Annual Report 2018

Your donations
Your impact

The University of Malta
Research, Innovation
& Development Trust

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Contents

INTRODUCTION

Engaging society to drive change

The European Commission passed some direct observations in its report published at the end of a peer review of the Maltese Research and Innovation System. The report was published in June 2019.

One of the key messages referred to Malta's stated ambition and efforts undertaken during recent years towards the evolvement of a knowledge-based society. This ambition, the Commission penned, has not yet been embraced, and the over-reliance on high economic growth and low unemployment is not sustainable in the medium to long-term.

The Commission goes on to strongly recommend that Malta should give a higher profile to research and innovation as the basis for future sustainable growth. The review, biting and blunt as it may be, is by no means surprising, particularly to those in the sector.

After more than 14 years since Malta became a Member State of the European Union, our investment in Research and Innovation, both at the Government level and in Industry remains remarkably low, and significantly distant from the targets set by the EU itself.

The creation of a knowledge-based society can only happen once Malta ensures that there is enough investment for the creation of the required building blocks. Without this investment, Malta risks losing its competitive advantage, particularly with regards to local industries that compete in a knowledge-based market. It can also have a negative effect on international corporates operating in Malta. In a nutshell, investment in research will contribute to innovation, which will nurture existing and future sectors of the Maltese economy.

One of the fundamental building blocks required for the creation of a knowledge-based society is the establishment of a research fund for competitive funding for basic research. Truth is that, without investment in basic research, we would not be enjoying the quality of life that we have today. In our daily routines we have become accustomed to using smart phones, navigating around using GPS while doctors prescribe medicines to cure us from nasty diseases. All these 'luxuries' materialised not because Einstein had a commercial application to his equations, neither because Fleming was thinking of big pharma companies when he discovered penicillin. Most of the life-changing innovations of our time came from the unexpected outcomes of basic research.

Evidently, applied research is more rewarding. It starts with a problem and works towards a solution. One can even be fortunate enough to commercialise the solution in his/her lifetime and translate all the effort into equity and cash in on the initial investment. Yet there can only be limited economic growth if all our investments in research go towards applied, or industrial studies. And we are not even investing enough in that sector to make a big difference, anyway.

Like many other things in life, the way forward lies somewhere in the middle of the road. What is undisputable is the fact that Malta needs to pump up its investment in research and innovation across the board, from basic research to applied and close to market studies. And this needs to be done as part of the country's development strategy.

Though the State itself should be doing more to provide increased funding through existing and additional competitive programmes, an equally important partner is ultimately society itself. We operate in a society that is proud of its generosity and of its philanthropy. Our society raises tens of millions each year for very worthy causes, thanks to the dedication and hard work of hundreds of volunteers who constitute the backbone of a number of NGOs operating in various sectors.

Since its inception in 2011 the RIDT has sown a seed which is now growing and bearing fruit. We have introduced the idea that a portion of the funds raised through philanthropy and corporate social responsibility programmes should be directed towards finding solutions rather than addressing the problems. This we have managed to do by showcasing the fantastic work that Maltese researchers are doing in the laboratories of the University of Malta and by appealing to the generosity of the generous Maltese public.

The results are very encouraging. €3.5 million raised over a period of a few years, a total of 60 research projects funded, including 7 PhD scholarships, and a growing culture in favour of supporting research as part of philanthropy. These results, the fruit of public support, reinforce our resolve to keep nurturing the required culture change, where research and innovation become main drivers of Malta's growth and progress.

CHAIRMAN'S MESSAGE

A University for a Modern Society

Over a stretch of 425 years the University of Malta, under one form or other, served the Maltese society and contributed to its economic, cultural and social development. It provided the preparation of future generations and served as the incubator for the country's intelligentsia. As the country developed and evolved, so did the University, moving closer to the modern model of a research-intensive institution and a reference point to knowledge-based industries that drive our economy.

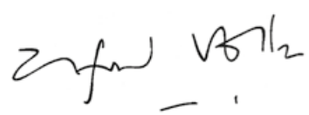
Our academics are at the forefront of research into a myriad of challenges; from rare diseases to quantum communication, from art conservation to life-threatening disorders. This, together with the provision of outstanding education, is the way that a modern university contributes to the society it operates in.

Knowledge-based societies depend heavily on sustainable research activities and investments. To this effect, it remains an undisputed fact that as a country we are not yet investing in research in the way we should be. As a university we depend on a variety of funding streams that include government funds, which should be the core funding source. Furthermore we also rely (and not to a small degree) on the generosity and the support that we receive from society under the form of philanthropy.

The Research, Innovation and Development Trust was set up in 2011 to undertake this key task of engaging with the various sectors of our community and to attract support. We do this by appealing for philanthropic contributions from the general public and by engaging with the corporate sector's CSR programmes.

The support that we have been receiving over these years allows us to be more ambitious and attract the best talent, particularly at postgraduate and post-doctoral levels. It also allows us to go for more complex research undertakings that can provide the solutions to global challenges. Philanthropy however should not be a substitute for public funding, but it should be complementary to it.

This report is intended to show all our supporters what we are doing with their money. It is also intended to confirm that philanthropic donations for university research matter a lot.



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

Dr Michael Sciriha
President of the Council of the University of Malta – ex officio

Dr Mario Vella
Governor of the Central Bank of Malta – ex officio

Mr Alfred Camilleri
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.

CEO'S MESSAGE

All thanks to you

The following pages will give you an overview of what has been done with the money that you so generously donated to the RIDT. We will be introducing you to the talented scientists and academics, postgraduate students and post-doctoral researchers who are putting their minds together to come up with solutions to our everyday challenges. Above all you will be given an update on your projects because these project would not have been undertaken were it not for your continuous support.

Since its setting up in 2011 the RIDT has financed over 60 research projects, including 7 Ph.D. scholarships – 3 of which in cancer research. We have managed to raise around €3.5 million through direct donations from all sectors of the Maltese community. This support has allowed the researchers of the University of Malta to be more ambitious in what they want to achieve and in some instances provided the means for them to turn these ambitions into realities.

This report also gives an account of the diversity of the research activities that we have been financing thanks to your contributions. From the conservation of the majestic murals at the Palace of the President in Valletta, to the use of thermal imaging for the early detection of skin cancer, and to the use of bacteria for the deterioration of plastics. The list is long and varied, one that covers a wide range of areas of study and does not stop with health-related research.

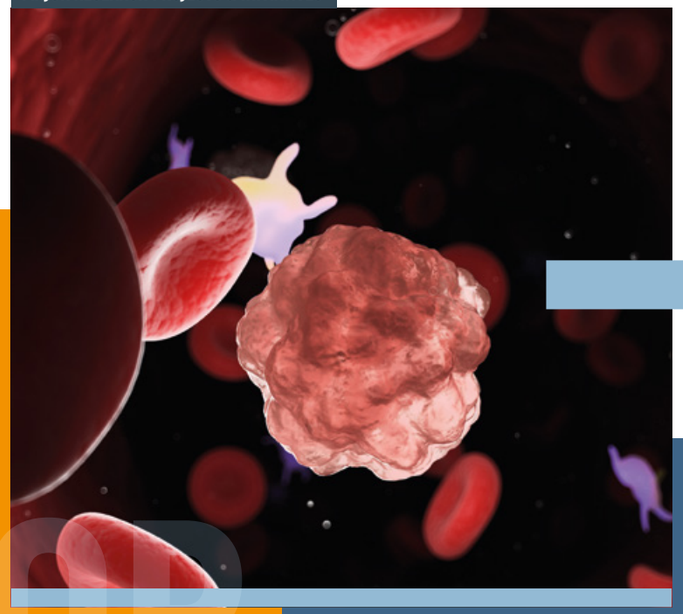
These donations – your donations, are making a difference in the way that the University of Malta operates. They are helping our University to remain at the forefront of research and innovation and they are helping us offer scholarships to talented young people who wish to join the engine of investigation and experimentation, which is the driver of knowledge-based societies. For this we are very grateful.

