

Lungs: The Forgotten Organ

Research into lung diseases—the third biggest cause of death in the UK—isn't receiving the attention and funding that it needs, and **Dr Katy Roach** is one researcher who would like this to change. In this piece for Frontier, she discusses why we forget about lung diseases and how the University of Leicester is working to place them back in the spotlight.

Have you ever found yourself gasping for breath and sounding worryingly similar to Darth Vader by the time you reached the top of the stairs? Do you ever feel as though your lungs are about to explode when you overdo it in the gym? Or have you been forced to run for a bus and found, somewhat dismayingly, that you're huffing and puffing more than you'd like? Whatever your lifestyle and no matter your age, at some point in your life you will have suffered from shortness of breath. For those of us who have experienced it, breathlessness can be debilitating and the uncomfortable recovery can last for a matter of seconds to several minutes. Often we can reassuringly attribute our breathlessness to overestimating our fitness levels. But imagine if your shortness of breath wasn't caused by overexertion; imagine if all it took was for you to speak a few words while having a conversation, or walking a few metres to the bathroom, or even when lying still trying to get to sleep. Breathlessness can be terrifying, but importantly it can ultimately become disabling and herald a rapid decline in quality of life and health.

As we've all been well aware since the moment we took our first breath, we require a continued supply of oxygen to survive. There are over 37 trillion cells in your body and every one of them requires oxygen to perform cellular respiration, a process that allows the cell to convert sugars into energy. The lungs themselves are a part of an incredibly complex organ system aptly named the "respiratory system". There are three major components of this system: the airways, the surrounding lung tissues, and the muscles, which enable the lungs to inflate and deflate. While our lungs can be strengthened by activities such as aerobic exercise and deep

breathing, they are extremely susceptible to damage by hazards such as cigarette smoke and dust inhalation. **But despite the paramount importance of our lungs for our quality of life and health, why is respiratory research significantly underfunded?**

Do we blame the smokers?

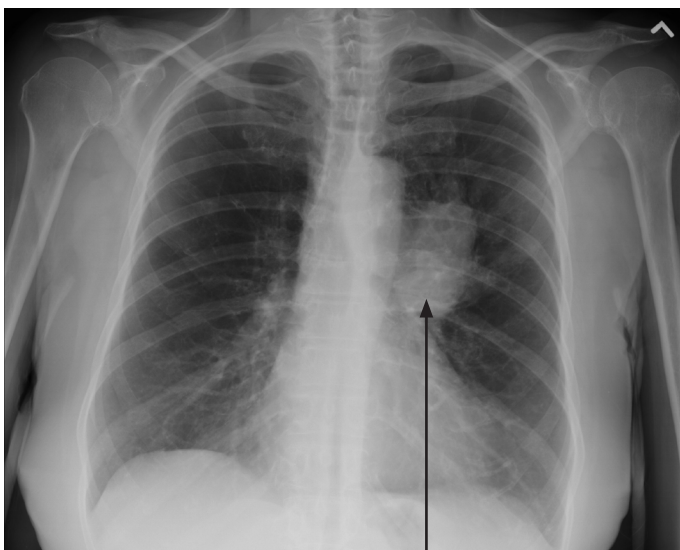
The unfortunate fact of the matter is that smoking-related lung diseases suffer from a heavy societal stigma; smoking is voluntary, and therefore the resulting disease is considered to be self-inflicted. However, many thousands of people who suffer from life-threatening lung diseases have either never smoked or given up years, even decades before the diagnosis was given. Take, for example, the wife of the British BBC journalist Robert Peston, who became a victim of lung cancer aged 51 despite never touching a cigarette in her life. She represents just one of 6,000 non-smokers who are diagnosed with lung cancer each year in the UK.

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But of course, respiratory research doesn't just focus on smoking-associated diseases such as lung cancer and emphysema. Insufficient funding also affects asthma, a disease extremely common in both adults and children, which can be severe enough to cause hospitalisation and necessitate the administration of strong drugs with harmful side-effects. Incapacitating and fatal inherited conditions such as cystic fibrosis, which kills at least two people every week, also receive inadequate support. Shockingly, one in 25 of us carry the disease gene without even knowing.

Are lung diseases more uncommon than other diseases?

The 'Respiratory Health of the Nation' report released in 2012 states that respiratory disease is the third most common cause of death in the UK, accounting for 20% of all deaths. This places respiratory diseases behind non-respiratory cancers (23%) and cardiovascular disease (28%). To put this into context, 35,000 people die from lung cancer every year, in contrast to 16,000 deaths caused by



X-ray radiograph of small cell carcinoma in the lung on the right.



Autopsy sample showing the final stage of a lung disease known as pulmonary fibrosis

bowel cancer and 12,000 deaths caused by breast cancer, according to data released by the National Cancer Intelligence Network. Even more alarming and unsettling were the survival rates released by the Office of National Statistics. 70% of lung cancer sufferers die within a year of diagnosis, and many other lung diseases have a similarly poor prognosis. So far, the evidence overwhelmingly suggests that both government and charity funding for research into lung diseases should be much higher than it currently is.

“Charity-driven donations for cardiovascular research clearly surpass the support for any lung-based disease”

Is there just not enough money?

Of course, we could blame lack of overall funding in research for this deficiency, but one look at other areas of research quickly

obliterates this idea. A recent study in the research journal *Thorax* published in 2015 by Noel Snell, Directory of Research for the British Lung Foundation showed the annual combined spending in 2013 and 2014 by 16 government agencies and national charities on respiratory research was approximately £96 million. In sharp contrast, a single cardiovascular research charity, the British Heart Foundation, managed to spend £115 million. Charity-driven donations for cardiovascular research clearly surpass the support for any lung-based disease. But why is this so? Are not cardiovascular diseases just as often, if not more so, caused by voluntary lifestyle choices, such as an unhealthy diet, excessive alcohol consumption, smoking and lack of physical activity? What explains this apparent sympathy for heart disease and not for the lungs?

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What does the University of Leicester think?

Here at the University of Leicester, we are determined to ensure the lungs are not forgotten or overlooked. With a dedicated team of academics, clinicians and nurses spread across the main University campus and the hospitals including Leicester Royal Infirmary and Glenfield Hospital, the University of Leicester has become one of the main centres for respiratory research in the UK. Our focus encompasses research into the pathogenesis and management of airways diseases, including lung infections, tuberculosis and cancers. In particular, the Institute of Lung Health (ILH) at Glenfield hospital has benefited enormously from a multi-million pound government investment by the National Institute for Health research (NIHR). This essential funding led to the establishment of the Leicester Respiratory Biomedical Research Unit, a partnership between the University of Leicester and the University of Hospitals of Leicester NHS trust, which brings together respiratory research and clinical activity in Leicester. The ILH alone have published over 300 research papers and attracted over £60 million in research funding since 2006.

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While encouraging, this progress is still not enough. With lung diseases becoming more prevalent and an increasing economic burden, there needs to be a change in the strategic priorities of government funding for respiratory research. However, perhaps more importantly, there must also be a collective transformation of our society’s perception of respiratory diseases. The concept of blame must be eradicated; the nation must become sympathetic to support those who are suffering. The lungs should not be forgotten.

So next time you run a marathon, bake a cake or leap out of a plane for charity perhaps consider donating to a respiratory charity, because, as it turns out, none of us can live without our lungs.

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