



breakthrough
CANCER RESEARCH



ANNUAL REPORT 2018

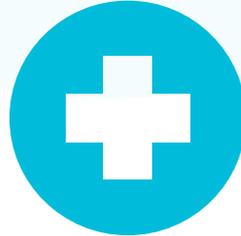
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2018 IN NUMBERS



15
Research
Grants
Awarded



€779,923
Invested in
research to
beat cancer



15
Cancer Prevention
Seminars across
the country



4
Cancer Prevention
Initiatives



2
Global Cancer
Awareness Campaigns



4
Scholarships/
Fellowships
in Progress



4
Patient Intervention/
Patient Experience
Projects

CHAIRMAN'S REPORT

In 2018, Breakthrough Cancer Research (BCR) was able to significantly take forward our vision: to apply world class cancer research into poor prognosis cancers, to translate lab discoveries into new effective treatments for cancer patients and to drive/facilitate greater collaboration between scientists and clinicians across Ireland and Internationally.

This past year brought significant investment into the research staff, consumables and equipment needed to fund vital world class cancer research projects, all of which aligned with our research priorities (page 11). Breakthrough Cancer Research has also been able to launch and sustain some fantastic partnerships which have been extremely important in allowing us to put our vision into practice by supporting exceptional research to change the future of cancer.



Investing in our Research Vision

In 2018, BCR was delighted to fund 15 different research grants which aligned with our mission to discover and develop new and better cancer treatments while ensuring that the patient is at the centre of everything we do. Breakthrough does not receive any state or guaranteed funding and thus relies on fundraised income to invest in our research priorities. The total funds raised for 2018 was €1,316,546 of that we were pleased to be able to invest €779,923 into research this year while also committing additional support in the amount of €667,351 to a series of multi-year projects.

The funds invested in 2018 were able to support projects in many underserved cancers such as oesophageal, pancreatic and lung cancers as well as look at how we can rise to meet patient's needs before, during and after treatment. We were also once again able to fund a number of initiatives focused on nutrition and cancer and through outreach, worked to empower the public with knowledge to reduce cancer risk and provide evidence based tools for patients and carers to help patients on their cancer journey and hopefully improve survival. BCR has funded and/or enabled multiple clinical trials that are in the pre-trial and trial phases and we are eager to continue seeing research translated from the lab into treatments for patients and families who are waiting for more effective approaches.

Partnerships Enable Progress

Breakthrough Cancer Research is exceptionally fortunate to have partnerships with some world class companies and organisations who also believe in the capacity of research to improve cancer care. Again this past year, partners new and old, helped us to have an impact and believe as we do, that it will be a team effort to change the future of a disease like cancer (page 30). We are so grateful to each and every one of them.

In 2018, we were delighted to be a main charity beneficiary of the Ring of Kerry Charity Cycle for the first time which allowed us to commit funds to research biomarkers of drug resistance.

Our newest corporate partner, Qualtrics, who have shown incredible dedication and commitment to cancer research, have raised an exceptional €258,000 between October 2017 to the end of 2018 through their 5 For the Fight Campaign. The Five for the Fight initiative will fund a three person research team to look at how to make immunotherapy more effective for more cancer patients.

Last, but by no means least, we must pay tribute to our most longstanding and consistent supporters, Musgrave Retail Partners, who through their 2018 triathlon were able to donate €120,000, adding to the tremendous amount they have already invested in our cancer research programmes. Together we have decided to channel these funds into the creation of a new Cancer Research PhD scholarship and look forward to selecting an exceptional researcher and ambassador in the next twelve months.

Outstanding Voluntary Support

A huge thank you is due to our incredible Board of Directors, who volunteer their time and expertise to the charity. This year the Board continued its good governance and worked with the team at Breakthrough to ensure the organisation continued to meet the Triple Lock standards set out by the Charity Institute of Ireland. We also must acknowledge the amazing expertise, input and drive of our Scientific Advisory Committee and our Public-Patient Panel. These groups bring invaluable perspectives on the strategy and projects into which we channel our research investment ensuring we have both scientific rigour but also are meeting the unmet needs of patients and families.

I would also like to take the time to commend Orla Dolan and the entire dedicated team for all of the hard work they put into making 2018 such a great year. The Breakthrough Cancer Research team is immensely passionate and driven to fulfil our mission and are entirely committed to ensuring we are both raising and investing enough funds to make a significant impact for patients.

Lastly, I would like to express my immense gratitude to all of our volunteers and supporters, without whom, we would not have been able to make any of the progress we made this past year. It is wonderful to know that, together with our researchers, collaborators, boards, committees and charity staff, we are 'all in' for one mission. I know we will make even more impact in 2019 together.

Thank you,

Bryan MOHALLY
Chairman

CHIEF EXECUTIVE'S REPORT

At Breakthrough Cancer Research (BCR) our mission is clear and when asked we simply say what guides everything we do “we want to save those people who are diagnosed with cancer, who cannot be saved today”. We are passionately focused, on finding new ways to save the people whose lives will be heartbreakingly shortened by cancer.

The story for many patients is getting better and there is no doubt there has been significant progress in diagnostics and treatments. Regrettably, this is not the case for all cancers. We still have many patients who are failed by the treatments currently available. This is most evident in those cancers, frequently termed poor prognosis cancers, which are often resistant to current treatments and/or diagnosed late, making treatment even more difficult. These are the cancers which still need more research investment to find new approaches and deliver hope for patients and families – and that is what Breakthrough Cancer Research exists to do.



In 2018 we continued to invest in research programmes, both new and ongoing, targeting Oesophageal, Colorectal, Lung, Leukaemia, Osteosarcoma, Ovarian, Melanoma, Pancreatic and Advanced Breast cancers to find new treatment approaches to improve quality of life and survival for patients. All of our supported researchers and institutions are encouraged, and are successful, in leveraging BCR support to secure additional funding from other National and International Funders. One specific way BCR leverages our research funding is as a member of the Medical Research Charities Group (MRCG) and our participation in the MRCG-Health Research Board (HRB) Joint Funding Scheme. This innovative scheme allows us to nominate peer reviewed projects, which fulfil our research priorities and if selected, secure 50% funding from the Health Research Board (HRB), while providing the additional 50% from ourselves. In 2018, through this scheme, we provided funding for the final year of a 3 year project titled: Bacteria in Human Tumours. Following an open call last year, and after undergoing extensive peer review and assessment by both our Patient Panel and Scientific Advisory Committee, we also provided the first year of funding for three newly selected multi-year projects which commenced in late 2018; a project on Oesophageal Cancer in Trinity College Dublin, a Lung cancer project in UCC and an Oesophageal Project in UCC. More details on these and other projects can be found in the research section of this report.

In the field of cancer research, collaboration is essential and has always been important here at BCR – many of our activities in 2018 illustrated that. Late in the year, together with the National Cancer Control Programme (NCCP), Marie Keating Foundation and Irish Cancer Society we co-founded the Irish Cancer Prevention Network, which will be officially launched in early 2019. We also joined multiple stakeholders in commencing the work needed to develop, with the NCCP and HSE, a “Skin Cancer Prevention Action Plan”. On World Pancreatic Cancer Day we ‘lit it purple’ with our worldwide partners in the World Pancreatic Cancer Coalition. Breakthrough also worked with multiple other Irish charities to host patient events on World Ovarian Cancer Day which brought together several speakers on research, current state of care and the role of palliative care in quality of life and extending life. We also continued to deliver our #MySmallChange campaign, visiting and speaking with businesses across

the country sharing how through small diet and lifestyle changes, we can stack the odds in their favour and lower our own and our families' risk of developing cancer.

