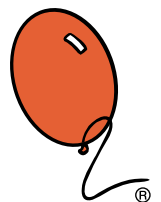


# Changing Lives

## BLF Research 2009/10

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**British Lung Foundation**

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- 3 Foreword

## Completed grants

- 5 Exercise training to help recovery following hospital admission for patients with COPD  
6 Finding new drugs for tuberculosis, an emerging 'old' disease  
7 Characterisation of a new gene involved in lung cancer  
8 Is the natural lung protein 'surfactant protein D' protective against the development of emphysema?  
9 Better vaccines for preventing a common cause of pneumonia and other chest infections  
10 Uncovering genes responsible for lung disease  
11 Interactions between specialised lung cells promoting the survival of lung cancer cells

## Grants awarded 2008–09

- 13 The potential of vitamin D to improve current treatments for asthma  
14 Development of a questionnaire to measure quality of life for people with pulmonary fibrosis  
15 Treating malignant mesothelioma with stem cells  
16 Improving lung transplant success  
17 Benefits of physiotherapy in adult cystic fibrosis  
19 Developing new tools to manage TB  
20 Does using oxygen during pulmonary rehabilitation give added benefit to those people whose oxygen levels drop only on exertion?  
21 The switch from normal lung healing to abnormal lung scarring: what is the cause and can it be modified?  
22 Finding new drugs for tuberculosis: boosting natural immunity to kill TB  
23 Acknowledgements

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Front cover shows a laboratory  
image of mesothelioma cells  
© Dr S. Al-Taei, Cardiff



**W**elcome to *Changing Lives, BLF Research 2009/10*. This booklet provides an overview of the research grants we have awarded during the last year and reports on some of the completed work.

All BLF research grants are selected by our Scientific Committee, which consists of expert respiratory researchers and non-scientific members who have a lung condition. This allows us to fund work that is scientifically robust and is also important to changing the lives of people who have a lung disease.

The committee works to a 'research strategy', which is reviewed each year. This ensures that we get the most value from our investment into research. Our strategy includes building capacity for lung research in the UK by supporting junior researchers and targeting several important disease areas that either affect huge numbers and/or are poorly understood. Our recently awarded grants reflect this strategy including:

- a capacity-building Research Fellowship award investigating asthma
- £500,000 committed to researching tuberculosis, which has seen a resurgence in recent years
- the Mick Knighton Mesothelioma Research Fund award tackling a deadly cancer caused by asbestos exposure
- several awards focusing on idiopathic pulmonary fibrosis, a poorly understood condition which has no cure.

By working within this strategy, we hope that the science we fund will tackle issues that are of the greatest

importance to people living with lung disease and will provide a healthy future for respiratory research in the UK.

Over the past year, we have also consolidated our relationship with the Medical Research Council, building on previously awarded joint studentship awards by agreeing to offer a joint Fellowship award in which the BLF will invest 25 per cent to the MRC's 75 per cent investment. This is an excellent way for the BLF to gain added value to our research spend.

In addition, 20 travel fellowship awards of £750 each were made over the year, helping exceptional junior scientists to attend world-class research conferences in the USA and Europe. These awards were sponsored by Allen & Hanburys.

Also, the BLF Research team exhibited the findings of BLF survey work at the European Respiratory Society conference in Vienna, September 2009, and at the British Thoracic Society winter meeting in London, December 2009. This is the first time that BLF work has been recognised at international respiratory science conferences.

Finally, the research team has set up an ongoing programme of site visits to all BLF grant-holders. This has allowed us to build our relationship with grant-holders, learn more about the work they're doing and ensure that grants are running smoothly.

I hope you enjoy reading about our latest research efforts to tackle lung disease and work towards better lung health in the future.

**Ian Jarrold, Research Manager**

*Minibiog: Professor Moxham is Medical Director of King's College Hospital NHS Foundation Trust and Professor of Respiratory Medicine in the School of Medicine. His specialist interests include COPD, pulmonary rehabilitation, breathlessness and respiratory muscle weakness. As well as respiratory medicine, he is also a general physician responsible for acute medical admissions.*



## Exercise training to help recovery following hospital admission for patients with COPD

Chronic obstructive pulmonary disease (COPD) is an umbrella term for diseases including emphysema and chronic bronchitis. COPD is increasing worldwide, and the World Health Organization predicts that it will be the third most common cause of death, and fifth most common cause of lost working days by 2020. COPD causes shortness of breath, which has a huge impact on daily living.