We thank you for your generous support.

Wilfred Kenely
CHIEF EXECUTIVE OFFICER

MAJOR RESEARCH PROJECTS & INITIATIVES

MAJOR RESEARCH PROJECTS & INITIATIVES



Major Cancer Research Projects awarded €314,818

MADE POSSIBLE BY

ALIVE® charity foundation

In November 2018, the Research, Innovation and Development Trust (RIDT) at the University of Malta, launched a call for proposals for cancer research projects with a €240,000 fund available for disbursement. The funds were made available by the ALIVE Charity Foundation through a number of donations in the previous years.

A total of 21 applications were received by the closing date with the overall level of applications being extremely high. Six projects were eventually selected early in 2019 following a process of assessment by an external team of expert evaluators. Following discussions with the ALIVE Charity Foundation, the total amount to be disbursed was raised to €314,818.

The projects, which could have a maximum duration of 36 months from the date of award, received a maximum of €60,000 for the completion of the study. Awards took into consideration the relevance of the work proposed and the quality of work anticipated. The call was open to any Resident Academic of the University of Malta with applications eligible to receiving only one grant under this specific call.

The main goal of the project is to support research that might in future help reduce the incidence of cancer, improve cancer survival and the quality of life of cancer patients. Grants were awarded to support fundamental or translational research into the causes, mechanisms, diagnosis and treatment or prevention of cancer.

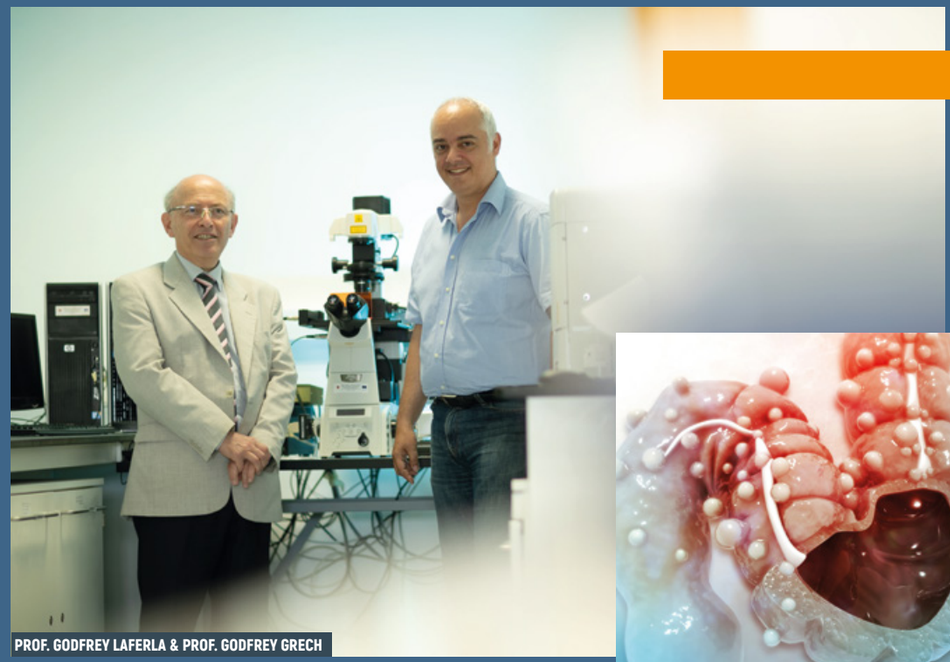
The 6 projects that received funding are:

Project	Lead Investigator	Faculty/Centre University of Malta	Budget
Colorectal cancer risk factors and design of preventive strategy and early diagnosis	Prof. Godfrey Grech	Faculty of Medicine & Surgery	€60,000
The differentiation inducing effects of phenolic compounds from endemic Maltese extra virgin oils on chronic myeloid leukaemia	Dr Marion Zammit-Mangion	Faculty of Medicine & Surgery	€27,618
Combined thermal and visual imaging for early detection of skin cancer	Dr Owen Falzon	Centre for Biomedical Cybernetics	€60,000
Effectiveness of a physical and psychosocial intervention on quality of life in adult cancer patients	Dr Josianne Scerri	Faculty of Health Sciences	€47,200
Microwave hyperthermia for breast cancer	Prof. Charles Sammut	Faculty of Science	€60,000
Dexamethasone in glioblastoma multiform therapy	Prof. Mauro Pessia	Faculty of Medicine & Surgery	€60,000

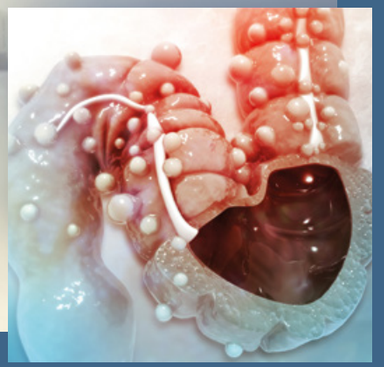
COLORECTAL CANCER RISK FACTORS AND DESIGN OF PREVENTIVE STRATEGY AND EARLY DIAGNOSIS

Lead investigator:
Prof. Godfrey Grech
Associate Professor, Faculty of Medicine and Surgery, Department of Pathology, University of Malta, in collaboration with Prof. Godfrey LaFerla

In Malta, colorectal cancer (CRC) is the second commonest cancer with respect to new cases and deaths. Currently due to lack of early-disease symptoms, low acceptability towards screening programs and medical advice, a high percent of CRC cases present at an advanced stage of disease. This project aims to set up a well-annotated and sampled prospective cohort and conduct a pilot project to measure microbiome profiles and plasma biomarkers, providing high quality data to design potential future strategy for early diagnosis. The impact of a blood test for early detection of CRC prompts a wider acceptability for screening, promoting more effective treatment outcomes.



PROF. GODFREY LAFERLA & PROF. GODFREY GRECH



DR MARION ZAMMIT-MANGION & DR LUCIENNE VASSALLO GATT

THE DIFFERENTIATION-INDUCING EFFECTS OF PHENOLIC COMPOUNDS FROM ENDEMIC MALTESE EXTRA VIRGIN OLIVE OILS ON CHRONIC MYELOID LEUKAEMIA

Lead investigator:
Dr Marion Zammit-Mangion
Senior lecturer, Faculty of Medicine and Surgery, Department of Physiology and Biochemistry, University of Malta, in collaboration with Dr Lucienne Vassallo Gatt

Phenolics from Maltese Extra Virgin Olive Oil (EVOO) have, in a separate project, been tested for their effect on acute myeloid leukaemia cell lines (AML). This work yielded positive and promising results which showed the potential of a group of compounds as differentiation-inducing agents. The novel project being proposed in this application aims to investigate the effects of phenolics from a Maltese EVOO on chronic myeloid leukaemia (CML) cell lines.
To date, the treatment offered for CML remains Imatinib a tyrosine kinase inhibitor, which however has been linked to severe adverse effects. Spectroscopic assays will be used to assess differentiation capacity, followed by morphological analysis and differentiation marker analysis. The mode of action of these compounds will finally be determined through RNA sequencing.

