

Annual Report 2009-2010



'taking the problem to the clinical researcher
and returning the solution to the patient'

About the Trust

Restore – Burn and Wound Research (formerly Stoke Mandeville Burns and Reconstructive Surgery Research Trust) was founded in 1991 to support research into burns and their treatment and also to provide for innovative reconstructive surgery, particularly for patients undergoing therapy and surgery for breast cancer. The emphasis of the research is rooted in the challenges faced by medical staff working with patients in the Plastic Surgery Unit at Stoke Mandeville Hospital. Restore's philosophy is to take the problem to the research laboratory and return the solution to the patient. To achieve this aim Restore employs clinicians as Research Fellows who can interact with patients and understand the issues facing them and their doctors and take these problems to some of the major scientific laboratories in the country.



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The Trust is a Registered Charity - Number 1003899

Chairman's Report

I am pleased to report continuing progress in our search for answers to the terrible effects of scarring from burns and wounds. Our current Research Fellow has identified cell surface markers of considerable interest

Recent Government changes in the organization of medical education and appointments have caused us to reconsider the way we recruit Research Fellows. In addition to Postgraduate Research Fellows we believe it may be appropriate to engage Doctorate Fellows at an earlier stage in their medical careers. We have concluded we have sufficient funding, currently, to appoint two Doctorate Fellows and a Postgraduate Fellow, if suitable candidates can be found.

The recovery in the stock market has had a positive impact on the value of our equity investment portfolio, which has improved significantly in the past year. Low interest rates have, however, reduced the level of income generated from our fixed income investment portfolio in comparison to previous years.

Nevertheless we have been fortunate during the year to be the beneficiary of a number of generous and significant donations, which, together with the proceeds of two fund raising events, have contributed to our current healthy financial state of affairs and enabled us to purchase a specialised microscope for use in our research.

I shall shortly be retiring as Chairman of the Trustees and handing over to Michael Constant, who has considerable experience in financial markets both nationally and internationally. I am confident he will take the work of the Trust to new levels. Finally I am appreciative of the enormous support of the Trustees, other officers of the charity, fellow members of the medical profession, and the numerous benefactors, who have done so much to support the vital research of the Trust during the twenty years since I founded it, and more recently as a Trustee and for the past four years as Chairman. It has been a very rewarding experience and I look forward to continuing to serve Restore as a Trustee.



A handwritten signature in black ink, appearing to read 'A H N Roberts'.

A H N Roberts MA BSc BM BCh FRCS FRCSG

Chairman of Trustees



Patron – HRH The Duke of Kent KG

Restore was honoured by a visit from His Royal Highness the Duke of Kent on Monday 1 March 2010. In the morning he attended a reception and light lunch at Hartwell House where he met Trustees, Vice Patrons and a number of supporters and benefactors.

In the afternoon His Royal Highness visited Stoke Mandeville Hospital, where Sir Henry Aubrey-Fletcher, the Lord Lieutenant, presented County and District leaders and Hospital principals. The Duke and an invited audience attended a seminar in the Sir Henry Floyd Auditorium at Stoke Mandeville Hospital's Postgraduate Centre where Mr Anthony Roberts introduced Mr Mike Tyler, Mr Thanassi Athanassopoulos, Miss Jennifer Kean and Mr John Pleat who spoke about their research work. Prof Gus McGrouther spoke about the different possible directions for research in the future. The importance of the work done at Stoke Mandeville has been paramount and has received worldwide recognition. In conclusion Ms Ann Eden spoke about the importance of research to the National Health Service.

The Duke then visited patients and staff in Ward 7, the Burns Unit and Occupational Therapy Department, escorted by Mr Mike Tyler and distinguished guests.

Restore is extremely grateful to His Royal Highness for his continuing and gracious interest and patronage.