People with COPD may experience a rapid worsening of symptoms in what is called an 'exacerbation' or a flare-up. These are usually triggered by a chest infection and often require hospitalisation. During time in hospital, patients become weaker and even more inactive. It may take several weeks or months to recover their prior level of activity and health.

Many COPD patients are treated with an exercise-based programme called 'pulmonary rehabilitation' to maximise their lung health and capability for physical activity. However, it is not known whether pulmonary rehab is useful in helping COPD patients to recover from an exacerbation. During the study, Professor Moxham and his team investigated this.

They recruited 60 patients who were admitted to hospital with a COPD exacerbation. Half received usual care and the other half received additional pulmonary rehab. All patients were monitored for three months to see how well they did. Thirty-three per cent of those treated with usual care ended up back in hospital with another exacerbation, compared to only 7 per cent of the pulmonary rehab group. The pulmonary rehab group also showed better muscle strength, better performance in a walking test and superior quality of life.

This study has shown that pulmonary rehabilitation is not only a successful tool for helping to maintain quality of life in COPD, but that it is also a vital tool in helping people recover from a COPD exacerbation. Crucially, this provides the scientific evidence needed for this practice to be safely recommended to all COPD patients.

**Professor John Moxham**  
King's College London

Amount awarded  
**£106,696**

Duration  
**24 months**

Relevant diseases  
**COPD**

Relevant age groups  
**Adults**

# Finding new drugs for tuberculosis, an emerging 'old' disease

**Professor Melanie Newport**  
University of Sussex

**Amount awarded**  
£70,470

**Duration**  
24 months

**Relevant diseases**  
TB

**Relevant age groups**  
Adults and children

Tuberculosis (often called TB) is a disease caused by a germ called mycobacterium tuberculosis. Since current vaccines and management are only partially effective, it is on the increase both in the UK and around the world despite efforts to control the disease. Clearly, there is a major need for better treatments to comprehensively tackle TB.

Some people have a greater natural ability to fight TB than others. This is thought to be due to differences in genes controlling how our immune system tackles TB. However, little is known of the genes involved. Better

understanding of these genes, will help scientists develop better vaccines and drugs to help everyone fight TB successfully.

With this BLF funding, Professor Newport and her team studied how well the immune systems of babies from the Gambia respond to TB and which genes might

be important in this process. They found that genes located on chromosomes 8, 10 and 11 are crucial. Moreover, the team have narrowed down their search to around 20 individual genes which they believe are particularly critical to fighting TB.

Further work is now needed to determine the exact role of these genes and how their function can be improved in people less able to fight TB. In the long term, this work will contribute to improved treatment for millions of people with TB around the world. In the short term, these findings may lead to the development of a genetic test to identify people least able to fight TB and who therefore need specialist treatment and particularly careful monitoring.

*Minibiog: Professor Newport's career has focused on understanding how our genes influence how well we are protected against infectious diseases. She has previously worked at the Medical Research Council Laboratories in the Gambia to investigate the genetic basis of susceptibility to TB.*



## Characterisation of a new gene involved in lung cancer

**Dr Tyson Sharp**  
University of Nottingham

**Amount awarded**  
£72,087

**Duration**  
24 months

**Relevant diseases**  
Lung cancer

**Relevant age groups**  
Adults

Lung cancer is the most common cancer in the world with 1.3 million new cases diagnosed every year. In the UK, it is the most common cause of death from cancer for both men and women, claiming over 36,000 lives each year.

Lung cancer develops when cells become abnormal and grow out of control. This usually happens when there is damage to certain genes, which are important in controlling cell growth. The five-year survival rate of newly diagnosed lung cancer patients has not improved in the last ten years. This is partly due to a lack of understanding

of the genetic changes that take place in lung cells that lead to cancer. A better understanding will help scientists to develop new ways to fight lung cancer.

Dr Tyson Sharp and his team at the University of Nottingham had previously identified a gene that is damaged in lung cells by cigarette smoke. This gene is called LIMD1. With this BLF grant, the team has investigated whether damage to this gene might lead to lung cancer.