With the patient at the forefront of our minds and to address unmet needs, we also continued to provide our free, evidence based, resources revolving around nutrition for cancer patients. This year we commenced work with Dr. Aoife Ryan on the development of a new book aimed at cancer survivors, which we aim to launch next year. This cookbook, and those previously released, aim to support cancer patients and survivors with healthy, evidence based recipes and information to meet the differing nutritional needs during and post treatment. The charity also continues to fund the treatment of patients with Electro-Chemotherapy, a non-surgical technique for the treatment of skin based cancers offered upon referral at Cork University Hospital and Mercy University Hospital.

Breakthrough Cancer Research believes that teams are essential to our vision of taking research projects from bench to bedside. It is vital that those who work directly with cancer patients connect with those with expertise in a laboratory setting. Only by these types of collaborative projects and teams can we ensure that the ideas developed in the lab will be seen through until they can become novel and effective treatments for patients. In 2018 we added the patient voice to this process so we can be further assured that the patient is the focus of our research.

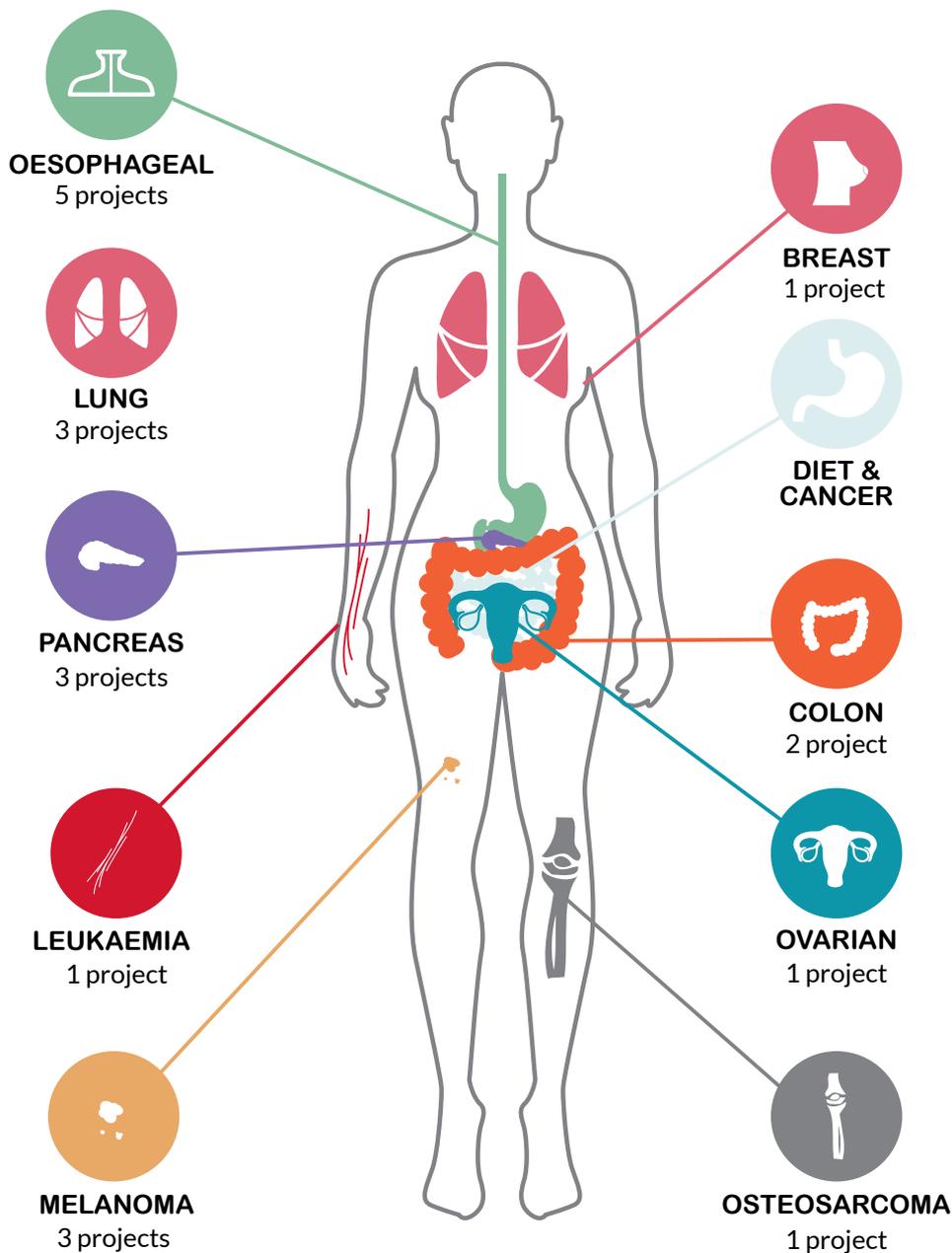
Collaboration, team work and partnerships are not only the drivers of our research vision but also it is our partnerships with companies and organisations which are allowing investment in this research mission. Our long-term partnership with Musgrave Retail Partners has and continues to have an immeasurable impact and the funds raised in 2018 will be used to fund a new PhD scholarship programme starting in 2019. Our newest partnership with Qualtrics and 'Five for the Fight' provided support for the first year of the Dermot Costello Cancer Immunology Fellowship and allowed us to boost investment in an area we have long wanted to aggressively pursue, cancer immunology. Also becoming a main charity for the incredibly successful Ring of Kerry Charity Cycle and being selected as one of the GAA's charity partners, allowed us to connect our vision and mission with an even wider community in Ireland, spreading our message of hope.

All at Breakthrough are very proud to share our achievements and accomplishments with the amazing companies, organisations, individuals, and families that help us raise funds again this year and every year. As we reflect back on 2018 and look forward into 2019, we are only too aware of how devastating a cancer diagnosis is and the pain it has caused so many families here in Ireland and all over the world. I would like to thank all of our supporters, collaborators, board members, and team for their hard work, commitment and generosity, but primarily for their passionate belief that research will make the difference. We can change the future but only if we do it together.

Orla DOLAN
CEO

AREAS OF FOCUS

Below are some of the areas we focused our research on during 2018. We also continued to fund treatment of a variety of skin based cancers, leading to many patients being treated successfully throughout the year.



RESEARCH



OUR RESEARCH PRIORITIES

The patient is at the centre of everything that we do at Breakthrough. Our six research priorities reflect this and show us the path forward to ensuring that our focus remains on improving treatments for the poorest prognosis cancers and improving patient care.

1. Increase our research investment into poor prognosis cancers and currently incurable cancers prioritising lung, oesophageal, ovarian and pancreatic cancers.

2. Continue to significantly invest in research on the role of the immune system in cancer development and identify opportunities to harness the immune system to control and eradicate metastatic cancers.

3. Improve integration of cancer research into cancer care in Ireland by prioritising funding for projects and infrastructure with significant clinical engagement/input.

4. Continue to discover and develop new therapeutics and surgical approaches/technologies, including increased investment in biological and immuno-therapies.

5. Continue to fund research, which aims to improve the effectiveness or specificity of current cancer therapies including investing in biomarkers discovery, nutrition and therapeutic delivery.

6. Invest in research-led innovation at every stage of the cancer patient journey from first diagnosis through to treatment, clinical trials and palliative care to improve survival and quality of life.

Oesophageal cancer continues to increase in incidence, yet it is still one of the most difficult to treat cancers due to advanced stage of presentation and drug resistance. Unlike many other cancer types, when it comes to the treatment of oesophageal cancer we are still using treatments that have existed for decades – chemotherapy drugs with radiation treatment to kill the cancer cells followed by surgery. However the tumours in a large percentage of patients (70%) do not respond.