*HRH The Duke of Kent
at Hartwell House
(photograph courtesy
of the Bucks Herald)*



*HRH The Duke of Kent with Mr Mike Tyler and patient
(Photograph courtesy of Bucks Hospitals NHS Trust)*

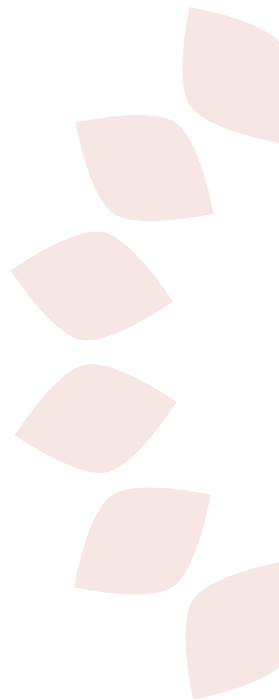
Fundraising: The Scarlet Ball

A high point of Restore's fundraising year was The Scarlet Ball, hosted in the magnificent surroundings of Stowe House in early May 2010. The disruption of a recent General Election and pervading economic gloom did nothing to quell the enthusiasm and commitment of organisers, sponsors, donors and guests all of whose efforts raised an outstanding total of £33,822.25. This sum not only greatly exceeded expectations but enabled the purchase of a Nikon Eclipse TS100 Digital Microscope and Camera Control Unit, equipment which has already allowed our researchers to make significant further progress in the laboratory.

The evening opened with a champagne reception following which the 250 guests, many of whom had adopted the scarlet theme with some alacrity, were treated to a three course dinner, dancing to live band, Music Matters, a DJ and a fun casino. The Marble Hall and State Rooms of Stowe House provided a perfect backdrop for the various fund raising initiatives of the evening; the considerable generosity of the many contributors to the Raffle, Auction and Silent Auction of work & life experiences raised £13,610 towards the final total. Prizes included anything from villa and chalet holidays in exotic locations, shooting weekends and fine dining experiences to voice coaching lessons and work experience in the City, at Lord's and at the National Film School.

Our thanks go particularly to The Anson Charitable Trust and David Royds Esq for their generous sponsorship of the evening, to Schroders Private Banking, Nabarro LLP, Wayside Group, Hampden Agencies Limited and Knight Frank who between them provided funds for the delicious champagne, live entertainment, spectacular floral displays and chocolates and to the numerous auction and raffle prize donors listed below. We hope that the Ball will become a biannual event and one which will enable the charity to provide even better equipment and resources for invaluable research.

We also greatly benefited from the generosity of our donors whose very kind donations helped defray our costs in putting on the Ball. These included Frank Lissauer, Lord Carrington, the Bulldog Trust and many others.



Fundraising

With thanks to donors of the Auction and Silent Auction Lots and the Raffle Prizes:



AUCTION LOTS

Alex & Jane Boswell | The Atlantic Hotel
 Guy Bond Shooting | James & Pippa Naylor
 Kim Bailey Racing | La Manga Club
 Mike & Maggie Constant | Sally & Simon Rustom
 Ski Verbier | Swinton Park | Tim & Susie Oliver

SILENT AUCTION LOTS

Berry Asset Management | Burnett Works
 Charlotte Yorke-Long | The Concerto Group
 David Lloyd Leisure | Graham Slater
 Banbury General Practice | Ignis Asset Management
 Marylebone Cricket Club
 National Film & Television School | Stowe Events
 The Waterside Inn at Bray | Wayside Group
 Windmill Veterinary Practice

RAFFLE PRIZES

4 Beauty | The Angel, Long Crendon
 Beautifully Different | BEST Butchers
 The Betsey Wynne | Blooming Marvellous
 Brasserie Blanc | Cherie Blair | Cheryl Hawkins
 Daniel Hercheson | Delta Force | Emma Brooks
 Fiddes Payne | Fit Future | Foxdenton Estates
 Frosts Garden Centres
 George Hammond Bespoke Ironwork
 The Intercontinental Hotel, London
 John Dennis 4x4 | John Lewis Partnership
 Le Meridien Hotel, London | Lloyds Private Banking
 The Metropolitan Hotel, London | Nick Price
 Nuffield Health Club | Rosehip Flowers
 Rumseys Chocolates | Stantons Butchers
 Sue's Ironing | The Stables | The Thatched Inn
 The Unicorn | Waddesdon Manor
 Waterperry Gardens | Wayside Group | Winslow Deli



Last, but certainly not least, Restore's grateful thanks are due to our very hard-working Ball Committee whose tireless efforts resulted in a success beyond our expectations. The Committee was:

Jen Barker, Nicki Clarke, Mike & Maggie Constant, Sue Cross Brown, Sarah Hamilton-Ely, Rosie Insley, Gilli McGrouther, James & Pippa Naylor, Dr Sally Rider, Jane Rushton, Sue Tyler, Judy Welch & Derek Welford



Jen Kean with the Nikon Eclipse TS100 digital microscope and camera control unit

We are extremely grateful to all our friends and supporters who have made generous donations throughout the year and to those who have worked so hard to ensure the success of our fundraising events, and in particular the Scarlet Ball. In the ongoing uncertain financial climate we realise that difficult decisions have to be made and we are sincerely grateful for our supporters for their continuing loyalty and encouragement.

The Trustees would like to express their thanks both to major national and local donors for their generosity.

Amongst our many wonderful donors we should make particular mention of:

The Anson Charitable Trust

The Berqvist Charitable Trust

The Bulldog Trust

The Coutts Charitable Trust

The E M McAndrew Trust

Franklite Limited

Ian and Elizabeth Church Charitable Trust

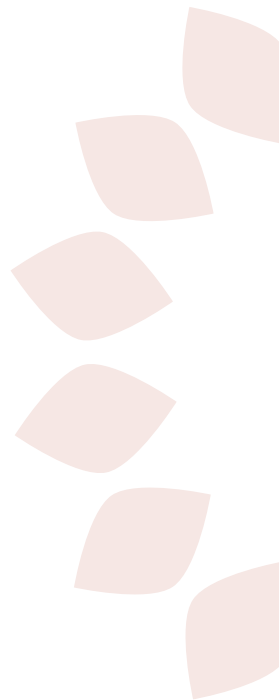
The Macdonald-Buchanan Charitable Settlement

The Silverstone Recreational Association

The Spurrell Charitable Trust

The Yorkshire Building Society Charitable Trust

We are also extremely grateful to the personal donors, too numerous to mention individually, who have given so generously. We are especially grateful to those who have continued to give regularly over a number of years.



Moving forward with stem cell biology



A lot of the changes occurring in Restore in this past year have been administrative, with the change over of Chairman. The stem cell research project is progressing well and Jennifer Kean has now been in post for over a year and we are definitely beginning to answer the question as to whether or not we will be able to harvest stem cells, either from the patient's blood if a patient is burned or from their fat. It looks like, as with many things in science, these things are easier said than done but we are developing a number of strategies and harvesting techniques to push forward with this research. As well as understanding how we can harvest them from a clinical perspective we still have much work to do in working out the theoretical advantages of having a skin substitute which is seeded with vascular stem cells into the reality of just how much an advantage this will give in terms of success of grafting tissue engineered skin in patients and also secondly the reduction in resultant scarring that a stem cell seeded dermal template will produce over one which is not seeded. These are all questions which remain in the ether and we are working hard to resolve.

The other arm of the research into cold therapy remains relatively static at the moment. Before embarking on a further Research Fellow it is important that we do get the calibre of candidate to take this step forward. The bio statistics nature of the work that was original done by Kong is highly complex and the supervision and progress of this report will be vital if we are to achieve any success. The Scientific Advisory Committee are closely considering the progress on this and should be able to report next year.

Mr Michael Tyler MB ChM FRCS (Plast)

Director of Clinical Studies



HRH The Duke of Kent with Mr Mike Tyler and patient (Photograph courtesy of Bucks Hospitals NHS Trust)

A Tale of Two Hands

One of the complications of having a burned hand is that subsequent scarring can restrict the movement of the first web space (the space between the thumb and the index finger). This is a vital part of human anatomy as it allows us to separate our thumb and fingers and grasp objects. If the space is narrowed then it becomes more difficult to grasp objects of any width, reducing the function of the hand.

In the first patient with relatively limited contracture of the web space we can just simply re-arrange the skin, forming a 'Z' shaped scar as demonstrated in the picture. This is a relatively quick and useful operation, but does rely on there being soft and pliable skin either side of the scar tissue.