The team used cutting edge laboratory techniques to examine samples of lung cancer cells taken from patients and found that the LIMD1 gene was indeed damaged in lung cancer cells, but not in non-cancerous tissue. They also showed that engineering cells devoid of the LIMD1 gene led to the development of lung cancer. This study demonstrates that a working version of the LIMD1 gene is essential to the health of lung tissue. It also illustrates that damage to the gene by factors such as cigarette smoke contributes to lung cancer.

This is very exciting news for several reasons. Firstly, detecting damage to the LIMD1 gene may be a new way to identify cancer much earlier, which means earlier treatment with more chance of success. Secondly, finding a way to replace a damaged version of the gene with a working one may be a new therapy for stopping the growth of lung cancer.

*Minibiog: Dr Sharp is a Lecturer in Biochemistry at the University of Nottingham's School of Biomedical Sciences. His work in the Netherlands, USA and the UK has focused on the biochemistry and genetics of lung cancer.*



**Dr Howard Clark**  
University of Oxford

**Amount awarded**  
£95,760

**Duration**  
24 months

**Relevant diseases**  
Emphysema, COPD, cystic fibrosis, neonatal chronic lung disease

**Relevant age groups**  
Adults and children

*Minibiog: Dr Clark is a Senior Research Fellow at the University of Oxford. His main interest is harnessing the lungs' own immune defences to develop new therapies for lung disease.*

## Is the natural lung protein 'surfactant protein D' protective against the development of emphysema?

Inflammation in the lungs is linked to many lung conditions including chronic obstructive pulmonary disease (COPD), cystic fibrosis and neonatal chronic lung disease. Evidence suggests that this inflammation might be due, in part, to problems with the body's immune system. More specifically, initial research has suggested that damage or loss of a protective molecule called 'surfactant protein D' (SP-D) may be key.

With BLF funding, Dr Howard Clark and his team used cutting edge molecular biology techniques to investigate how SP-D might protect our lungs, and how a lack of SP-D might lead to the inflammation seen in diseases like COPD.

This work has identified some of the effects that this lack of SP-D has on the lungs. Importantly, the team also found that SP-D can indeed help to prevent the damage caused by the inflammation seen in lung disease. The team also produced a version of SP-D in the laboratory, which may be useful as a therapy in future.

Further work is now needed to gain a deeper understanding of this process and to establish whether SP-D might be a useful therapy in the prevention and treatment of inflammatory lung disease.

**Dr Jeremy Brown**  
University College London

**Amount awarded**  
£110,605

**Duration**  
24 months

**Relevant diseases**  
Pneumonia, acute bronchitis,  
COPD, bronchiectasis

**Relevant age groups**  
Adults and children

*Minibiog: Dr Brown is Reader in Respiratory Infection and Honorary Consultant at University College London. His work focuses on the biochemistry of lung infection,*



*particularly in pneumonia, with the aim of producing new ways to prevent or treat infection.*

## Better vaccines for preventing a common cause of pneumonia and other chest infections

The bacterium streptococcus pneumoniae (*S. pneumoniae*) is the most common cause of pneumonia, and is responsible for over one million avoidable deaths worldwide each year. *S. pneumoniae* also frequently causes milder lung infections, resulting in exacerbations of common lung conditions like chronic obstructive pulmonary disease. Vaccines exist but are either very expensive and only protect against a limited number of the wide range of different *S. pneumoniae* strains that cause disease, or are not effective at preventing lung disease in children or older people – the groups that are at the most risk of lung infections. New, more effective vaccines are desperately needed to protect people from developing lung diseases caused by *S. pneumoniae*.

Most existing *S. pneumoniae* vaccines are based on sugars found in the bacteria. During this BLF project grant, Dr Brown and his team attempted to develop and test new vaccines based on proteins found in the bacteria. As these proteins exist in all strains of the bacteria, they hoped that these vaccines would be effective against most *S. pneumoniae* infections.

The team tested several different types of protein and although several effects on the immune system were noted, protection against infection in the lung was very limited. However, the team also tested a live form of the bacteria which was altered to make it unable to cause infection. Excitingly, they found that this live version can protect against pneumonia.