Despite recent advancements in treatment strategies there has been no significant improvement in the overall survival rate for those diagnosed with oesophageal cancer - making it imperative that new strategies are developed to improve treatment options for patients. This is why Breakthrough has prioritised oesophageal cancer as one of the poor prognosis and currently incurable cancers for increased investment (Research Priority 1)

Gold-drug: Targeting a novel dual inhibitor drug with gold nanoparticles for improving radiation response in oesophageal cancer

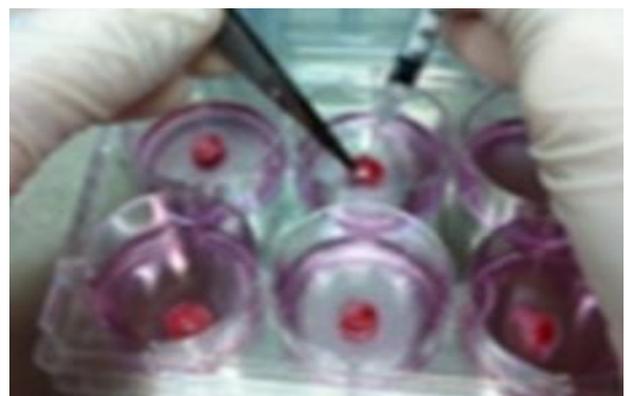
PI: Professor Jacintha O’Sullivan



As most patients go through Chemo Radiation Treatment (CRT) with often no benefit, whilst enduring significant side effects, it is really important for the majority of patients that we can make their tumours sensitive to treatment. Cancer cells do two things to prevent radiation from killing them: generate a lot of energy and send out signals to trick your body, this allows the tumour to survive instead of dying. Professor O’Sullivan and her group discovered a novel drug called CC8 that stops cancer cells doing these two things in oesophageal cancer cells and can increase response to treatment in resistant cells. This project will test packaging the drug with tiny gold particles using patient tumour samples and in mouse studies. Prof. O’Sullivan believes this packaging will make their drug go to the tumour and target the powerhouse of the cells that provides the energy for the cancer cells to survive. They will see how well this new combination works in oesophageal cells in the lab, in patient tumour samples and in mice.

It is their goal that this work will position their drug along a pathway where it could eventually be given to oesophageal patients alongside standard CRT to make tumours respond and result in better outcomes for these cancer patients.

**Research
Priorities:
1, 3, 5**



Evaluation of the role of MxA & ISGylation in Chemosensitivity in oesophageal cancer

PI: Dr Sharon McKenna

Many oesophageal cancers develop resistance to the drugs currently used to treat this disease, which allows the cancer cells to survive. This means the cancer can come back again at variable times after initial treatment. Building on previously performed research the team has identified genetic differences between cancer cells that respond well to treatment and those that do not and are hoping to use that knowledge to further investigate genetic involvement with different responses to standard treatments.

Specifically, this project will examine how the genes involved can re-program cancers and influence their response to treatment. They have already identified a novel gene pathway that can dramatically improve how cancer cells respond to chemotherapy. Understanding these novel genes and how they regulate death and survival in cancer cells will enable us to develop more specific anti-cancer agents for the future. The overall aim of this project is to identify new ways of targeting resistant cancers, so that chemotherapeutic regimes can be improved and recurrent disease eliminated in cancer patients.



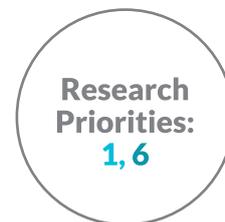
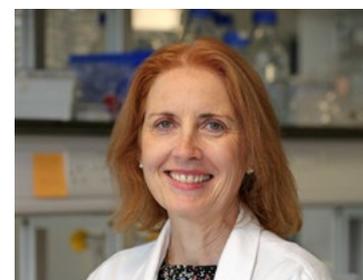
Epigenetic modulating compounds as potential therapeutic agents for oesophageal cancer management

PI: Dr Orla P Barry

Epigenetics is a relatively new field of molecular biology. It is a complex mechanism of gene regulation, defined as the collection of heritable changes on DNA that affects the packaging of chromatin. It has been approved by regulatory agencies for treatment of non-solid tumours. Epigenetic changes are different from mutations that change the underlying structure of DNA, and is a normal and vital process in cell differentiation and development.

However, cancer is a disease of widespread epigenetic dysregulation that interacts extensively with underlying genetic mutations while changes in DNA methylation patterns are known to be key drivers of oesophageal carcinogenesis. Knowing this, and seeing the success of its use for non-solid tumours lead Dr. Barry and others to believe that epigenetic therapy could be used for solid tumours such as oesophageal tumours.

This project will use FDA approved epigenetic drugs alone, and in combination with standard anticancer therapies, to see if these drugs can alter key hallmarks such as cancer cell growth, migration and increased sensitivity to existing cytotoxic drugs. Through this research it is hoped that epigenetic therapy may be identified as an effective and in the future a well-tolerated treatment for oesophageal cancer.



In Ireland lung cancer is now the number one cause of cancer deaths for both men and women. This particular cancer is poorly served by current treatment options. Lung cancer has one of the lowest survival rates of all cancers since more than two thirds of cases are diagnosed at an advanced stage; 5 year survival in the Ireland is less than 16%. Lung cancer shows marked resistance to conventional forms of chemotherapy. No current treatment option has demonstrated long-term benefit in surgically ineligible patients with advanced disease – such patients represent the majority of lung cancer cases. Therefore, there is a need for new therapeutic platforms for the treatment of lung cancer patients to improve their prognosis. In very recent times immunotherapy has offered some hope for lung cancer patients and this avenue of treatment, previously thought to be closed off, represents some hope for cancer patients. Breakthrough has increased our investment into projects looking at improving the prognosis for lung cancer patients (Research Priority 1) and are significantly investing in the role of the immune system in cancer development to identify opportunities to harness the immune system to control and eradicate metastatic cancers (Research Priority 2).

Combining electrochemotherapy with a Toll-Like receptor agonist for the treatment of lung cancer

PI: Dr Pat Forde

Successful cancer treatment aims to totally eliminate the entire tumour and the risk of recurrence. Treatment currently relies on removal of the primary tumour by surgery or radiotherapy followed by control of the remaining dispersed cancer cells in the whole body usually by chemotherapy. Dr. Forde has been examining these two aspects of treatment, removal of the tumour mass and the cancer cells circulating in the body, with the aim of eliminating the tumour mass non-invasively and recruiting an immune response against the remaining cancer cells.

Dr. Forde and his team are examining the use of electric pulses to aid in the delivery of drugs to tumour tissue. Short electric pulses have been demonstrated to make tissue temporarily more porous and allow a much greater uptake of therapeutic agents by the cancer cells. Over 400 patients with inoperable skin cancers have been treated with this approach with over 85% showing a positive response to treatment. The drug toxicity is limited to the site where the electric pulses are delivered. In this therapy, the toxicity is directed at the tumour tissue, thereby saving healthy organs and tissues. The team will combine this with a modulator designed to improve the immune response at the site of the tumour.

The aim is to develop this treatment further through the application a non-invasive method to deliver drugs and thereby allow the treatment of lung cancer in combination with a modulator to enhance the anti-tumour immune response. Such an approach has the potential to significantly improve the quality of life for lung cancer patients and also reduce the costs associated with therapy, through shorter treatment times, reduced hospitalisation and volume of chemotherapy drugs required.



Research
Priorities:
1, 2, 4

Serum identification of circulating tumour MYC oncogene amplification in patients with small cell lung cancer

PI: Dr Dearbhaile Collins

Unfortunately, patients with small cell lung cancer (SCLC) have an exceptionally poor prognosis and overall survival rate. Out of those diagnosed up to 30% of patients have a high expression of the oncogene, MYC, in their tumour, which can drive tumour growth and encourage its spread. It has also been shown that Tumour MYC can be detected in patient's blood as it is shed from the cancer.

This project will consist of using droplet digital polymerase chain reaction (ddPCR) technology to identify MYC in the bloodstream. This will help patients avoid undergoing a needle biopsy. Dr. Collins will then collect blood from patients at their diagnosis prior to starting cancer treatment. The result will be correlated with patient findings and standard oncology endpoints such as tumour response to treatments, allowing a better understanding for where the cancer is currently going, how it will progress and reveal potential new targeted treatment approaches. The focus is to be able to do so at first diagnosis to help ensure a better outcome and treatment process for the patient.



