

What is the most important medical advancement over the last 100 years, and why?

1,590,000 – The estimated number of deaths caused by lung cancer in 2012, the single biggest cancer killer in the world. Lung cancer differs to other cancers in that in around 90% of cases, it occurs as a direct result of cigarette smoking. Whilst 1,590,000 is a staggering figure imagine how high that figure would be today if we were still unaware of the link between smoking and lung cancer. It is clear without the discovery and evidence of the link the world would be a much different place today. But what point was this discovery made and why is it such an important medical advancement?

One man who is very important in the story of how the link was between smoking and cancer was understood and accepted was Sir Richard Doll (1912-2005) who was once described as “perhaps Britain’s most eminent doctor”. He is important not only for his work in proving the link between smoking and cancer but his work in highlighting the importance of epidemiology and the significance of statistics in medicine. In 1945 at the end of the Second World War Britain had the highest incidence of lung cancer in the whole world and there seemed to be no clear reason why. Therefore the Medical Research Council instructed Doll and Sir Austin Bradford Hill who were both members of the Statistical Research Unit of the MRC to carry out an investigation as to what was causing this huge increase in lung cancer numbers. Doll himself at first believed that the increase in cases might be due to carcinogens in tar used in tarring of roads or possibly other work-related aspects such as fumes from coal fires.

In fact after carrying out their investigation Doll and Hill came to the conclusion that smoking was what was causing the increase in incidence of lung cancer and published their findings in the British Medical Journal on September 30 1950. Twenty hospitals took part in the study and 709 people were interviewed who had carcinoma. From this sample 649 were male and 60 were female. In the study it states “Of the men 0.3% and of the women 31.7% were non-smokers (as defined in the text). The corresponding figures for the non-cancer control groups were: men 4.2%, women 53.3%.” The figure of 0.3% is particularly poignant in highlighting just how important a factor smoking was in the presence of lung cancer in their study. They also came to the conclusion that it was more common for men to develop lung cancer than women as more men smoked than women. They were backed up with the previous study carried out by Wynder and Graham, two Americans who carried out a similar study. Graham himself had sadly been a heavy smoker himself until his research and died of lung cancer in 1957. It would be reasonable to have thought that the tobacco industry would have suffered and people would have been grateful for an answer to the lung cancer problem

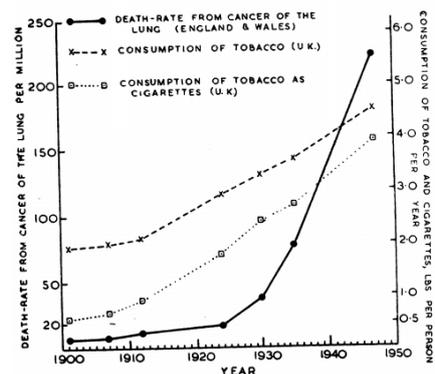
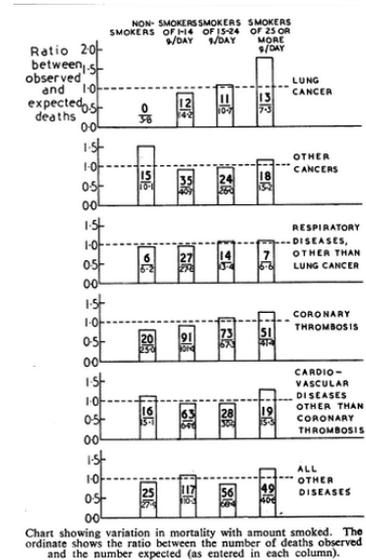


FIG. 2.—Death rate from cancer of the lung and rate of consumption of tobacco and cigarettes.

however there was quite an opposite reaction with Doll saying he was surprised at the “great reluctance on the part of most cancer research workers, physicians, and scientists to accept our conclusions.” The problem in my opinion was and still is, that many people found it difficult to accept smoking could cause harm as it is something that had been incorporated and seen as acceptable in society for such a long time, it would be scary to think that it was causing so many people, including those scientists and doctors themselves, harm. To add to this, the study faced controversy due to criticisms of bias when it came to Doll and Hill interviewing and diagnosing the patients with lung cancer.