This work has highlighted the difficulty in using proteins as vaccines against *S. pneumoniae* infections, but has shown that using modified live bacteria can be effective. Further work is now needed to explore how this modified live bacteria might be converted into a reliable vaccine for worldwide use.

# Uncovering genes responsible for lung disease

Despite major advances in medicine and healthcare, the underlying causes of many lung conditions, including asthma and pulmonary fibrosis, are still not well understood. Increasing our understanding of how and why lung conditions develop is vital to the successful prevention, treatment and cure of these diseases.

Many lung diseases are linked to our genetic make-up. Even before we're born, our genes play a vital role in how our lungs develop and in keeping our lungs healthy.

**Dr Charlotte Dean**  
Medical Research Council  
Harwell, Oxfordshire

**Amount awarded**  
£117,009

**Duration**  
24 months

**Relevant diseases**  
Asthma, pulmonary fibrosis

**Relevant age groups**  
Adults and children

Problems with specific genes can cause problems with our lung development and this can lead to lung disease. In diseases like cystic fibrosis, the exact gene involved has been identified. However, for many other lung conditions the role of our genes is far more complex and the relevant genes are more difficult to identify.

Dr Charlotte Dean was awarded a BLF Research Fellowship to investigate which genes might be important in healthy lung development and whether problems with these genes might

lead to disease. Following on from previous work, Dr Dean studied a specific group of genes that have a suggested role in healthy lung development to see whether they might be involved in disease.

During this study, Dr Dean identified a new group of genes that are critical for lung development in the womb. Preliminary experiments suggest that at least one of these genes, called 'Vangl2', has a role in pulmonary fibrosis. Further work is now needed to understand more about these genes and their role in lung disease in order to develop management strategies for this disease.

This fellowship enabled Dr Dean to establish her laboratory at MRC Harwell. She was awarded two more years funding from the MRC to continue her studies. This demonstrates the value of BLF Fellowships in helping junior scientists to establish themselves in lung research.

*Minibiog: Dr Dean is Group Leader of the Lung Development and Disease section at the Medical Research Council's facility in Harwell, Oxfordshire. The section's work focuses on how our genes control lung development and how lung diseases occur when these processes go wrong.*

## Interactions between specialised lung cells promoting the survival of lung cancer cells

**Professor Tariq Sethi**  
University of Edinburgh

Amount awarded  
£109,025

Duration  
36 months

Relevant diseases  
Small cell lung cancer

Relevant age groups  
Adults

Lung cancer is the most common cancer in the world with 1.3 million new cases diagnosed every year. In the UK, it is the most common cause of death from cancer for both men and women, claiming over 36,000 lives each year.

A particular form of lung cancer, called small cell lung cancer (SCLC), accounts for 20 per cent of all lung tumours. Current treatments of SCLC have very limited success.

Our immune system protects us from harmful invaders and patrols

the body looking for unusual cells to be destroyed, including cancer cells. However, previous studies have suggested that SCLC cells have the ability to evade the body's immune system. This process also seems to make the cancer cells more resistant to chemotherapy. Little is understood about how these cancer cells achieve this, but the process helps SCLC cells to survive and thrive.


With BLF funding, Professor Sethi and his team

investigated how SCLC cells evade our immune system. To do this they took samples of SCLC tissue from patients and studied how they affected immune cells in the laboratory.

The team showed that SCLC cells can indeed inhibit the function of several different cells of the immune system called 'T cells' and 'macrophages'. It then investigated the mechanism involved. The results have implicated a molecule called Galectin-1, which is found on the surface of the cancer cells.

The next step is to understand more about the role of Galectin-1 and other molecules that may be involved. This will help scientists to begin developing new ways of dealing with SCLC cells, by boosting the immune defence and helping enhance existing chemotherapy treatments.

*Minibiog: Professor Sethi is an internationally renowned lung cancer researcher who leads a group investigating the regulation of growth and drug resistance in small cell lung cancer. There are only a few groups investigating this subject worldwide, highlighting the importance of their work.*

A portrait of Dr. Xystrakis, a man with dark, wavy hair and glasses, wearing a grey button-down shirt. He is looking slightly to the left of the camera. The background is a dense green hedge with some red flowers visible at the top left.