Targeting CD38 expression and regulatory B cells for novel immune-based treatments of poorly prognostic cancers

PI: Sylvie Amu

In addition to chemotherapy and radiotherapy, cells of the immune system may be used to kill tumour cells. However some immune cells in the tumour have suppressive function and the ability to suppress the anti-tumour immune cells. The purpose of this project is to develop new immunotherapy strategies by uniquely targeting a lymphocyte population which is known to suppress anti-cancer immunity.

To achieve this, this team aims to study one of these suppressor cells in the tumour, regulatory B cells, and determine how best to stop their suppressive function and/or deplete them from the tumour. By blocking or removing this suppressive cell subset they will permit an immune anti-tumour response to occur which will result in killing of tumour cells, thus improving clinical outcome for the patient.

This project is focusing on solid tumours and will be receiving tissue from a lung cancer clinical trial during the term of the project.



PANCREATIC CANCER

564 new cases per year
9th most common cancer
9% 5 year survival rate

Pancreatic Cancer continues to be one of the most fatal cancers and is one of the only cancer types with a single digit 5 year survival rate. It is one of the highest ranked cancer-related killers in Ireland. It is often diagnosed late and is resistant to current therapy options. That is why we have invested in a new 2 year research programme to further our progress towards new treatment options for this horrible disease.

Enhancing Electroporation Delivery for Pancreatic Cancer

PI: Dr Pat Forde
Researcher: Katie Cooke



This project aims to develop a therapy that has the ability to overcome treatment resistance in pancreatic cancer. To do so, the researchers will use a panel of pancreatic cancer cells which have been selected to be tested for their sensitivity and resistance to commonly used chemotherapy drugs such as Gemcitabine. Once the cells sensitivity and resistance has been identified, electrochemotherapy (ECT) will be applied to improve the response rate of these resistance cells after treatment. ECT combines electroporation with chemotherapy drugs allowing for more of the chemotherapy to be delivered inside the cells. This research will also be looking to combine cancer cell cycle modulators to improve the resistance by slowing down the cells from dividing and multiplying which will make the cancer cells more susceptible to electrochemotherapy.

This research will be performed to develop a clinical relevant protocol that can be used in patients to treat resistant pancreatic cancer and better their outcomes.

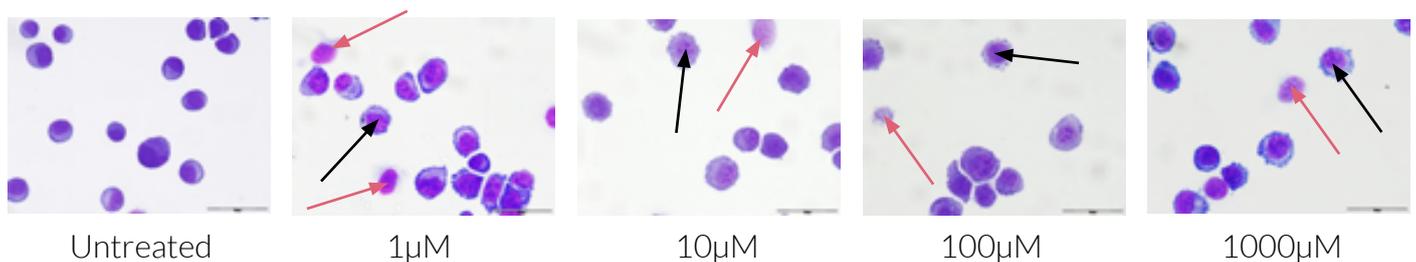


Figure 1: PanO2 24hr post Gemcitabine treatment. Pancreatic PanO2 cells treated with dose range (0-1000µM) of gemcitabine. Morphological changes observed post treatment. The black arrows denote membrane blebbing. The red arrows denote PanO2 cells with loss of cytoplasm and membrane



Figure 2: PanO2 murine pancreatic cell line was treated with Gemcitabine for 24hrs. PanO2 cells were seeded at 400 cells per well. Cells were allowed to recover for 7 days. Untreated cells recovered and grew as normal. However, gemcitabine treated cells, at increasing concentrations, did not recover.

CANCER PATIENT JOURNEY

Breakthrough has also chosen to focus invest in research-led innovation at every stage of the cancer patient journey in 2018. It is immensely important to us that the patient is at the focus of everything we fund and everything we do, which is why we are funding research that focuses on areas such as recovery services, prevention and more. It is our hope that if someone has to endure a cancer journey, they can do it with as little pain, side effects and all of the support that they could possibly need.

Contribution of diet and lifestyle factors and metabolic phenotype to cancer risk in the Irish Population: a prospective investigation in middle-to-older aged adults



PI: Dr Catherine Phillips, Dr Janas Harrington & Prof Ivan Perry

Lifestyle factors such as diet, physical inactivity, smoking and alcohol consumption as well as high body mass index (BMI) are known to contribute to cancer risk. It has also been estimated, from research conducted in the United States, that 42% of cancer cases and 45% of cancer deaths, are linked to modifiable lifestyle factors and thus could be prevented.

This project will examine the relative contributions of dietary quality and the dietary inflammatory index to cancer risk and determine associations between metabolic health phenotypes in both obese and non-obese middle-aged men and women and cancer risk. By doing so, we hope to construct a healthy lifestyle score as a mediator for cancer risk which can be used to help provide the public with knowledge of more effective preventative and screening measures for whole populations as well as individuals.

Evaluation of a Mindfulness Based Stress Reduction programme on the quality of life of survivors living with secondary cancer



PI: Dr. Frances Drummund

Those impacted by cancer can be affected both physically and psychologically, such as potential added stress, depression, fatigue and more. The practice of mindfulness has been shown to have a positive effect on the health and wellbeing of cancer patients.



The Mindfulness Based Stress Reduction programme is a 9 week course that teaches people mindfulness methods they can do themselves. Although mindfulness has been shown to help decrease pain, improve sleep, manage anxiety, and more – it has yet to be discovered whether this mindfulness course can be run for people with cancers that do not have a cure and whether it would have a positive effect on their life with a terminal diagnosis. So far, up to 50 people living with a terminal cancer have attended this mindfulness course. The aim of this project is to investigate if and how this course has helped the quality of life and wellbeing of these cancer patients.

CANCER PATIENT JOURNEY

Nutrition and Cancer: a patient experience survey in cancer survivors

PI: Dr. Amy Mullee

The need for more oncology specialist dieticians to provide expert dietary and nutritional advice and interventions in Ireland is necessary. To optimise nutritional wellbeing and quality of life at all stages of cancer treatment and rehabilitation, interventions must be high quality, evidence-based and patient centred.

Due to the lack of professional advice, cancer survivors can be lead to seek out information for themselves from unreliable sources such as the television, radio, books and the internet. This can be harmful as there is room for false information to be relayed to patients. Misinformation can be detrimental to both those undergoing treatment and rehabilitating.

This project focusing on documenting where and what dietary or nutritional information cancer survivors in Ireland currently access, and identifying their needs for nutritional care and support with the goal of discovering what nutrition services cancer survivors are currently not getting that they would like to receive.



Research
Priorities:
5, 6

Evaluation of the impact of emotional, nutritional and physical exercise support interventions delivered by a volunteer-led cancer support centre, on the unmet needs and health related quality of cancer patients

PI: Dr Frances Drummond

From diagnosis, treatment and recovery, cancer patients often experience physical and psychological side effects. Currently, patients do not have many sources when it comes to this type of care - counselling, nutritional advice, exercise programs, touch therapies and meditation - all things which could help improve the patients and their family's quality of life.

Currently it is the volunteer-led sector who are offering these supports to cancer patients and their families. This study will work with the East Galway and Midlands Cancer Support Centre, a centre that provides counselling, touch therapies, nutritional advice and more, all funded by charitable donations. The aim is to investigate the benefits to users, and their unmet needs to understand how the services can be further improved to ensure that the patient's physical and psychological needs are being met throughout their cancer journey.