PROF. KENNETH CAMILLERI, DR OWEN FALZON & MR JEAN GAUCI

COMBINED THERMAL AND VISUAL IMAGING FOR EARLY DETECTION OF SKIN CANCER

Lead investigator:
Dr Owen Falzon
Senior Lecturer, Centre for Biomedical Cybernetics, University of Malta, in collaboration with Prof. Kenneth Camilleri and Mr Jean Gauci.

Early detection of skin cancer is crucial for increasing the effectiveness of treatment. Current methods for the differentiation between benign and malignant tumours are invasive. In this work we propose a computer aided diagnosis method that combines dynamic thermography with visual dermoscopic data for the detection of skin cancer and the non-invasive differentiation of benign and malignant tumors. We are going to study thermal and visual characteristics of the human skin to automatically distinguish between healthy and pathological skin regions. For this purpose, we are going to be looking at the application of advanced image processing, machine learning and data analysis techniques such as deep learning algorithms, which have already shown promise in improving detection rates when applied on dermoscopic images.

EFFECTIVENESS OF A PHYSICAL AND PSYCHOSOCIAL INTERVENTION ON QUALITY OF LIFE IN ADULT CANCER PATIENTS

Lead investigator:
Dr Josianne Scerri
Senior Lecturer, Head, Department of Mental Health, Faculty of Health Sciences, Chairperson Faculty Research Ethics Committee, University of Malta, in collaboration with Dr Michael Galea and Prof. Carmel Cefai.


DR JOSIANNE SCERRI & DR MICHAEL GALEA


PROF. CARMEL CEFAI

The provision of palliative care needs to address a broad range of physical, and psychosocial issues. Hence this study explores any changes in quality of life measures between the present standard treatment of compression bandaging and exercise and the present treatment together with manual lymphatic drainage in individuals with lymphoedema. In addition, the study shall introduce innovative concepts into an intervention consisting of sessions on the use of mindfulness, cognitive behavioural therapy, resilience skills, expressive arts and critical and creative thinking skills to address psychosocial and emotional issues being experienced by palliative care patients. Training modules and the implementation of standard treatment care will also be introduced.

DEXAMETHASONE IN GLIOBLASTOMA MULTIFORM THERAPY

Lead investigator:
Prof. Mauro Pessia
Professor, Faculty of Medicine and Surgery, Department of Physiology and Biochemistry, University of Malta


PROF. MAURO PESSIA

Glioblastoma Multiform (GBM) is an incurable brain tumour currently treated with dexamethasone (DEX) to reduce the deadly formation of brain oedema. Here we hypothesise that DEX-withdrawal boosts GBM cell proliferation, migration and aggressiveness in vitro and in vivo. By using a multidisciplinary approach, we will clarify the mechanisms of DEX actions and test drugs (e.g. Navitoclax) that are predicted to abolish the postulated pro proliferative and pro-migratory effects of DEX on GBM cells.

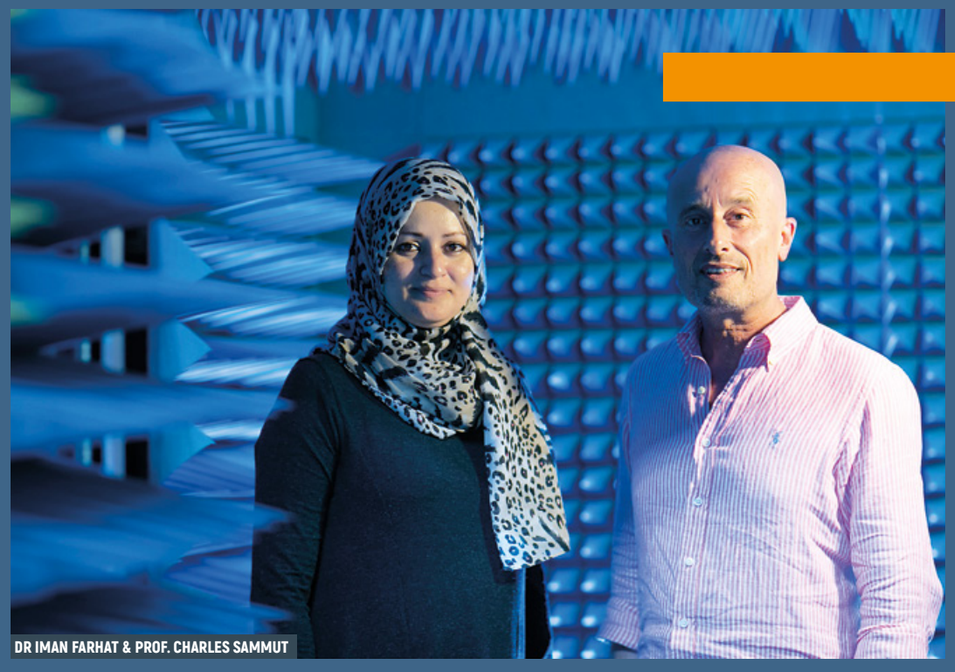
Thus, the overarching goal of this project is to demonstrate that DEX must be withdrawn from GBM therapy, as it reduces the life expectancy of patients by increasing the risk of GBM reappearance. Alternatively, it could be still prescribed but only in combination with a drug that abolishes the tumorigenic effects of DEX.

MICROWAVE HYPERTHERMIA FOR BREAST CANCER – HYPER4B

Lead investigator:
Prof. Charles Sammut
Professor, Faculty of Science, Department of Physics, University of Malta in collaboration with Mr Gordon Caruana Dingli and Dr Iman Farhat.


MR GORDON CARUANA DINGLI

Breast cancer is the most common malignancy and the leading cause of cancer-related mortality in women. Although mortality rates have declined, incidence continues to increase. Standard clinical treatments include surgery, chemotherapy, hormone and radiotherapy (RT). However, recently it was shown that microwave hyperthermia (HT) significantly limits side effects and improves effectiveness of chemotherapy and RT. This project proposes a novel microwave breast HT system. Two antenna structures will be investigated, one is a novel phased array antenna design and the other is a conical antenna coupled to a circular waveguide. A prototype system will be constructed for HT-assisted radio- or chemotherapy of breast tumour patients.


DR IMAN FARHAT & PROF. CHARLES SAMMUT

MAJOR RESEARCH PROJECTS & INITIATIVES

PHOTO BY UNIVERSITY OF MALTA

Conservation project of d'Aleccio's Great Siege wall paintings

MADE POSSIBLE BY

THE GASAN FOUNDATION

The Department of Conservation and Built Heritage of the University of Malta and Heritage Malta have embarked on a partnership, under the auspices of the Office of the President of Malta, to conserve the cycle of wall paintings illustrating key events of the 1565 Great Siege of Malta located in the Grand Council Chamber of the Grand Master's Palace in Valletta.

The Great Siege wall paintings were executed by the Italian artist, Matteo Perez d'Aleccio (1547–before 1616) who was specifically invited to come over to Malta in 1577 to depict the Great Siege events by Grand Master Fra Jean de Cassiere (1572-1581) himself. It should be recalled that the Grand Master was a Great Siege veteran himself. The Great Siege is depicted in 12 episodes interspaced by allegorical figures as a frieze decorating the upper part of the walls of the hall presenting the four-month siege in a narrative sequence.