*Minibiog: Dr Xystrakis is a Post-doctoral Research Fellow in the Division of Asthma, Allergy and Lung Biology at King's College London. Following his medical and research training at the Paul Sabatier University in Toulouse France, Dr Xystrakis moved to King's College London to embark on independent research in autoimmunity, regulation of the immune system and asthma.*

## The potential of vitamin D to improve current treatments for asthma

**Dr Emmanuel Xystrakis**  
King's College London

**Amount awarded**  
£120,000

**Start date**  
5 January 2009

**Duration**  
36 months

**Relevant diseases**  
Asthma

**Relevant age groups**  
Adults and children

### What's the problem and who does it affect?

Asthma is a common disease – it affects about five million people in the UK. People with asthma have unusually sensitive airways that become irritated in some situations. Irritated airways become narrow and may produce more mucus than normal; this makes it difficult to breathe. More severe asthma is treated with inhaled drugs called 'corticosteroids', which help prevent asthma attacks. However, these drugs do not work very well in some people with asthma. New treatments are needed to help these people control their asthma better.

### What is the study trying to achieve?

Recent evidence suggests that vitamin D might help the body to keep the lungs healthy and help inhaled corticosteroids to work better. During this study, Dr Xystrakis will investigate whether vitamin D does help control asthma and how it might do this.

### How will this benefit people with lung disease?

Vitamin D deficiency is relatively widespread in the UK, although taking vitamin D supplements is a simple, relatively inexpensive and safe solution. If this study demonstrates a clear benefit, vitamin D supplements could be a simple and effective way to improve quality of life for millions of people with asthma.

## Development of a questionnaire to measure quality of life for people with pulmonary fibrosis

### What's the problem and who does it affect?

Idiopathic pulmonary fibrosis (IPF) is a disease caused by repeated injury to small areas of the lung. This results in inflammation and then scarring. The scar tissue makes it difficult for the lungs to do their

job of getting oxygen into the bloodstream and carbon dioxide out. This causes breathlessness, especially when doing daily activities like walking uphill or climbing stairs.

The causes of IPF are not well understood but several treatment options are available. Monitoring the progression of IPF and the effect of treatment is more difficult. In other diseases, questionnaires on 'quality of life' are extremely valuable in doing this, as they focus on things that are important to the patient – the ability to carry out the tasks of daily life. Currently, no such questionnaire exists for monitoring IPF.

### What is the study trying to achieve?

During this study, Janelle Yorke aims to create an internationally recognised questionnaire that will capture information about how IPF affects a person's quality of life.

### How will this benefit people with lung disease?

Developing this questionnaire will be a great step in helping doctors to measure the progress of IPF, prescribe appropriate treatments and monitor the success of these treatments. As decisions on treatment will be informed by what's important to the patient, this will be great news for people living with IPF.

*Minibiog: Janelle Yorke is a Lecturer at the University of Salford School of Nursing. After training in Sydney, Australia, Janelle relocated to Imperial College London and then Manchester to pursue her interest in the care of people with lung disease.*



**Janelle Yorke**  
University of Salford

**Amount awarded**  
£14,614

**Start date**  
2 February 2009

**Duration**  
14 months

**Relevant diseases**  
Pulmonary fibrosis

**Relevant age groups**  
Adults

## Treating malignant mesothelioma with stem cells

### What's the problem and who does it affect?

Mesothelioma is a type of cancer that affects the 'mesothelium' – a thin lining in the chest and abdomen. Mesothelioma is most commonly found in the chest lining. A connection between mesothelioma

and asbestos was discovered in 1960 and exposure to asbestos is now known to be the cause of over 90 per cent of mesothelioma cases.

Despite a ban on the use of asbestos in industry in the 1970s and major advances in several cancer treatments over the past 30 years, malignant mesothelioma is on the rise and is still incurable. The average time from diagnosis to death is 18 months. Clearly, new treatments to combat the disease are desperately needed.

### What is the study trying to achieve?

Previous work by Dr Janes has

demonstrated that modified stem cells are able to kill certain cancer cells. During this study, Dr Janes and his team will investigate whether this technique might be successful in killing mesothelioma tumour cells while preserving healthy lung tissue.

### How will this benefit people with lung disease?

If these experiments are successful, this work may lead to the development of a new and effective treatment for mesothelioma, which would revolutionise the outlook for people diagnosed with the disease.