Research
Priorities:
6

CLINICIAN LED

Be it collaboratively or clinician led, Breakthrough looks for projects which are clinically linked and offer a clear path to translation. This way we are accelerating the pace of getting new options to the patients who need them. In many cases we are involved in clinical trials and studies directly impacting patients and here you see a few examples of these research projects.

Clinical Delivery and Evaluation of Electrochemotherapy to Improve Patient Quality of Life and Palliation in Hard to Treat Tumours

PI: Mr James Clover

Electrochemotherapy, (ECT) is a combination therapy that uses a low dose of Bleomycin, a chemotherapy drug with electroporation, an electrical pulse applied directly to cancer cells. ECT is often used for patients with skin-related tumours who are unable to undergo more conventional treatment due to disease location or other conditions. Physical and psychological stress can be a constant reminder of disease status and a positive bi-product of this form of treatment could be the effect on quality of life.

While the efficiency and durability of ECT is well established, little focus has been given to these aspects of the patient journey, with no publications on this theme in the field of ECT.

This research project concentrates on how patient's quality of life is improved by Electrochemotherapy.



Research
Priorities:
5, 6

Creation of invasive cervical cancer tissue microarray (TMA) for correlation with immunohistochemical predictive and prognostic tumour markers

PI: Dr Dearbhaile Collins

Currently metastatic cervical cancer has very limited treatment options with only 12-14% of patients responding to standard care, making it critical that better, new treatments are being made available for the remaining 9/10 patients who do not get a response with immunotherapy. A tissue microarray (TMA) consists of a paraffin block in which a few hundred separate tumour tissue cores are assembled and organised in an orderly fashion to allow multiple scientific analysis. Each TMA block can be cut into 100-500 sections, which can be subjected to different tests.

This project will create a TMA of cervical cancer samples with a corresponding database of patients' details, their cancer treatment(s) and response(s) to these therapies, as well as the time taken for the tumour to recur and overall patient survival. The creation of cervical cancer TMAs will allow researchers to look for predictors of response to cancer treatments and estimate the risk of cancer relapse - which includes but is not limited to, expression of potential biomarkers such as tissue factor (TF) and AXL expression for which there are targeted drugs being developed. The project will begin in Cork University Hospital with a collaborative plan to subsequently expand worldwide and help to create the framework for not only a better understanding of why patients with cervical cancer are so resistant towards treatments, but to then be able to provide solutions and better treatment options.



Research
Priorities:
6

A LESS INVASIVE APPROACH

Since 2004 we have been involved in supporting the only Irish group involved in a European network of centres pioneering the use of Electrochemotherapy (ECT) as an alternative to surgery. We are proud to still be supporting the delivery of ECT for Irish patients with Skin Cancers, including Melanoma, and recurrent breast cancer.

From 2009 we have been supporting the development of the Endo-Ve medical device which is now in clinical trial in multiple sites for both Colorectal and Oesophageal cancers.



-  ECT For Skin Cancer
-  ECT For Breast Cancer
-  ECT For Colorectal and/or Oesophageal

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- 8. Resident bacteria in breast cancer tissue: pathogenic agents or harmless commensals?**
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2011

Breakthrough Cancer Research was officially founded as an Irish Medical Cancer Research charity to inspire and enable financial support for exceptional research into cancer in Ireland leading to more effective treatments for patients in Ireland and Internationally.

2014

Launched the Sponsor a Scientist campaign which is a direct debit programme that has raised over €300,000 to date to support Breakthrough funded researchers.

2016

Two Breakthrough funded research programmes progressed to clinical trial stages in the final quarter of 2016

2017

Record number of Breakthrough supported projects received funding through the MRCG /HRB joint funding scheme.

January**BT Young Scientist & Technology Exhibition**

In 2017, Breakthrough Cancer Research supported the facilitation of the extended research of a transition year student, Conleth Aspel from Colaiste Treasa, Kanturk. Co. Cork who was then awarded first prize in his category at the 2018 BT Young Scientist Competition.

March**Sláinte Ball, Croke Park**

Teamed up with fellow 2017/18 GAA Charity Partners The Alzheimer Society of Ireland and Make-A-Wish® Ireland to host the Sláinte Ball a gala dinner celebrating the best of Irish in Croke Park in the lead up to St Patricks Day

May**Beneficiaries of the Spring into Summer Ball**

Hosted by the 2017/18 Cork Rose Aishling O'Connor, the Spring Into Summer ball raised over €16,000 for Cancer Research.

July**Ring of Kerry Charity Cycle**

Chosen as a Tier 1 charity main beneficiary of the Ring of Kerry Cycle, over 600 cyclists supported Breakthrough along the route and supplied over 40 volunteers to help over the weekend, raising €70,000 for Cancer Research.

September**Kerry Way Walk Went On Tour**

The annual Kerry Way Cancer Walk took on a new route for 2018, moving from July to September and from Kerry to the Seven Heads peninsula, Courtmacsherry in beautiful West Cork and had over 100 walkers taking part on the day.

November**Three Grants for Research into Poor Prognosis Cancers Awarded**

The HRB announced €3.2 million for 14 new projects supporting research amongst medical charities. Three of the 14 projects were co-funded by Breakthrough Cancer Research and specifically looked to impact the survival of patients with poor prognosis cancers.

December**Shop'n'Drop**

Breakthrough provided a donation driven service in partnership with The Cork City Centre Forum to offer a friendly and secure service to shoppers, giving them the opportunity to enjoy all the City has to offer during the festive season in the lead up to Christmas.

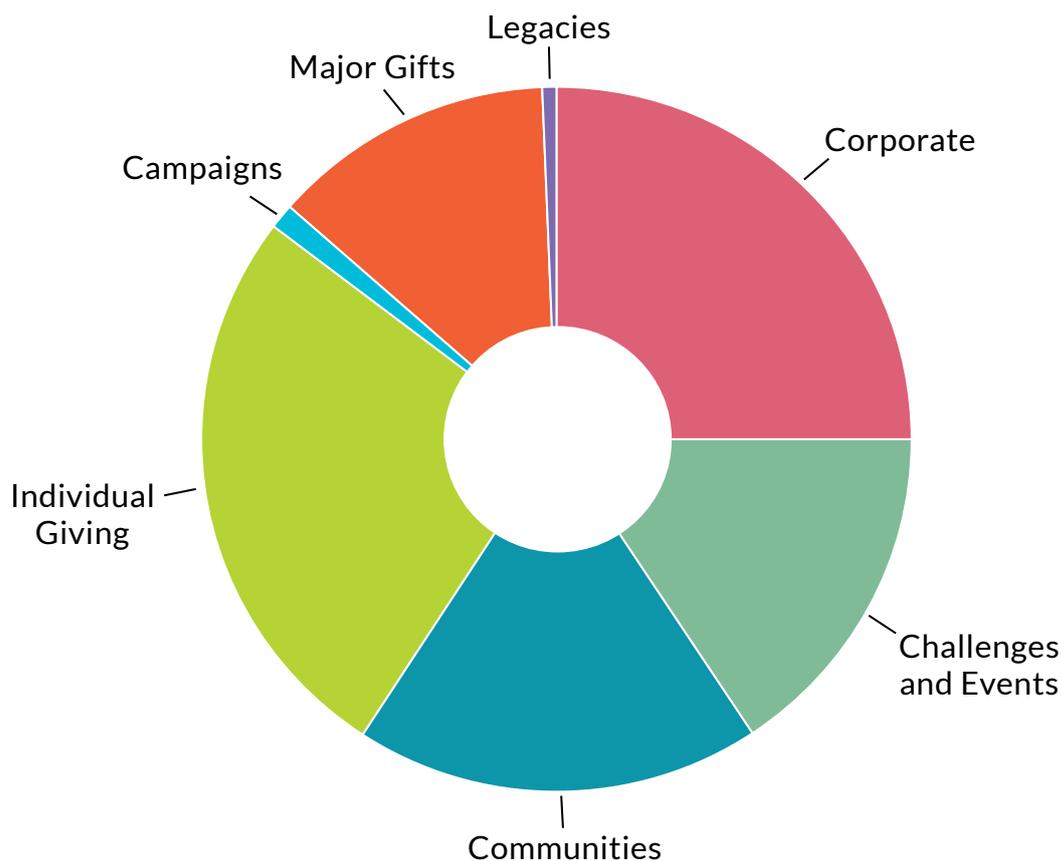
FUND RAISING



TOTAL INCOME 2018

We couldn't fund life saving cancer research without your support.