D'Aleccio's cycle is the most detailed and historically accurate visual document of the Siege itself. Drawn from many eyewitness accounts and written narratives, these paintings constitute an important historical document, serving as an enduring symbol in defining Maltese identity whilst also being a threshold in the history of art in Malta.

The cycle was partially conserved in 2001-2005 by the University of Dresden, but the project was not completed, leaving approximately one third of the paintings still in need of conservation.

The conservation project which began in October 2018 is a three year project which will complete the work begun in the 2000s by using updated conservation methods that will stabilise the final third of the paintings. The conservation will remove surface soiling which currently darkens the wall paintings while improving the legibility of the cycle as a whole.

These conservation works are being managed and supervised by the professional wall painting conservators at the Department of Conservation and Built Heritage at the University of Malta as well as by professional conservators from Heritage Malta and elsewhere. The project includes the full participation of the students following the M.Sc. in the Conservation of Decorative Surfaces at the Department of Conservation and Built Heritage. The conservation works are in fact an essential part of the Master's programme being followed by these students. Heritage Malta curators will be advising on the Historical and Art Historical aspects of the project.

This project, which requires €300,000 for the 3-year duration was supported by the Gasan Foundation. This contribution made it possible for the project to commence. Furthermore, the RIDT is also in the process of generating further funds to ensure the completion of this project. Representatives of the Gasan Foundation and the RIDT visited the restoration site at the Grand Master's Palace in May 2019.

PROF. JOANN CASSAR

MAJOR RESEARCH PROJECTS & INITIATIVES

DR SARAH CUSCHIERI

Saħħtek Study

MADE POSSIBLE BY

The Alfred Mizzi Foundation
National Heritage - Education - Social Solidarity

Atlas Insurance

L-Università ta' Malta

The SAĦĦTEK study on type 2 diabetes was a cross-sectional health examination survey conducted between November 2014 and November 2015. A randomised stratified sample population (by age [18 – 70 years], gender and locality) was obtained from the national registry.

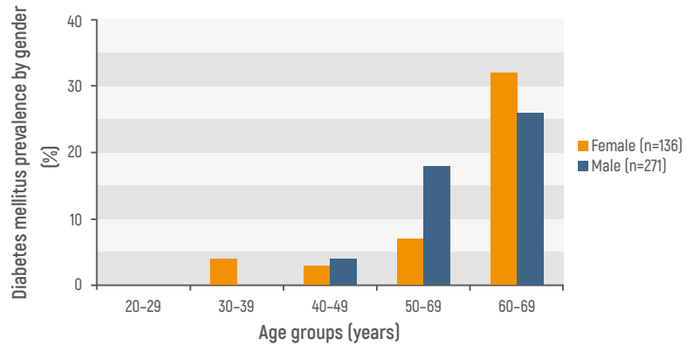
Examination hubs were set up in each town, where the participants completed a socio-demographic questionnaire and underwent blood pressure, weight, height and waist circumference measurements. Blood samples for fasting blood glucose (FBG), lipid profile and whole blood (for genetic analysis) were also collected.

In this study an overall response rate of 47.15% was obtained. The prevalence of type 2 diabetes was 10.39% (95% CI: 9.47 – 11.38) with a male predominance (as seen in Figure 1). Out of which, 6.31% (95% CI: 5.59 – 7.11) were known diabetics, while the remaining 4.08% (95% CI: 3.50 – 4.74) were newly diagnosed diabetics.

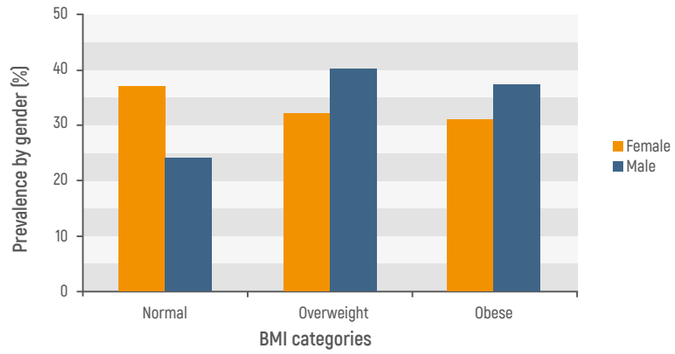
Younger diabetics (<55 years) were predominantly newly diagnosed diabetics while older diabetics (>55 years) were already known diabetics 1.

The study was based on the international guidelines and local experts' input from various specialties; (Epidemiology – Prof. Julian Mamo; Diabetologist – Prof. Josanne Vassallo; Medical Statistician – Prof. Neville Calleja; Genetics – Prof. Alex Felice and Dr Nikolai Pace; Pathology – Dr Christopher Barbara).

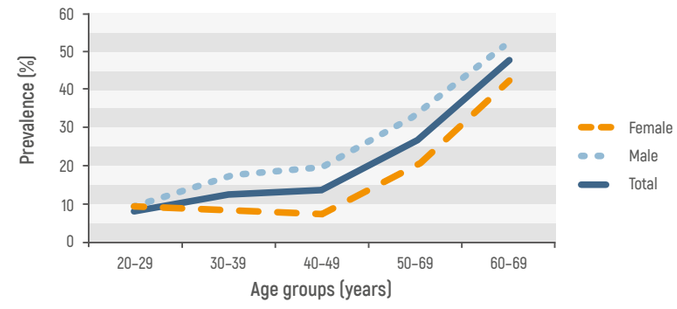
Conducted by Dr Sarah Cuschieri, an assistant lecturer from the Department of Anatomy, Faculty of Medicine and Surgery at the University of Malta as part of her Ph.D. studies, the study's main sponsors were The Alfred Mizzi Foundation – renowned for their work in funding projects related to Maltese culture, its heritage, education, the environment and social solidarity. Other sponsors included Atlas Insurance and the University of Malta through the RIDT.



DISTRIBUTION OF THE DIABETES MELLITUS POPULATION BY AGE GROUPS AND GENDER



DISTRIBUTION OF THE BMI PREVALENCE BY GENDER



DISTRIBUTION OF HYPERTENSION PREVALENCE BY GENDER

MR FRANCIS CARBONARO

In your eyes

MADE POSSIBLE BY

THE MALTA COMMUNITY CHEST FUND
FOUNDATION

Ophthalmic experts and researchers at the University of Malta are in the process of conducting a national survey – The Malta EYE Study, which will establish the prevalence of eye disorders, such as glaucoma and cataracts in Malta.