***Minibiog: Dr Janes heads a group of scientists based at University College London who are interested in the causes and development of lung diseases, and the role of stem cells in cancer formation and treatment. He also works as a consultant in Respiratory and General Medicine with a particular interest in lung cancer.***



**Dr Sam Janes**  
University College London

**Amount awarded**  
£99,158

**Award date**  
16 June 2009

**Duration**  
18 months

**Relevant diseases**  
Mesothelioma

**Relevant age groups**  
Adults

**Dr Chris Ward**  
Newcastle University

**Amount awarded**  
£5,600

**Start date**  
5 January 2009

**Duration**  
12 months

**Relevant diseases**  
Lung transplantation;  
potentially all lung diseases

**Relevant age groups**  
Adults

## Improving lung transplant success

### What's the problem and who does it affect?

Lung transplants can save lives but they are not always a long-term success. The reasons why transplanted lungs stop working are not fully understood. Many people who receive a lung transplant develop 'gastro-oesophageal reflux disease' or GORD. This is a condition where stomach contents and acid from the stomach leak up into the gullet (oesophagus) and cause heart burn and acid reflux. GORD can be successfully treated with surgery.

treat GORD is considered in lung transplant care.

### What is the study trying to achieve?

During this grant, Dr Ward will monitor lung transplant patients to determine conclusively whether they experience GORD. In addition, the team will investigate whether GORD plays a role in lung transplant rejection. For the first time, this will determine whether surgery for GORD is beneficial in lung transplantation.

### How will this benefit people with lung disease?

The BLF hopes that this research will improve the success of lung transplantation through the new application of an established treatment for GORD.

*Minibiog: Dr Ward is a Senior Lecturer at Newcastle University's Institute of Cellular Medicine. His main interests are in airway remodelling and lung transplantation.*

Some research suggests that GORD contributes to the lung damage seen in transplant rejection, but more conclusive proof is needed before additional surgery to

## Benefits of physiotherapy in adult cystic fibrosis

**Dr Diana Bilton**  
Royal Brompton Hospital,  
London

**Amount awarded**  
£13,948

**Start date**  
1 January 2009

**Duration**  
Six months

**Relevant diseases**  
Cystic fibrosis

**Relevant age groups**  
Adults

### What's the problem and who does it affect?

Cystic fibrosis (CF) is the UK's most common life-threatening inherited disease, affecting over 8,000 people. CF causes the lungs to be clogged with thick sticky mucus, making it difficult to breathe. There is currently no cure for CF, but treatments such as 'musculoskeletal physiotherapy' can enhance quality of life by improving posture, relieving pain and helping to clear mucus. Unlike chest physiotherapy, musculoskeletal physiotherapy is not currently part of treatment when a person with CF visits hospital with a chest infection, but it may offer significant benefits.

### What is the study trying to achieve?

Dr Bilton and her team aim to determine whether or not musculoskeletal physiotherapy helps CF patients to recover from a chest infection in hospital. They will do this by monitoring how well these patients perform when they are given normal care, including chest physiotherapy, versus normal care with additional musculoskeletal physiotherapy.

### How will this benefit people with lung disease?

The BLF hopes that this research will provide evidence that musculoskeletal physiotherapy, a simple and inexpensive treatment, can help thousands of CF patients recover more fully from a chest infection. This would represent a significant step in treatment, improving quality of life for all people with CF.

*Minibiog: Dr Bilton is a Consultant Physician at Royal Brompton and Harefield NHS Trust and Honorary Lecturer at Imperial College London. Dr Bilton has many years' experience of cystic fibrosis care and her expertise is internationally recognised.*



*Minibiog: Professor Lalvani is an Infectious Disease Physician and Clinical Scientist who works on tuberculosis. Professor Lalvani's previous work includes the development of a blood test for tuberculosis infection, which is now widely recommended to complement the traditional skin test.*

## Developing new tools to manage TB

**Professor Ajit Lalvani**  
Imperial College London

**Amount awarded**  
£249,949

**Start date**  
20 April 2009

**Duration**  
36 months

**Relevant diseases**  
Tuberculosis

**Relevant age groups**  
Adults and children

### What's the problem and who does it affect?

Tuberculosis (TB) and HIV are two of the greatest threats to public health globally, and both are increasing in the UK. HIV is a virus that attacks the immune system making people more vulnerable to other infections. It is therefore common for someone with HIV to also have TB, and up to 50 per cent of people with HIV die from TB infection.