Our Breakthrough community support us in many different ways from coffee mornings and fashion shows to corporate challenges, cycles and triathlons. This support ensures that we can continue to fight cancer. A breakdown of our income is below.



Corporate	€330,123
Challenges and Events	€204,842
Communities	€245,137
Individual Giving	€345,143
Campaigns	€13,947
Major Gifts	€169,652
Legacies	€7,702
Total:	€1,308,844

KAY CURTIN Wife, Mother & Stage 4 Cancer Patient

Why is cancer research important to me?

Research is important to me because I started from a place where there were no effective treatment options available for my disease. It is only through investment in, and support of, research that has changed somewhat and now there is some hope where once there was absolutely none.

To be honest I would probably have jumped out of a plane anyway or given my story but knowing I could do some good towards the development research for new treatment strategies was a huge bonus it gave me the extra push to get up and do it and it also showed other patients not to lose hope.

Why support Breakthrough Cancer Research specifically?

BREAKTHROUGH ARE THE BOMB. Seriously I think their philosophy of not giving up on trying to find treatments for the “incurable” is so important: no one should live without hope, even if it’s just a glimmer.



PETER MCGREEVY, Five For The Fight Leader, Qualtrics

What impact has cancer had on your life?

Unfortunately, cancer has had a pretty significant impact on my life thus far. My mother, Bernie McGreevy passed away when I was 22. She was originally diagnosed when I was 16 and received treatment for a number of years which grew in severity. Throughout treatment she always put on a brave face and wanted to minimise the impact on our lives. A legend of a woman. I also saw a close friend and schoolmate Marc Owens pass with a rare form of cancer “soft tissue sarcoma”. He battled hard throughout his treatment, his mentality throughout I think had a lasting impact on a lot that met him.



How did you first hear of Breakthrough Cancer Research?

Through 5 For The Fight, an initiative launched by 3 employees at the grassroots of the company I work for, Qualtrics. They put together a very specific and measured campaign that had a goal of €500,000 to hire 3 researchers to investigate advancing the field of immunology.

What made you choose to fundraise for Breakthrough Cancer Research?

The transparency for me was important. Specifically, with The 5 For The Fight programme, there was a set target of 500k to hire 3 researchers. In my opinion, this is very different to simply donating to charity. It allows you to see where your investment goes. Also, the fact that they were going after under-funded hard to treat cancers seemed logical and like it could have a real impact going forward.

MAURICE KEANE, Breakthrough Volunteer & Fundraiser

What was your favourite part of fundraising?

I am always surprised at how willing people are to support but I think my favourite part of fundraising is adding a bigger element to an event, challenge or whatever it is you might already want to do. For example, the Dublin marathon is something I always wanted to do, and being able to fundraise made me feel even more motivated and inspired to do it. I think it adds another level to whatever your activity is. Same with volunteering – you get to have some great experiences all while helping out where needed!

What was the most difficult part of your fundraiser?

Being honest, the most difficult part is that I am not a fundraiser. I wouldn't be someone who has ever been great at asking people for money or support, so I found it pretty intimidating getting involved in the fundraising. That said, the new online sites like Everyday Hero and Facebook fundraising has made it so much easier to avoid that that 'awkwardness'. You can just share it around work or on Facebook and people are happy to support! Even friends or family I had not seen in ages – it was actually really nice.



MICHELLE SLATTERY, Supporter and Fundraiser

What made you choose to fundraise for Breakthrough Cancer Research?

I believe in signs. I had decided to do the Camino walk and wanted to Fundraise. It was always going to be a cancer charity as I was doing the walk to honour my mam and some other dear friends I have lost to Cancer. I was looking up some cancer charities and there was a picture of me on the Breakthrough Cancer Research page from an event I had helped with years ago.

Why do you feel that investing in cancer research is important?

I know if my mam was diagnosed with cancer now as opposed to 16 years ago her chances of survival would have been much higher. Cancer is no longer the death sentence that it was. This is something that people have to know, there is hope with cancer. WE DO NOT have to fear it.

Do you have any tips for someone looking to plan a fundraiser in the future?

Do it. When it comes to Cancer people will always support. Keep it simple, people do not need bells and whistles to support a worthy cause. Tell your story and be honest, people always respond to situations and stories that are real.







IN GOOD COMPANY

qualtrics^{XM}

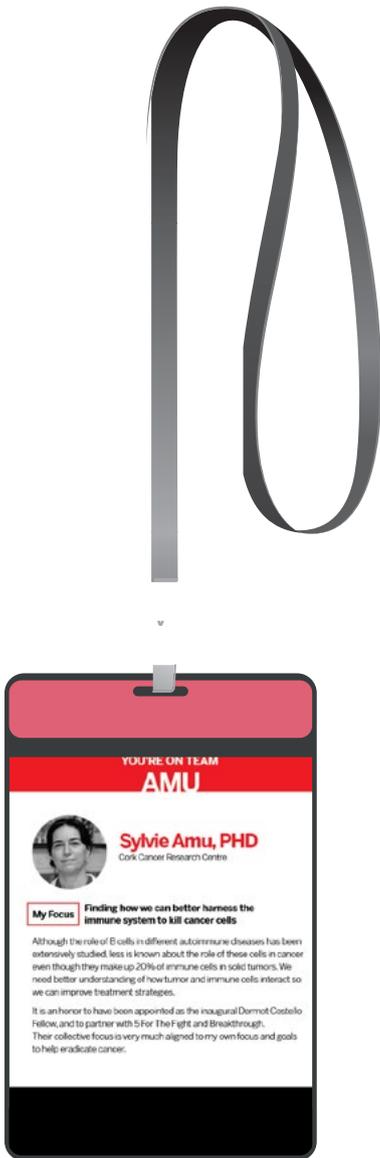


In December of 2017, Qualtrics and Breakthrough teamed up to take part in Qualtrics '5 For The Fight' campaign. Over €300,000 was raised within this first year, a truly outstanding achievement!

The idea behind 5 For The Fight is that it invites people to donate €5 (or more) towards the fight against Cancer and for each €5 donation Qualtrics matches that donation to help raise as much funds towards vital Cancer research as possible. 5 For The Fight is an international Qualtrics campaign which was brought to life in Ireland by the late EMEA Chairman Dermot Costello. Dermot's passion and drive for this campaign was inspiring and has played a huge role in the success the campaign has received to date.

In 2018, Dr Sylvie Amu was appointed the Dermot Costello Cancer Immunology Fellowship. Dr. Amu who will be the Principal Investigator of Breakthrough's 3 year tumour immunology programme. The team will consist of 3 researchers who will be studying regulatory B cells and how to stop their suppressive function and/or deplete them from the tumour, thus improving the clinical outcome for the patient.

It is a pleasure to work with Qualtrics who have accomplished so much in such a small period of time! We look forward to the continuation of this partnership and seeing the progression of the much needed cancer research we can, and will fund, together.



HARPER'S HATS PRESENTS: 'BELIEVE'

Thursday, 6th December 2018 saw a night of fashion and glamour in aid of Cancer Research all put together by the fabulous ladies behind Harper's Hats. A night of style & glamour, the Believe event was a fantastic evening, kicking off the festive Christmas season with the girls! Snacks and bubbles, following by fashion, music, shopping, prizes, and lots of special guests... it was a fantastic evening that helped raise over €6,500 for Breakthrough Cancer Research.