Photo 1: pre-operative photo showing a scarred web space between thumb and index finger



Photo 2: post-operatively zig-zag incisions have released the web of skin

In more severe cases we have to import unburned skin from different areas. In this second patient we have borrowed a little bit of skin from the back of the forearm, the resultant scar of which is shown in photograph 4 and we have kept that skin connected to some very small vessels which run along deep inside the forearm and provided we do not damage the vessels during an anatomical dissection we can then transpose that piece of skin from the forearm into the first web space. The fact that we are bringing the piece of skin with its own blood supply means that it heals in very nicely.

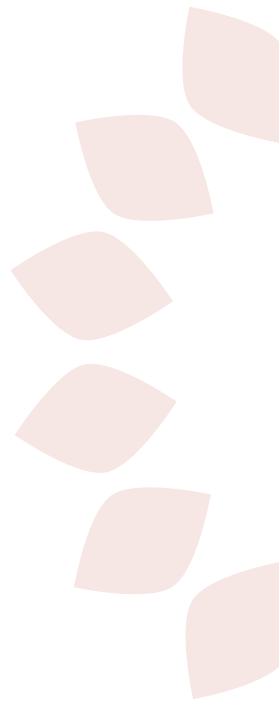


Photo 3: photo showing a web space released with skin from the forearm



Photo 4: photo showing a scar where the skin used came from

Obviously in patients who have burned their hands further up on the forearms this option is no longer available and this is where we start thinking about doing grafts and this would be an area where tissue engineered skin could potentially become important.



09/H0502/120

Active Research Project



Stem and Progenitor Cells in Wound Healing

Researcher: Miss Jennifer Kean **Date:** August 2009 – August 2012

Funding: Restore – Burn & Wound Research

Overview

The ability of tissues to repair themselves after injury is both pivotal to our survival and also the cause of scar tissue which in itself can cause pain and suffering. The quantity and quality of scar tissue formation after injury, therefore, is vital to the eventual outcome of any patient who is recovering from an injury. Playing a key role in both the quantity and quality of scar tissue is the process of new vessel formation, and central to new vessel formation is a blood vessel derived “stem” cell, called an endothelial progenitor cell (EPC).

Our research is based on the concept that manipulation of EPCs within the laboratory will enable us to control some of the forces of scar tissue and provide a better outcome for patients, in whom excess scarring may be a life long problem.

Fat is an easily harvested tissue and if we developed the ability to successfully isolate and culture EPCs from adult fat tissue we would be able to use these cells in the laboratory. We aim to create stable microvascular networks and provide a feasible clinical application for autologous engineered skin substitutes or other wound treatments for burns patients.

Project Outline

The initial project in this field clearly established that the body responds to a burn by releasing the body's natural store of EPCs from the bone marrow. The numbers released are proportional to the severity of the burn. Thereafter, however, the numbers of the stem cells remain low and it is our contention that they are needed to co-ordinate healing for the later skin grafting procedures but because they were all “spent” in the first 48 hours the bone marrow bank remains bankrupt and unable to supply the body later.

Our aim, therefore, is to see if we can raid the other bank of stem cells, namely the body's fat stores, and use them in the laboratory, where we are trying to multiply them in the lab ready to return them when needed for reconstruction, in the same way we hope the bank will do with our savings.

The aim of the project is to produce a safe, autologous (ie from your own body) pre-vascularised (i.e with the blood vessels pre grown in) skin substitute which is potentially feasible for clinical use.

We aim to do this by:

1. Identifying feasible source tissues for Endothelial Progenitor Cell (EPC) isolation and culture for use in clinical applications
2. Identifying best scaffolds for optimal microvascular network formation, integration and transfer to the wound bed
3. Determine interaction and integration of the vascularised skin substitute with an in vitro wound bed model

Current Work and Results

Umbilical Cord Blood

This has been used to establish control experiments and techniques. EPCs have been cultured and used in subsequent experiments with other supportive cells to establish the two dimensional and three dimensional microvascular tubule assays (Figure 1).

Peripheral Blood

This has been collected from fat donors and burns patients and work has been done to isolate EPCs as from cord blood (Figure 2). So far the yield has been disappointing in comparison, as expected from previous work although one fat donor sample has provided viable EPCs.