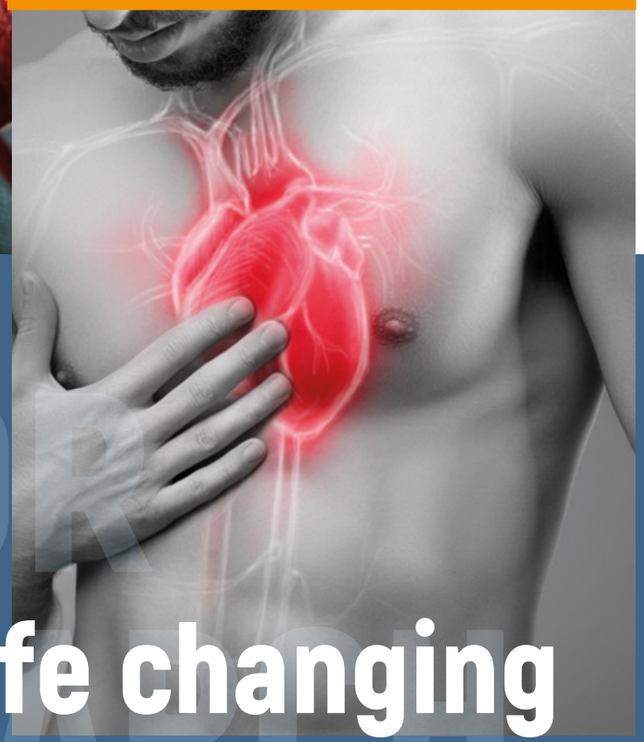
The findings will allow the team to determine the prevalence of common eye disorders and indicate the prevalence of refractive errors, such as myopia (short sighted) and hypermetropia (long-sighted) in Malta and Gozo. The project aims to collect data from 1% of the Maltese population between the age of 50 and 80 years of age, to determine both age and sex specific prevalence of presenting blindness and visual impairment in adults, and the attributable causes.

The aim of this unique project is to determine the prevalence of visual impairment and eye disease in Malta and Gozo. To date there is no reliable data available on blindness and common eye diseases such as cataracts, diabetic retinopathy and glaucoma. Hence the project will shed light on whether the Maltese are more prone to developing certain diseases and indicate any genetic predisposition or environmental factors, which could be managed in order to reduce the incidence of certain diseases.

This national study, which is also of crucial importance for the public health sector is being led by Francis Carbonaro, an ophthalmic surgeon and visiting senior lecturer at the Faculty of Medicine and Surgery at the University of Malta. It is being carried out by David Agius, a Ph.D. student over a period of three years and is being funded by The Malta Community Chest Fund (MCCF) Foundation through the RIDT.

At the beginning of June 2019 the first part of the equipment was delivered, with the second part to follow – both parts of the equipment were purchased with the funds donated by the Malta Community Chest Fund.

The Ph.D. has already started as well as the process of finalizing the Methodology and Ethics Proposal for submission to the University of Malta. Data collection is expected to take around two years.



Life changing data emerges from BEAT IT project

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MALTA heart FOUNDATION

Significant, life changing data has started to emerge from the BEAT IT project – Screening for Sudden Cardiac Death which started during the 2017-2018 scholastic year. A number of doctors offered cardiac screening in schools, with the aim of identifying individuals at risk of harbouring heart disease linked to sudden cardiac death. In total, 2708 students gave consent to be screened in schools, with a questionnaire and electrocardiogram (ECG). In total, 1 in 27 needed referral, with 90.2% of those referred having an abnormal ECG, with only 20% having symptoms, highlighting the importance of ECG screening in young individuals. At the end, 9 adolescents harboured disease linked to sudden cardiac death (1 in 301), 4 of which were professional athletes, with one of the latter disqualified from her competitive sport. Some of those referred were evaluated for the possibility of an inherited cardiac disorder. Thanks to clinical evaluation in 35 family members, another 9 individuals have underlying heart disease or are at risk of developing a problem in the near future. A number of individuals have also been found to have a mutation linked to heart disease. This has given information about how a mutation behaves in a family, who is more at risk, and who needs to be followed up closer than others. A total of 40 students were eligible for repeat ECG with 7 (21.2%) referred for secondary evaluation. A number of family members were screened with 10% referred for more evaluation. The majority of students had normal ECGs a year later, which is in line with international guidelines. Genetic testing on the 7 students is currently being carried out to help who is more at risk, while further testing including genetics on a number of first and second degree family members to help identify individuals at risk of harbouring heart disease is being carried out. The BEAT IT project is being led by cardiology specialist Dr Mark Abela and is being financed through a generous donation by Cherubino Ltd through the RIDT, together with other donations made by the Malta Heart Foundation. The study is being facilitated through the collaboration offered by the Ministry of Education and Mater Dei Hospital.

DR MARK ABELA. PHOTO BY THINK MAGAZINE

MAJOR RESEARCH PROJECTS & INITIATIVES

Environmental awareness

MADE POSSIBLE BY

THE GASAN FOUNDATION

Considerable amounts of single-use plastics are discarded and persist in our natural environment for an extended period of time. A research project about the biodeterioration of commonly used plastics is currently being carried out at the Microbiology Lab of the Department of Biology at the University of Malta. The project is funded by the Gasan Foundation through the RIDT.

A number of experiments are being conducted to compare the natural deterioration of different plastics in the soil and marine environments to that carried out by particular microbes *in vitro*.

Parameters indicative of surface appearance, polymer strength and composition are being measured before, throughout and after treatment. This study aims to monitor changes in the plastic films due to biological, as well as biophysical and biochemical degradation. The research is particularly relevant to the present situation in Malta, where landfills are expected to reach full capacity in the near future, and safe alternatives are thus being sought as a solution to the waste management crisis. The microbes used in the study are nonpathogenic and the end products of microbial deterioration are nontoxic.

This interdisciplinary study is being led by Dr Gabrielle Zammit, resident academic at the University of Malta's Faculty of Science and involves the participation of researchers from different Departments and the training of both undergraduate and postgraduate students enrolled at the University. The aim of the study is to raise awareness regarding the deterioration of plastics in our natural environment and to develop possible safe biotechnological solutions to the problem.

DR GABRIELLE ZAMMIT

MAJOR RESEARCH PROJECTS & INITIATIVES

DR CHRISTIAN ZAMMIT

DR JASMIN VELLA

PROF. MARIO VALENTINO

A gentle touch for stroke therapy

MADE POSSIBLE BY

THE ALFRED MIZZI FOUNDATION
NATIONAL HERITAGE • EDUCATION • SOCIAL SOLIDARITY

Emerging research from experimental studies in rodents suggests that sensory stimulation like touch and sound can protect the brain – if delivered within the first two hours following a stroke. The discovery of this 'touch' will have life-changing implications for stroke patients worldwide.

The news has been revealed by Prof. Mario Valentino, an experimental stroke specialist at the Faculty of Medicine and Surgery following an earlier discovery conducted at Yale University, USA.. Prof. Valentino together with a team of experts is currently working on a project called 'Sensory Stimulation as a Novel Treatment Strategy to Salvage the Brain during a Stroke'- a project which started in 2017 as a followup of this recent discovery.

Stroke research is globally a top priority especially because it is the world's third leading cause of death. In Malta, over 10% of the deaths recorded in 2011 were due to stroke. The impact – individually, socially and globally, makes stroke research a top priority.

At the University of Malta, a highly sophisticated technology centred around advanced laser imaging microscopy is currently being used by scientists Dr Jasmine Vella and Dr Christian Zammit.

Led by Prof. Valentino, the team follows what happens in a rodent's brain as a stroke unfolds in real-time. They use powerful lasers and very sensitive detectors coupled with special lenses, which allow them to capture the very fast events that unravel when a blood clot interrupts the blood supply in the brain.

At the same time they record events occurring around neighbouring blood vessels, nerve cells, and support cells in tandem with limb movements and motor coordination of the rodent.

This study is therefore aimed towards uncovering how sensory stimulation might then help protect the brain and establish the cellular mechanism involved in this protection. The conclusions will ultimately translate into how sensory stimulation impacts stroke patients, and point to the best ways to activate that mechanism. Perhaps touching a stroke victim's hands and face could have a similar beneficial effect, and this is what this research study hopes to define.