RING OF KERRY CHARITY CYCLE 2018

We were thrilled to be selected as one of the tier one charities for the 2018 Ring of Kerry Charity Cycle which took place on July 7th. With over 6,000 cyclists taking on the 175km challenge, Breakthrough had a great representation around the event with over 600 Team Breakthrough cyclists and 50 volunteers. Between the event and the fantastic cyclist fundraising, Breakthrough received just over €70,000 from this amazing one day cycle – the biggest charity cycle in the country!



STRICTLY COME DANCING - CARRIGALINE LIONS CLUB

The Carrigaline Lions Club generously selected Breakthrough Cancer Research, as one of three worthy causes as the beneficiaries of their Strictly Come Dancing Event! Originally planned for early March, the 'Beast from the East' de-railed their plans at the last minute, but the organising committee smoothly rescheduled for April and their brilliant supporters did not let them down. Strictly Carrigaline raised over €50,000 with Breakthrough Cancer Research receiving €17,675.00!



SPRING INTO SUMMER BALL

The Spring into Summer Ball was organised by 2017/2018 Cork Rose Aishling O'Connor, Ronan Walsh and Gavin Farmer to help raise awareness and funds for Breakthrough Cancer Research. The event took place on Friday May 11, 2018 at the Cork International Hotel with over 200 people in attendance. The evening was a fabulous success with over €16,000 raised for Breakthrough. Special guests on the night included current and past members of the Cork Football Panel and many of Ireland's 2017/2018 Rose of Tralee county roses!



IN GOOD COMPANY

SLÁINTE BALL

Breakthrough was named Official GAA Charity Partners for the 2017/2018 season and together with two of the other charity partners—The Alzheimer Society of Ireland, and Make-A-Wish® Ireland hosted the Sláinte Ball, a gala dinner celebrating the best of Irish, on 16th March at Croke Park. Legendary Irish sports commentator, Mícheál Ó Muircheartaigh was joined by presenter and broadcaster Matt Cooper and RTÉ sports broadcaster Evanne Ní Chuilinn along with a host of other stars on the night to entertain guests.



TEDDY DALY MEMORIAL CLIMB

In April, over €16,000 was raised at the second annual Teddy Daly Memorial Climb. Hundreds of friends, family, walking groups and community members, met at the bottom of Slievenamon to set off to the summit, in memory of Teddy Daly who passed away from pancreatic cancer in April 2016, at the age of 43. Funds raised from this event will be used to help fund a new two year Cork based master's programme, focused on pancreatic cancer research.

Speaking about the importance of the climb and, of research into pancreatic cancers, Teddy's wife Noreen states, "I always hoped that the funds we have raised from the climb will help the Breakthrough Cancer Research team come closer to finding more successful treatment options for pancreatic cancer patients, and keep awareness of this disease a priority, it is great to see that in action. I know that's what Teddy would have hoped for too."



96FM GIVING FOR LIVING RADIOTHON

Breakthrough was delighted to once again be one of the five local Cork charities who received fantastic support from the 2018 Giving for Living Radiothon. The Giving for Living Radiothon, run each year by Cork's 96fm, raises much needed funds for five cancer charities in Cork and as an organisation founded and based in Cork, we are absolutely delighted to be a part of this local initiative and to receive such generous and inspiring support from local communities.

The 11th annual Cork's 96FM's Giving for Living Radiothon 2018 ended with a total of €406, 863 to be donated to the five chosen charities, including Breakthrough.



MUSGRAVE TRIATHLON

Musgrave

Musgrave Retail Partners have been our most consistent and long standing corporate partners, and through their annual Musgrave Triathlon they have supported many worthy causes since 2002. In fact, to date, their Triathlon has raised over €4.6 million for a variety of Irish Charities. It was 2011 when we first became a partner and beneficiary for this event and we have been so honoured to have been involved in each year since.

Breakthrough Cancer Research are hugely grateful to Musgrave to have been the beneficiaries of funds raised from this triathlon and over the past 7 years their support has allowed us to fund research projects, purchase lab equipment and fund initiatives to meet patient unmet needs, like our evidence based cookbooks. In 2018 we decided to start a new initiative and use the funds raised to create a new PhD Scholarship programme. The



Musgrave Cancer Research PhD Scholarship aims to fund world class cancer research in Ireland while educating the next generation of cancer research leaders.



Together Breakthrough and Musgrave have long invested in cancer research to impact patients and this new PhD Scholarship programme will further promote and drive more patient focused cancer research within Ireland. The Musgrave Triathlon has been impacting communities for many years and now, with their support of Breakthrough, are investing in the power of research to transform the future of cancer care.

The Scholarship will provide funding for a 3 year PhD Scholarship that can take place at any University in Ireland currently engaged in cancer research and is open to researchers with a patient focus and with the ultimate aim to improve cancer care and increase survival. The first successful candidate will be unveiled at the 2019 Triathlon.

We are, and continue to be, proud and grateful for our partnership with Musgrave Retail Partners and the amazing, hard-working Triathlon Committee. We thoroughly enjoy playing a small part in the event which is so well executed each year. It is a joy to attend and be part of! We look forward to continued success together and meeting the cancer researchers of the future on the Musgrave Cancer Research PhD Scholarship Programme. We can change the future together.



FIGHTING CANCER TOGETHER



WOMEN'S LITTLE CHRISTMAS AFTERNOON TEA & FASHION SHOWCASE

Breakthrough was delighted to host our 7th annual Women's Little Christmas Afternoon Tea & Fashion Showcase on Sunday, 6th January at the Cork International Hotel. Full of fabulous guests, it was a great afternoon of helpful and practical fashion and beauty tips and full of all the glamour and luxury our beautiful guests could ask for!



VALENTINE'S BALL

Donned in their finest tuxedos and gowns, VIPs from across the medical, scientific, academic, corporate and political worlds once again joined us at the always luxurious Fota Island Resort for Breakthrough's annual Valentine's Ball. The event raised close to an outstanding €45,000 for cancer research.



LEE VALLEY GOLF CLASSIC

With the sun shining, it was an absolutely gorgeous day for golf at our annual at Lee Valley Golf & Country Club on Friday, 25th May as 100 golfers, in teams of three, tee'd off in aid of cancer research at our 8th Annual Lee Valley Golf Classic.



CORPORATE QUIZ

Keeping the crowd entertained once again was MC & Quiz Master, Jonathan Healy. He was joined by special guests including RedFM's Ray and Jay, RTE's Paschal Sheehy and Irish Rugby Legend Peter Stringer at The Clayton Hotel Silver Springs on Wednesday 10th October at our annual Corporate Quiz. As usual, it was a night full of laughs as we put the businesses of Cork to the test!

FIGHTING CANCER TOGETHER

Sponsor a Scientist
Corks 96FM Radiothon
CaminoWay
Spring into Summer Ball
Melanoma SOS
Cork Marathon
Slainte Ball
Teddy Daly Memorial Climb
VHI Women's Mini Marathon
Dublin Marathon
5 For the Fight
Dublin to Longford Cycle
Salesforce
Wicklow Hike
Montessori Pyjama Day
Women's Little Christmas
Noreen Ahearn Poetry
Lee Valley Golf Classic
Musgrave Triathlon
Blackwater 10
Queen of the Seas
Fiona Turley Christmas Cards
Echo Women's Mini Marathon
Caheragh Thrashing
CIT Cancer Society
BCR Corporate Quiz
Bantry 'Bring & Buy'
Ring of Kerry Charity Cycle Evening
Believe Fashion Show
Cork City Shop 'n' Drop
Fight for the Girls
C2C
Christmas Lights
Brid Carr Events
London & Donegal
Bengour Threshing
Valentine's Ball
Women on the Water
Sunshine and Umbrellas
Jagged Edge Tour
Easter Chickens
UCC Cancer Society
Kerry Way Walk
on Tour

FINANCES

MAIREAD PEREZ
FINANCE MANAGER



GOVERNANCE

Breakthrough is fully committed to openness, transparency and integrity to our donors, supporters, volunteers and funding partners by adhering rigorously to the Triple Lock standards set out by the Charity Institute of Ireland - **good fundraising, transparent annual financial reporting and governance.**

For more information on our Governance go to www.breakthroughcancerresearch.ie.