The next breakthrough that came for Doll and Hill was in 1954 when they published a report entitled “The Mortality of Doctors in Relation to Their Smoking Habits.” This report was as a result of a study set up by Doll and Hill in which they sent questionnaires in 1951 to 34,439 British male doctors which asked questions for example if the recipient was currently smoking or if they were an ex smoker. After this initial questionnaire further enquiries were made with smokers and ex smokers to find out more details about how long the doctors had been smoking for and how much tobacco they smoked. Doll and Hill also recorded the causes of death if any of these physicians died. To avoid accusations of bias when the deaths occurred Doll and Hill wrote to the deceased’s doctor to “find out the nature of the evidence upon which his diagnosis was based”. By 1954, 36 cases of death as a result of lung cancer had been reported and as shown in the table to the right no one who died was a non-smoker. Doll and Hill also noted a link between smoking diseases such as coronary thrombosis, which is when a blood clot in the coronary artery blocks the flow of blood to the heart, also known as a heart attack.



In this report Doll and Hill also came to the conclusion from their data that there was a significant decrease in the mortality as the length of time for which smoking had been stopped increased. From this study looking at the data Doll and Hill could not see much difference between the rates of lung cancer in large towns and more rural areas, suggesting that it was unlikely that pollution from the atmosphere was a significant cause of lung cancer.

A follow up report was published two years in 1956 to consolidate the findings as thirty six deaths was a rather small number to give a “firm conclusion”. By 1956 over 200 deaths had occurred as a result of lung cancer and lung cancer did not affect anyone under the age of 35, suggesting it is a cancer that takes a long time to develop. The findings of Doll and Hill could simply no longer be ignored.

Cause of Death	No. of Deaths	Death Rate Among:					
		All Men	Non-smokers	All Smokers	Men Smoking a Daily Average of		
					1-14 g.	15-24 g.	25 g. or More
Lung cancer ..	84†	0.81	0.07	0.90	0.47	0.86	1.66
Other cancer ..	220	2.02	2.04	2.02	2.01	1.56	2.63
Other respiratory diseases ..	126	1.10	0.81	1.13	1.00	1.11	1.41
Coronary thrombosis ..	508	4.78	4.22	4.87	4.64	4.60	5.99
Other causes ..	779	6.79	6.11	6.89	6.82	6.38	7.19
All causes ..	1,714	15.48	13.25	15.78	14.92	14.49	18.84

* That is, at November 1, 1951, for those smoking at that time and at the date of giving up for those who had given up at November 1, 1951.
 † The three cases in which lung cancer was recorded as a contributory but not a direct cause of death are included under both lung cancer and the cause to which death was assigned by the Registrar-General.

By 1957 the idea that smoking was harmful and caused lung cancer was being accepted more and Health Minister at the time Iain Macloed announced that the link between smoking and lung cancer had been established. After this the government slowly began to make efforts to reduce smoking, although there was still fierce arguments between the tobacco industry and health campaigners. By the 1970s there started to be health warnings on smoking packets and more recently the dangers of passive smoking have also been highlighted with the introduction of a ban on smoking in public places. However as expected there are still a significant number of people in society who smoke and it can be argued that there always will be.

Doll managed to revolutionise epidemiology with his study of the link between lung cancer and smoking, paving the way for many more important medical advancements. Lung cancer is not like other cancers in which you have a chance of being cancer free and the life expectancy you have is dramatically shortened, with only 1 in 10 people living past five years. It is also very difficult to detect early as there can be no symptoms for a long period of time. From doing work experience in a respiratory ward and clinic I saw first hand how grave the diagnosis of lung cancer, which can be easily prevented, is. I believe it can be argued therefore that the proof of the link between smoking and lung cancer is the most important advancement of the last 100 years because primarily for the millions of lives it has saved across the world and continues to save.

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