Infection with both HIV and TB can lead to a problem known as immune reconstitution inflammatory syndrome (IRIS). IRIS leads to a worsening of TB disease and even death in some cases. Since IRIS is currently not well understood, it is very difficult to diagnose and treat.

### What is the study trying to achieve?

During this grant, Professor Lalvani and his team will study people who are infected with both HIV and TB. They aim to understand how TB progresses and how and why IRIS develops. The team hope to use this knowledge to pioneer new ways to diagnose TB and IRIS earlier and more accurately.

### How will this benefit people with lung disease?

Earlier and more accurate diagnosis of TB and IRIS will allow more effective treatment of both conditions. Therefore, the results of this study could prevent the deaths of millions of people who have TB and TB/HIV around the world.

### **Julia Bott**

Surrey Primary Care Trust

### Amount awarded

£15,000

### Start date

1 October 2007

### Duration

30 months

### Relevant diseases

COPD, interstitial lung disease, bronchiectasis

### Relevant age groups

Adults

*Minibiog: Julia Bott is a Consultant Physiotherapist for Surrey PCT. Her work has focused on developing and delivering 'pulmonary rehabilitation' programmes to help increase quality of life for people with long term lung conditions.*

## Does using oxygen during pulmonary rehabilitation give added benefit to those people whose oxygen levels drop only on exertion?

### What's the problem and who does it affect?

Some people with long-term lung conditions deteriorate to the extent that, although they are uncomfortable at rest, they cannot exercise without getting breathless and their blood oxygen levels falling. We know that additional portable oxygen, or ambulatory oxygen (AO), allows them to do more exercise comfortably and lead a more active life. Many of these people are prescribed a programme of exercise and education called 'pulmonary rehabilitation'. This helps to maintain physical fitness, activity, and quality of life. However, it is not clear whether doing the exercise involved in pulmonary rehab while carrying portable oxygen improves the effectiveness of pulmonary rehab programmes in such patients.

### What is the study trying to achieve?

This study will assess whether people who have low oxygen levels on exercise only get more benefit from pulmonary rehab if the exercise involved is carried out while taking enough oxygen to keep the levels in the blood at an acceptable level. It will also determine whether it is better to assess a patient's need for AO before or at the end of a pulmonary rehab programme.

### How will this benefit people with lung disease?

We hope that this research will provide evidence for the Department of Health to change their guidelines for pulmonary rehab and oxygen, so that people will get the maximum benefit from pulmonary rehab.

**Dr Nik Hirani**  
University of Edinburgh

**Amount awarded**  
£149,845

**Award date**  
16 June 2009

**Duration**  
30 months

**Relevant diseases**  
Pulmonary fibrosis,  
adult respiratory distress  
syndrome

**Relevant age groups**  
Adults

*Minibiog: Dr Hirani is Senior Clinical Lecturer and Honorary Consultant at the University of Edinburgh's Centre for Inflammation Research. His career in respiratory research has included groundbreaking work on lung transplantation, Acute Respiratory Distress Syndrome and pulmonary fibrosis.*

## The switch from normal lung healing to abnormal lung scarring: what is the cause and can it be modified?

### What's the problem and who does it affect?

Idiopathic pulmonary fibrosis (IPF) is a disease caused by repeated injury to small areas of the lung. This results in inflammation and then scarring. The scar tissue makes it difficult for the lungs to do their job of getting oxygen into the bloodstream and carbon dioxide out. This causes breathlessness, especially when doing daily activities like walking uphill or climbing stairs.

There is currently no cure for IPF and little is understood about either what causes it or what is going wrong in the lungs to cause the scarring. Certain treatments such as steroids and immuno-suppressants can help, but in most cases the condition gets worse over time. A better understanding of the disease is urgently needed to help scientists to come up with better ways to treat and cure IPF.

### What is the study trying to achieve?

Healthy lungs have an incredible ability to repair themselves after small injuries, without scarring. However, in IPF something goes wrong with the healing process to cause scarring. During this study, Dr Hirani and his team will try to understand why our lungs 'switch' from healthy healing to scarring. Dr Hirani will focus on a small molecule called 'HIF' which he believes to be a crucial part of the puzzle. If the researchers can prove that HIF is involved in the scarring process, they will be able to develop ways to interfere with the scarring process.