Our Board of Directors is made up of independent individuals with diverse backgrounds who volunteer their time, expertise and passion to our vision. The Board provides the advisory and governance role for the charity. We do not pay members of our Board, cover their expenses or provide recompense in any other way.

The Board of Breakthrough has formally adopted, is signed up to and is fully committed to achieving the standards contained within the Statement of Guiding Principles for Fundraising.

The Statement exists to:

- Improve fundraising practice
- Promote high levels of accountability and transparency by organisations fundraising from the public
- Provide clarity and assurances to donors and prospective donors about the organisations they support.

We, Breakthrough, have considered the Statement and believe we meet the standards it sets out.

Breakthrough's annual accounts are independently audited every year by Moore Stephens. We prepare our accounts in accordance with Irish accounting standards and with reference to the Statement of Recommended Practice (SORP) for charities.

This is a comprehensive framework that enables us to explain what we aim to do, how we go about it and what we achieve.

You can download and view our most recent audited accounts at www.breakthroughcancerresearch.ie

The Board of Breakthrough has formally adopted and is publicly signed up to the Governance Code for the Community and Voluntary Sector.



FINANCIAL REPORT

STATEMENT OF FINANCIAL ACTIVITIES (INCLUDING INCOME & EXPENDITURE ACCOUNT)

FOR YEAR ENDED 31ST DECEMBER 2018

Funding is received from:

100% Fundraising

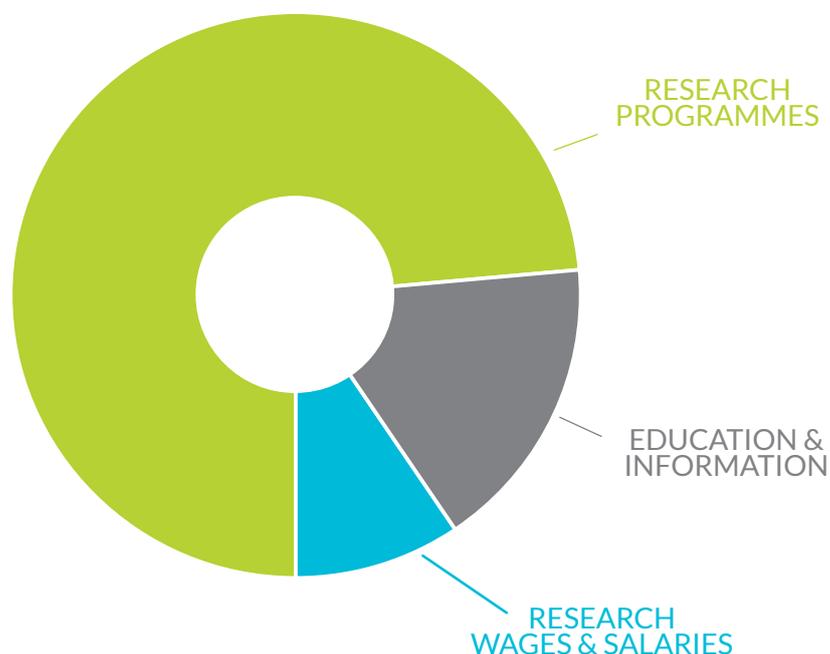
The investments made into the three priorities for the organisation in terms of research expenditure were:

Education & Information:
2018 - €75,564 (2017 - €90,621)

Research Programmes:
2018 - €666,039 (2017 - €236,618)

Research Wages & Salaries:
2018 - €38,320 (2017 - N/A)

Total - €779,923



BCR have an additional €667,351 of research commitments for 2019 and 2020 which will be met by cash reserves and anticipated future income which are based on conservative projections derived from prior history.

The figures presented represent the financial year 1 January, 2018 to 31 December 2018. The gross income was €1,316,546 (2017: €1,311,607)

STATEMENT OF FINANCIAL ACTIVITIES

for the year ended 31 December 2018

	Unrestricted Funds 2018 €	Restricted Funds 2018 €	Total 2018 €	Total 2017 €
Income from:				
Legacies	7,702		7,702	176,000
Charitable Activities ¹	981,839	327,005	1,308,844	1,135,607
Total Income:	<u>989,541</u>	<u>327,005</u>	<u>1,316,546</u>	<u>1,311,607</u>
Expenditure on:				
Raising Funds	<u>223,161</u>	<u>-</u>	<u>223,161</u>	<u>355,004</u>
Charitable Activities ²	<u>174,843</u>	<u>-</u>	<u>174,843</u>	<u>150,510</u>
Research	<u>523,309</u>	<u>256,614</u>	<u>779,923</u>	<u>327,239</u>
Total Resources expended:	<u>921,313</u>	<u>256,614</u>	<u>1,177,927</u>	<u>832,753</u>
Net income in funds for the year/ Net movement in funds for the year	68,228	70,391	138,619	478,854
Fund balances at beginning of year	<u>374,672</u>	<u>260,436</u>	<u>635,108</u>	<u>156,254</u>
Fund balances at the end of the year	<u>442,900</u>	<u>330,827</u>	<u>773,727</u>	<u>635,108</u>

The statement of financial activities includes all gains and losses recognised in the year. All Income and expenditure derive from continuing operations.

¹ Income from charitable activities outlined on Page 25

² Expenditure includes support, governance and sundry overheads

FINANCIAL REPORT

BALANCE SHEET

for the year ended 31 December 2018

	Notes	2018 €	2018 €	2017 €	2017 €
Fixed Assets					
Tangible Assets	11		1,781		
		3,473			1,737
Current Assets					
Debtors	13	99,111		390,390	
Cash at bank and in hand		849,394		434,896	
		948,505		825,286	
Creditors: Amounts falling due within one year	14	<u>(176,559)</u>		<u>(191,915)</u>	
Net Current Assets			<u>771,946</u>		<u>633,371</u>
Total Assets less Current Liabilities			<u><u>773,727</u></u>		<u><u>635,108</u></u>
Income Funds					
Restricted Funds	15		303,827		260,436
Unrestricted Funds			<u>442,900</u>		<u>374,672</u>
			<u><u>773,727</u></u>		<u><u>635,108</u></u>

COMMENTARY

Breakthrough Cancer Research is pleased to confirm that the accounts have been prepared in accordance with the statement of recommended practice (Charities SORP in accordance with FRS 102, effective January 2015). This reporting structure is accepted as best practice in the charity sector. Also, this is reflective on Breakthrough Cancer Research's on-going commitment to good governance and financial transparency.

The reserves for the year are €773,727 (2017: €635,108). Breakthrough Cancer Research remains in a position to support existing research projects, and to continue to fund research programmes in 2019.

The statement of Financial Activities and Balance Sheet included on page 39 and 40 respectively are an extract from the full statutory financial statement of the company for the year ended December 31st 2018, which are available on our website, www.breakthroughcancerresearch.ie.

Bankers:

AIB Bank plc.

College Road
Cork

Auditors:

Moore Stephens

Chartered Accountants &
Statutory Audit Firm
83 South Mall
Cork

Solicitors:

Ronan Daly Jermyn

2 Park Place
City Gate Park
Mahon Point
Co. Cork

Our Board of Directors who served the period:

- Breda O'Sullivan
- Dr. Declan Farrell (Resigned 1 April 2018)
- Brendan Buckley
- Bryan Mohally
- Derek Power
- Sean Ryan
- Doreen O'Mahony (Appointed 1 April 2018)
- Enda Lynch (Appointed 1 April 2018)



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Registered Charity No: 20077945