Alberta Group staff**  
RCI Insurance staff  
**St. Francis Secondary school**  
St. Martin's College  
**Chiswick House School**  
Stephanie Spiteri  
**Michelle Gialanze**  
Silvio Agius  
**Francis Nicholson**  
Alaine Handa  
**Betsson staff**  
Central Bank of Malta  
**The National Lotteries Good  
Causes Fund**  
Teatru Manoel  
**Regulator for Water and  
Energy Services**

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Discovery has fascinated mankind since the dawn of our species. Our determination to ask why, what and, most importantly, what if, has sped us along the journey of evolution. Yet, discovery requires perseverance and patience.

In the rapidly-changing world, Malta must stay focused on becoming a true knowledge-based society through continued research and innovation, both to stay ahead in the global marketplace and to progress ourselves as a sustainable, forward-thinking community.

RIDT's vision is to foster this paradigm shift towards research as the main driver of Malta's growth and progress, so that the country can continue to thrive in tomorrow's world.



THE UNIVERSITY OF MALTA  
RESEARCH, INNOVATION  
& DEVELOPMENT TRUST

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L-Università  
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