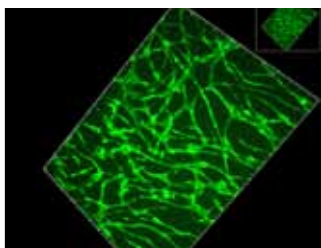


Figure 1 - 3D Network of blood vessels grown from umbilical cord EPCs

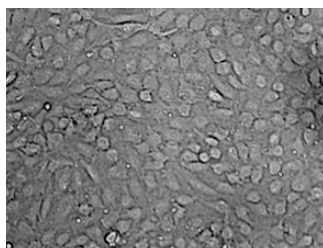


Figure 2 – EPCs from adult blood

Fat

The key techniques of processing fat samples have been established and flow cytometry has been used to identify markers for the potential cells of interest. This has been very encouraging, and now that we know we can tag the cell markers, the next stage of the project is to work on separating the EPCs from the rest of the fat tissue cells. So far cultures with endothelial medium which should encourage EPC growth have only yielded fibroblast like cells (Figure 3), and so I will use magnetic tagging and separation to try to remove these before placing the remaining cells in culture. Table 1 shows the different markers identified on cultured and fresh fat samples, which suggest that EPCs may be present in the fresh fat.

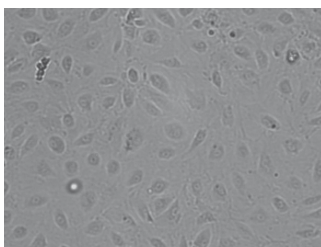


Figure 3 – Cells cultured from fat, these are probably not EPC

At the time of publication we are pleased to report that we now have managed to grow some EPCs from our fat samples and are in the process of gathering further samples to work on consistency of the harvesting techniques.

| Marker | Cultured | Fresh |
|--------|----------|-------|
| CD31 | | + |
| CD34 | | + |
| CD45 | | ++ |
| CD90 | +++ | ++ |
| CD105 | +++ | + |
| VEGFR2 | ++ | ++ |
| TIE2 | ++ | + |
| CD133 | | + |
| CD14 | + | + |

Table 1 - Cultured vs Fresh Fat Summary

Financial Report for the year ended 5 April 2010

The charity received donations during the year of £59,055 of which £500 was restricted. Total income during the year was £70,751 and an amount of £47,457 was expended resulting in net incoming resources of £23,294.

However gains on investments of £76,468 resulted in an overall surplus for the year of £99,762. This amount was comprised of a deficit of £5,337 on restricted funds, a surplus of £6,000 on unrestricted funds and an increase in the expendable endowment of £99,099.

The charity's investments increased in value during the year by 25%. The Trustees consider their investment to be sufficiently diversified to protect the capital base of the charity in the long term.

The Trustees consider that only a low level of 'free' unrestricted funds is required to cover costs. The unrestricted funds are maintained at an adequate level with all surplus income being classified as expendable endowment. The level of free reserves at the year end of £31,000 represents 8 months' unrestricted costs. The Trustees wish to establish a "core fund" of at least £500,000 and at 5 April 2010 this amounted to £674,757 (2009: £575,658).

The preparation of financial statements follows best practice as laid down in the Statement of Recommended Practice "Accounting and Reporting by Charities" (SORP 2005) and comply with the charity's trust deed and applicable law.

This financial report represents a summary and a full set of audited accounts can be provided upon application.

**Approved by the Board of Trustees
And signed on its behalf by Michael Constant (Chairman)
On 17 November 2010**



| Balance Sheet as at 5 April 2009 | | |
|---------------------------------------|-----------|-----------|
| | 2010 | 2009 |
| Fixed Assets | | |
| Investments | 386,046 | 309,578 |
| Tangible assets | 3,110 | 4,147 |
| | 389,156 | 313,725 |
| Current Assets | | |
| Debtors | 513 | 1,500 |
| HSBC- community account | 3,962 | 4,569 |
| Standard Life - 10 day notice account | 224,321 | 195,861 |
| CAF Gold account | 101,258 | 100,900 |
| | 330,054 | 302,830 |
| Current liabilities | | |
| Creditors | (12,745) | (9,852) |
| Net current assets | 317,309 | 292,978 |
| Net assets | £ 706,465 | £ 606,703 |
| Funds | | |
| Expendable endowment funds | 674,757 | 575,658 |
| Unrestricted funds | 31,000 | 25,000 |
| Restricted funds | 708 | 6,045 |
| | £ 706,465 | £ 606,703 |