The team is currently in the process of correlating data obtained during brain imaging with the rodent's movement and trajectory during a stroke. This is done using a motion-tracking device fitted under a sophisticated microscope, to record the behaviour of the rodent during high-precision tactile stimulation, such as stroking their whiskers, and detecting any gain of [brain] function through behavioural and locomotor readouts whilst 'looking' inside the brain in real-time.

If the scientists can prove that any protection is the direct cause of new blood vessels (or rewiring of migrating stem cells) resulting from the electrical activity inspired by the sensory stimulation, the next step would be to explore ways of redirecting these blood vessels or brain cells to the affected brain area.

The study is being carried out in collaboration with scientists from the University Peninsula Schools of Medicine and Dentistry, UK. It has been generously supported by a grant from the The Alfred Mizzi Foundation, through the RIDT.

MAJOR RESEARCH PROJECTS & INITIATIVES

ING. RYAN BUGEJA, PROF. LUCIANO MULE STAGNO & MR GUILLAUM POIRIER

Floating PV systems in open sea

MADE POSSIBLE BY

Xjenza The Malta Council for Science & Technology

TAKEOFF

REGULATOR FOR ENERGY & WATER SERVICES

The Institute for Sustainable Energy at the University of Malta through a €100,000 RIDT fund obtained from the Regulator for Energy and Water Resources to finance research on floating PV systems in open sea has set up the Solaqua 2.1 project. This is a follow up to Solaqua 1 and 2, the first experiments involving the testing of such PV systems in open sea and is critical because it establishes the economic and technical viability of such technology – offshore panels tend to produce 3% more energy than similar land based modules simply by being at sea.

The technology has been developed by a team led by Prof. Luciano Mule Stagno, Director of the Institute for Sustainable Energy at the University of Malta, the technology for the project has been developed. Experiments have also been conducted to test the same technology by producing different prototypes and Solaqua 2.1 will involve testing them in large wave

facility. The Institute has also discussed with the University of Malta Intellectual Property Office about possible patents for the design.

The ultimate aim of this research is to launch a large (hundreds of kWp to MWp) farm in Maltese territorial water. If such a project meets the cost and power output targets, it would be possible to implement similar systems worldwide.

Ing. Marjohn Abela, CEO at REWS reiterated the Regulator's support to ongoing research in renewable energy and congratulated the University of Malta for attempting such innovative research and using the open sea as a potential platform for such PV panels.

The project has already attracted proof of concept funds from the Malta Council for Science and Technology and Take Off, and once the technology has been positively demonstrated, the next step would be to test the concept and to measure the maximum power output in different sea conditions.

MAJOR RESEARCH PROJECTS & INITIATIVES

MR LUCA BONDIN

Virtual reality ‘pain relief’ for children

MADE POSSIBLE BY

Vodafone Malta Foundation

The University of Malta’s Department of Artificial Intelligence in collaboration with The Vodafone Malta Foundation are developing a cutting-edge adaptive technology involving virtual reality to reduce pain without the use of medication in children undergoing painful, high-stress hospital procedures. A first in the medical field, the project which is expected to take up to three years to develop and which has a €113,000 fund made available through the RIDT, combines virtual reality with ‘affective gaming.’ Meaning that the specially designed game also determines the user’s emotional and physical state and adjusts the game accordingly in real time in order to distract the child from feeling pain. The Vodafone Malta Foundation aims to first roll out the technology amongst children receiving cancer treatment at the Sir Anthony Mamo Oncology Centre and, subsequently, to all children receiving any form of hospital-based treatment. Studies have proven that VR can relieve by up to 50 per cent of the pain, anxiety and distress experienced by children suffering from various illnesses when undergoing medical procedures such as intravenous (IV) injections, vaccinations, anaesthesia administration, and other procedures required as part of routine care, such as burn wound dressing changes. However, the project will go beyond this since it will make use of adaptation which will enable the VR environment to change in real time according to the level of anxiety experienced by the patient. This will be measured using biometrics collected through non-invasive, wearable devices (such as a smartwatch).

By monitoring the heart rate of the child, it can be determined whether he/she is experiencing fear or pain in real time. By knowing this information, an Artificial Intelligence mechanism will adapt the graphics of the VR game, the action within it and the tempo of the background music. Therefore, a high heart rate will prompt a change to calming colours and soothing music in order to calm the patient whilst, conversely, if the child is not engaged enough, the game will become more exciting in order to distract the child from the pain he/she would be feeling.

MR DYLAN SEYCHELL, PROF. ALEXIEI DINGLI & MR MARK BUGEJA

MAJOR RESEARCH PROJECTS & INITIATIVES

PROF. KENNETH CAMILLERI

DR ING. MARVIN BUGEJA

PROF. ING. SIMON FABRI

Robotics experts build Smart Wheelchair

MADE POSSIBLE BY

APS bank

A team of engineers at the Department of Systems and Control Engineering of the University of Malta have designed and built a ground-breaking prototype for a Smart Wheelchair. Motivated by the head of department, Professor Ing. Kenneth Camilleri, the team is creating a new frontier in independent mobility for the physically impaired.

Prof. Ing. Camilleri and the team – Dr Ing. Marvin Bugeja, Prof. Ing. Simon Fabri, Noel Agius and engineering student, Matthew Aquilina – launched the project in 2017 following a request made to Prof. Ing. Camilleri by a friend who expressed his wish for a remote-control facility for his wheelchair.

Together with two of the department's academic experts in robotics, namely Dr Ing. Marvin Bugeja and Prof. Ing. Simon Fabri, they recognised the potential to use their collective robotics expertise and hence create an entirely new system for a Smart Wheelchair.

The team set about converting a standard motorised wheelchair into a smart wheelchair by equipping it with sensors, computing hardware, and software, all shaped by the team's decades of experience, work, and research in the more general field of mobile robotics.

Developing the concept further, the team's new system was installed with multiple modes of operation and capabilities, to be selected by the user through one of three input methods presented on a touchscreen mounted on the wheelchair - the project's objectives were achieved in less than a year.

Thanks to funding made available by APS Bank through the RIDT, this life-changing project has the potential to become a globally ground-breaking journey for the prototype smart wheelchair. The team is currently planning additional work to make the prototype more sophisticated and to look at potential commercialization routes.

MAJOR RESEARCH PROJECTS & INITIATIVES

NICHOLAS MAMO, DR GILLIAN MARTIN, DR JP EBEJER & MARIA DESIRA

DWARNA health portal

MADE POSSIBLE BY

Vodafone Malta Foundation

DWARNA - A portal that will mark a new frontier for technology and health-related research in Malta and one that will enable the general public to participate in Biomedical and Genomic Research is expected to be launched in March 2020.

Led by Dr Gillian Martin, a sociologist at the Centre for Molecular and Biobanking, the idea of 'DWARNA' was first raised in June 2017 as a technological means to provide a closer collaboration between donors to the Biobank and researchers, while encouraging more people to donate to the Biobank, regardless of their health, nationality or background.

The DWARNA team are developing an interactive IT interface between the research centre and the public, whereby research participants can track and see how their individual samples in the biobank are used.

Dr Martin together with her team: computer scientist Dr Jean Paul Ebejer, Research Support Officers Maria Desira (sociologist), and Nicholas Mamo (software programmer), have created a fully-operational prototype in preparation for the web portal - expected to be one of the first IT portals of its kind in the world.