### How will this benefit people with lung disease?

We hope that this work will bring us closer to understanding the scarring found in IPF and closer to developing ways to successfully prevent, treat and cure the disease. This work may also be beneficial in other lung diseases that involve inflammation and scarring such as acute respiratory distress syndrome.

## Finding new drugs for tuberculosis: boosting natural immunity to kill TB

### What's the problem and who does it affect?

Tuberculosis (TB) is an infectious disease that particularly affects the lungs. It is caused by a bacterium called mycobacterium tuberculosis (MTB). TB affects millions of people across the globe and, although it can be cured, current treatment requires patients to take up to four antibiotics and treatment lasts for at least six months. Consequently, many patients do not complete the full course of treatment. This can lead to the development of resistant forms of the bacteria that respond poorly to available antibiotics. New simpler and more effective treatments are urgently needed.

### What is the study trying to achieve?

Professor Newport and her team at the University of Sussex will use this grant to investigate how our body's own immune system responds to MTB. Different people are able to naturally fight MTB better

than others. Professor Newport intends to unravel why this is so, with the aim of boosting the body's own immune system to successfully fight MTB.

### How will this benefit people with lung disease?

Harnessing and enhancing the body's natural defence mechanisms to tackle MTB would represent a huge step forward in the fight against TB. This would have a life-saving impact on millions of people who are exposed to TB across the world.

*Minibiog: Professor Newport's career has focused on understanding how our genes influence how well we are protected against infectious diseases. She has previously worked at the Medical Research Council Laboratories in The Gambia to investigate the genetic basis of susceptibility to TB.*

**Professor Melanie Newport**  
University of Sussex

**Amount awarded**  
£249,297

**Start date**  
1 March 2009

**Duration**  
24 months

**Relevant diseases**  
Tuberculosis

**Relevant age groups**  
Adults and children

## Thank you

The British Lung Foundation wishes to thank all of the individuals, Breathe Easy groups, trusts, foundations and organisations who have given their valuable support to our research projects this year. Some of these include:

- Arnold Burton 1998 Charitable Trust
- Arthur James Paterson Charitable Trust
- Astor Foundation
- Bartlett Taylor Charitable Trust
- Benham Charitable Settlement
- Burges Bequest Charity
- Charles and Elsie Sykes Trust
- Charles Littlewood Hill Trust
- Cliff Richard Charitable Trust
- Coutts Charitable Trust
- Donald Forrester Trust
- Douglas Heath Eves Charitable Trust
- Eranda Foundation
- Felicity Wilde Charitable Trust
- Fiona Needleman
- Flow Foundation
- Freemasons' Grand Charity
- Garfield Weston Foundation
- George John and Sheilah Livanos Charitable Trust
- Greendale Charitable Foundation
- Harris Charitable Trust
- Hospital Saturday Fund
- J K Stirrup Deceased Charitable Trust
- Joseph Strong Frazer Trust
- Kirby Laing Foundation
- Lynn Foundation
- N M Rothschild and Sons Ltd
- Peter Courtauld Charitable Trust
- PF Charitable Trust
- Robert Luff Foundation Ltd
- Rosetrees Trust
- Sir Samuel Scott of Yews
- Swire Charitable Trust
- Three T Charity
- Weinstock Fund
- Standard Life Plc



...and a number of trusts and foundations that wish to remain anonymous.

# The British Lung Foundation

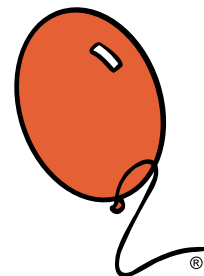
One person in seven in the UK is affected by a lung disease. Whether it's mild asthma or lung cancer, the British Lung Foundation is here for every one of them.

This is what we do:

- We **support** people affected by lung disease through the individual challenges they will face. Support is the focus of many of our activities, including Breathe Easy, our nationwide network of support groups.
- We help people to understand their condition. We do this by providing comprehensive and clear information on paper, on the web and on the telephone.
- And we work for positive **change** in lung health. We do this by campaigning, raising awareness and funding world-class research.

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Foundation**