Statement of Financial Activities

For the year ended 5 April 2010



Statement of Financial Activities for the year ended 5 April 2009

| | Unrestricted Funds | Restricted Funds | Expendable Endowment Funds | Total Funds 2010 | Total Funds 2009 |
|---|--------------------|------------------|----------------------------|------------------|------------------|
| Incoming resources | | | | | |
| Incoming resources from generated funds: | | | | | |
| Voluntary Income | 58,912 | 500 | - | 59,412 | 45,355 |
| Activities for generating funds: | | | | | |
| Investment income | 3,496 | - | - | 3,496 | 9,340 |
| Events and raffle tickets | 7,843 | - | - | 7,843 | 1,495 |
| Total incoming resources | 70,251 | 500 | - | 70,751 | 56,190 |
| Resources expended | | | | | |
| Costs of generating funds: | | | | | |
| Costs of generating voluntary income | 5,412 | 500 | - | 5,912 | 2,571 |
| Charitable expenditure - Burns research | 39,457 | 236 | - | 39,693 | 45,555 |
| Governance costs | 1,852 | - | - | 1,852 | 1,802 |
| Total resources expended | 46,721 | 736 | - | 47,457 | 49,928 |
| Net incoming resources / (resources expended) before transfers | 23,530 | (236) | - | 23,294 | 6,262 |
| Transfers between funds | (17,530) | (5,101) | 22,631 | - | - |
| Net incoming resources / (resources expended) after transfers | 6,000 | (5,337) | 22,631 | 23,294 | 6,262 |
| (Decrease) Increase in the market value of investments | - | - | 76,468 | 76,468 | (57,392) |
| Net movements in funds | 6,000 | (5,337) | 99,099 | 99,762 | (51,130) |
| Funds balances brought forward at 6 April 2008 | 25,000 | 6,045 | 575,658 | 606,703 | 657,833 |
| Funds balances carried forward at 5 April 2009 | 31,000 | 708 | 674,757 | 706,465 | 606,703 |

Publications



Publications

Kean J, Stewart K J. Remodelling of the pinna in myxoid degeneration of the ear. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2010 Jul; 63(7):e556-60. Epub 2009 Dec 22.

Kean J, Al-Busaidi S S, Quaba A A. A case report of frontonasal dysplasia. *International Journal of Pediatric Otorhinolaryngology*. 2010 Mar; 74(3):306-8. Epub 2009 Dec 30.

Kean J. The effects of smoking on the wound healing process. *Journal of Wound Care*. 2010 Jan; 19(1):5-8.

Kean J, Stephen C, Hughes J, Enoch S. *Focused Clinical Examination for MRCS Finals (OSCE)*. 1st Edition. Doctors Academy Publications. August 2010. ISBN:978-93-80573-12-0.

Amez Z M, Khan U, Tyler M P H. Classification of soft-tissue degloving injuries. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2010; 63 (1865-1869)

Presentations

Kean J, Tsaknakis G, Athanassopoulos A , Tyler M P H, Watt S M.

In Vitro Microvascular Network Formation Within Artificial Dermis – Working Towards Pre-Vascularised Artificial Skin.

Podium presentation - 3rd International Scar Club Meeting, Montpellier, March 2010

Poster presentation - 3rd International Scar Club Meeting, Montpellier, March 2010
- Medical Sciences DPhil Symposium, Oxford, July 2010

Kean J, Schaverien M and Bahia H. Popper Burns - A Traumatic Consequence of Alkyl Nitrite Abuse.

Poster presentation - BAPRAS Summer Scientific Meeting, Sheffield, July 2010

Awards and Prizes

Douglas Murray Prize 2010 winner:

Pleat J M, Dunkin C, Tyler M P H, Gillespie P, McGrouther A. Scarring: a human population study.

Douglas Murray National Plastic Surgery Research Meeting, Selly Oak Hospital, Birmingham. October 2009.



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