DWARNA aims to address the current procedure whereby donors to the Biobank hand over control of their samples to the researchers when they donate, with very limited involvement in the research process moving forward. Likewise, researchers and academics have minimal opportunity to stay in communication with donors and therefore cannot keep them informed of the outcomes of any research that is carried out on their samples. The platform will offer participants the chance to give or withhold their consent, via a click of a button, for their samples to be used in new research studies while maintaining their privacy and data security. DWARNA may have significant implications, since everyone and anyone is eligible to donate to the biobank population collection, the portal may provide a unique opportunity for Malta-wide research exploring the causes and potential treatments for locally-prevalent diseases such as diabetes, asthma, thalassemia, colorectal cancer and ALS.

The biobank was established in 1989 by Prof. Alex Felice at the University of Malta. It is the national node of the pan-European Biomedical research infrastructure BBMRI-ERIC and is situated within the Centre for Molecular Medicine and Biobanking at the University of Malta.

The DWARNA project is being funded by a Foundation that is committed towards connecting the Maltese Community - Vodafone Malta Foundation through the RIDT. The team was also supported by the SWITCH team who contributed their expertise in branding the platform.

MAJOR RESEARCH PROJECTS & INITIATIVES

DR ING. ROBERT N FARRUGIA, PROF. ING. TONIO SANT & DR ING. DANIEL BUHAGIAR

FLASC – the creation of renewable energy storage

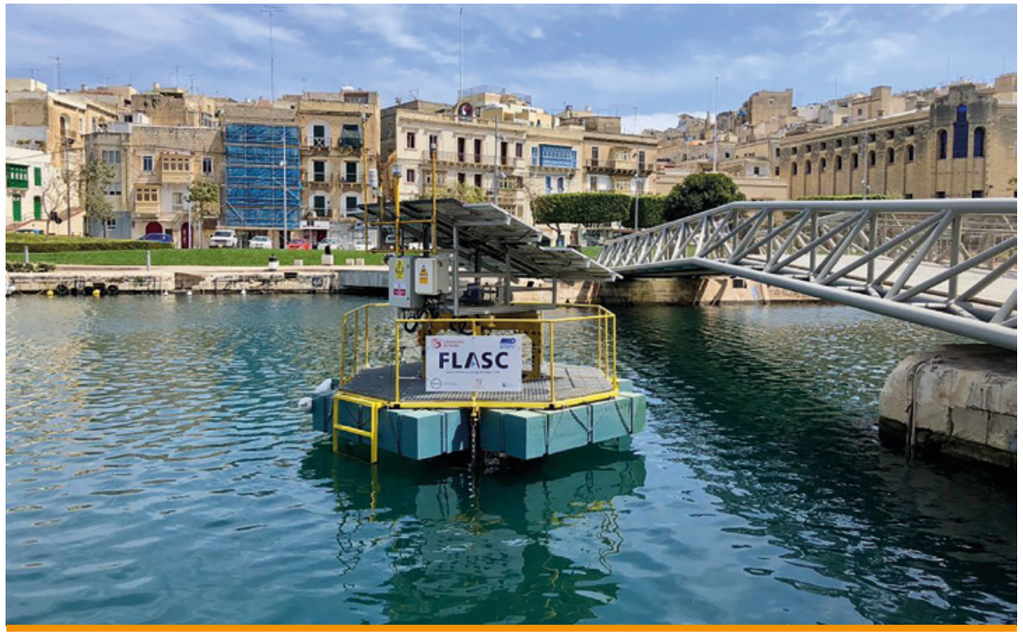
MADE POSSIBLE BY

FLASC is a project that provides an interface between offshore renewables, solar, wind or wave energies, and which uses compressed air for energy storage. Through storing the energy in the form of a pressurised fluid, the intermittent output of green renewable energy is smoothened and stored for a short period of time to better supply energy at peak hours.

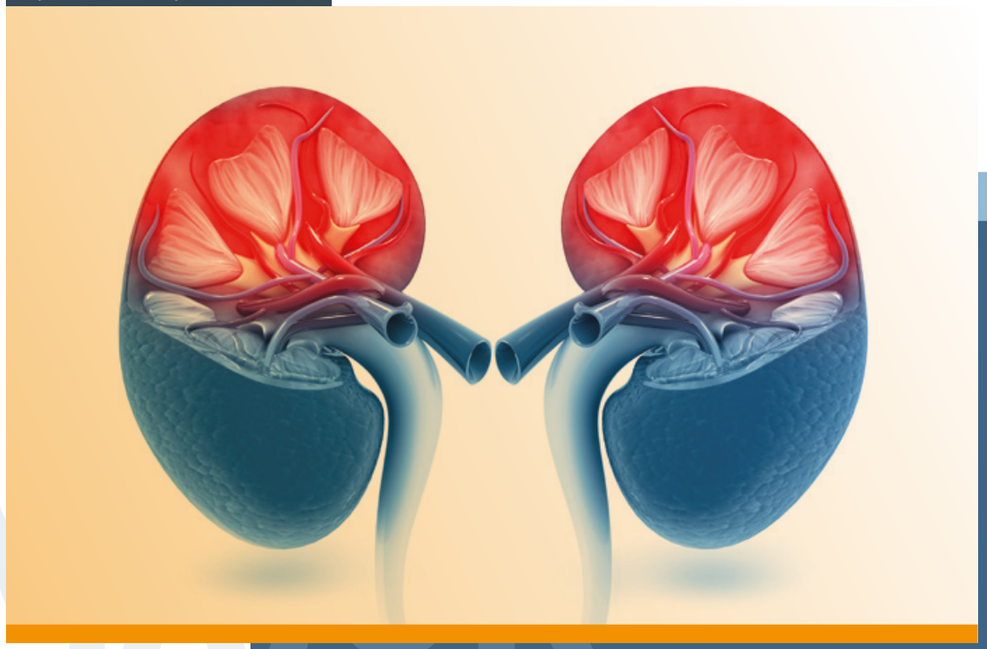
This renewable energy storing system stemmed from a project which was financed by the Malta Council for Science and Technology under the Fusion Programme and which was also amongst others assisted by the University of Malta's RIDT which helped fund the development of a system for monitoring the surface temperature of FLASC pressure vessels.

This innovative concept consists of a stable floating platform which uses a dual-chamber system that allows the pressure response to be controlled independently of the deployment depth of the water. One of the key challenges for efficient compressed air storage is maintaining a stable pressure. It is ideal for supporting maritime services offshore including oil, gas and aquaculture industries. It exploits existing resources and infrastructure, resulting in a cost-effective solution, beating batteries at their own game.

The project is a collaboration between the Department of Mechanical Engineering and the Institute for Sustainable Energy of the University of Malta and Medserv plc. A significant amount of experimental data has been collected from a scaled prototype deployed in the Grand Harbour. This is currently in the analysis phase. The FLASC concept has been successfully patented by the University of Malta. Further details about the project may be found in www.offshoreenergystorage.com.



MAJOR RESEARCH PROJECTS & INITIATIVES



Investing in kidney disease research

MADE POSSIBLE BY

LIFECYCLE MALTA FOUNDATION SINCE 1999

Professor in physiology and biochemistry at the Faculty of Medicine, Alex Felice together with a team of scientists, namely lead researcher Dr Valerie Said Conti consultant paediatric nephrologist at Mater Dei Hospital and visiting lecturer and Ms Esther Zammit, are investigating what causes children to be born with congenital anomalies of the kidney and urinary tract (CAKUT).

These anomalies, which arise from defects in kidney development before birth and are the commonest cause of end-stage kidney disease in children, are thought to result from an interplay between genetic factors and environmental hits which influence the developmental pathways.

The researchers have established a high-quality kidney disease biobank at the University of Malta where biological samples from families of children with CAKUT are now stored. They have looked at potential risk factors during pregnancy and have performed ultrasound studies on first-degree relatives. It was determined that 3 of 26 (11.5%) individuals had a renal anomaly which compares well with a family history of 10% reported in the literature.

Using Next Generation Sequencing, a modern technology which allows the human genome to be sequenced rapidly and in great detail, the researchers have identified a number of variations in the genomes which play a part in development. Since CAKUT is classified as a rare disease and the number of individuals studied by any research group is small, the data will contribute to the larger pool with the aim to develop preventive measures and individualised future therapy.

DR VALERIE SAID CONTI AND PROF. ALEX FELICE

The researchers are looking at fundamental physiological mechanisms of kidney development and explore in greater depth the effect of these and other gene variations in children and adults. The new kidney biobank gives researchers and Maltese families the opportunity to join large research programs with collaborators from other countries.

The continued investment of the kidney programme was made possible thanks to a €25,000 donation made to the RIDT by the LifeCycle (Malta) Foundation. The money was received by LifeCycle as part of the 2018 title sponsorship by Foster Clark Products Ltd. LifeCycle began supporting medical research in kidney disease in 2014 and have been raising money through their yearly LifeCycle Challenge to help and provide better care for patients suffering from kidney disease. Over a span of four years a total of €120,000 was donated by LifeCycle towards the kidney research project.

Fundraising and outreach events

OASIS Art exhibition

OASIS, a collective art exhibition was organised in July by the RIDT in collaboration with the Honorary Consulate General of the Slovak Republic in Malta at the University of Malta Valletta Campus. Participating artists included Josette Fenech, Bernard Anastasi, Ivona Matejkova and Lubica El Malaheg.

My Way concert

In February some of Malta's best musicians and singers fronted by Nadine Axisa paid tribute to Frank Sinatra in a fundraising concert for medical research organised by the RIDT. The concert was held in February at the Grand Ballroom, The Phoenicia Hotel, Floriana. The hotel ballroom ambience was turned into a 1960s jazz club with Axisa being joined by Dominic Galea on the piano and Joe Micallef on the drums, Oliver Degabriele on double bass and Walter Vella on Saxaphone. All proceeds from the ticket sales have gone towards health related research projects. The event was supported by Alberta Ltd and Hotel Phoenicia.


PHOTO BY ELISA VON BROCKDORFF AND THE SCIENCE IN THE CITY FESTIVAL

Science in the City

The RIDT participated in Science in the City–European Researchers' Night where Malta's leading scientists, artists and influential thinkers were brought together for one purpose. The event celebrated science and culture with an original programme that included theatre, dance, film, workshops, debate and interactive installations, innovators, scientists-in-the-making, and families, that transform the city and bring some of the world's leading scientists in direct contact with the broader public.

With Valletta being the 2018 European Capital of Culture, Science in the City closely collaborated with Valletta 2018 Foundation to give the participants a unique experience. Artists and scientists from the University of Applied Arts, Vienna and University of Malta joined forces to create three interactive installations in the activity Of Mice, Carbon and Tritons.

Sixties and Seventies party raises €11,200 for the RIDT

During the RIDT annual Christmas concert held at the Church of St Catherine of Italy in Valletta with special guests Nadine Axisa and Christian Borg a donation of €11,200 was presented to the RIDT by Marcelle Abela who collected the funds during a fund raising party 'Show You Care' held in November at Villa Arrigo in Naxxar. All funds were allocated to cancer research projects.

SCHOOL PROGRAMMES
Creating knowledge through research

One of the main outreach progreammes of the RIDT is the education programme. Through the vast network of experts in various fields the RIDT has been reaching out to a number of schools to offer knowledge and raise awareness on the importance of research. In March when the world marks International Brain Awareness, Chiswick House School organised a unique and colourful event with flamboyant hats being created out of paper, plastic and other recyclable materials. Students were asked to come to school wearing casual clothes instead of their uniform and wearing a hat done by the children themselves. CHS and St Martin's College have endorsed the RIDT mission and understanding that supports investment in research.

The RIDT is committed to promoting the importance of research amongst students and has created a tailor made programme specifically for schools. The programme offers a ray of educational talks, events and activities that capture a glimpse of national research and awareness. Those schools who are interested in participating in this programme can contact **daniela.allen@ridt.org.mt**

How you can help

The Research Trust 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 Research Trust 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 in this unique grassroots movement, as we transform our future through research.

Make a donation

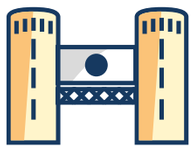
One can make a donation either online, via ridt.org.mt or by transferring funds to this account:
UNIVERSITY RES INNOVA AND DEV TR, Central Bank of Malta,
MT37MALT011000040360 EURCPE50001, MALTMTMT
Alternatively, one can send cheques by mail to:
RIDT, University of Malta, Valletta Campus, St Paul's Street, 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 the 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.

The University of Malta Research, Innovation and Development Trust

Management Accounts December 2018

Income and Expenditure

	2018	2017
Income		
Donations - Unrestricted	63,017	24,605
Donations - Specific	450,678	330,955
Investment interest	–	4,250
Capital Grant	109,206	101,087
Commission	51,669	–
	674,570	**460,897**
Specific endowments	450,678	330,955
Donations	–	2,695
	450,678	**333,650**
Expenditure		
Salaries	72,983	75,146
Marketing	25,234	23,320
Fund raising expenses	1,504	11,598
Communications	1,158	1,184
Hospitality	1,839	2,125
Stationery	729	453
Transport		
Other	15	15
Audit fees		
Conference	1,239	2,519
Memberships	264	117
Loss on redemption of investment	–	3,750
Depreciation	109,206	101,087
	214,171	**221,314**
Net Income / (Deficit)	**9,721**	**(94,067)**

Balance Sheet

	As at 31/12/2018	As at 31/12/2017
Assets		
Non-current assets		
Investments	–	–
Donated equipment (in use by beneficiaries)	222,805	164,011
	222,805	**164,011**
Current assets		
Accrued income	400	400
Bank Balance	2,396,156	2,064,673
	2,396,556	**2,065,073**
Total assets	**2,619,361**	**2,229,084**
Reserves and liabilities		
Specific Endowments	745,345	551,177
Capital account	800,000	800,000
Deferred Capital Grant	222,805	164,011
Reserves	(792,063)	(801,784)
	976,087	713,404
Current liabilities		
Accruals	-	20,542
Creditors	-	354
Owed to University	1,643,274	1,494,784
	1,643,274	1,515,680
Total reserves and liabilities	**2,619,361**	**2,229,084**

We thank our supporters who have kept us going over the years

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Tonio Casapinta
Anne Cadle & friends
Marcelle Abela
Alberta Group staff
RCI Insurance staff
St. Francis Secondary school
St. Martin's College
Chiswick House School
Central Bank of Malta
The National Lotteries Good Causes Fund
Teatru Manoel
Regulator for Water and Energy Services

RIDT

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RIDT aims to strengthen investment in high-calibre research and development across every faculty and department within the University of Malta, and on a national level, and to foster the application of research outcomes.

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