Pantridge, Frank (James Francis)

by Linde Lunney

Pantridge, Frank (James Francis) (1916–2004), pioneering cardiologist, was born 3 October 1916 in Sion Hill, a farm on the southern outskirts of Hillsborough, Co. Down, son of Robert James Pantridge (d. 1927), and his wife Elizabeth (née McCandless). Frank had at least a sister and a younger brother; the family was Church of Ireland. Frank attended Downshire primary school locally, then Friends School in Lisburn, and went on to Queen's University Belfast in 1934, to study medicine.

He graduated with honours in 1939, and on the day after war was declared, he volunteered with four friends to become members of the Royal Army Medical Corps. He was sent to a military hospital in Malaya, became medical officer of an infantry battalion, and was awarded the MC for his bravery in providing services to the wounded on the battlefield during the fall of Singapore in February 1942. He was captured by the Japanese and was incarcerated in Changi camp and later in the slave labour camps building the infamous Burma railway. Despite suffering near#starvation, kidney problems and cardiac beriberi (which in most cases would have proved fatal), Pantridge continued to challenge camp authorities and to provide what medical help he could. He was liberated in 1945, one of a very few who survived, but was physically at a very low ebb; he suffered from ill health for the rest of his life. His experience of the military defeat, which he felt had been caused by incredible incompetence and over#confidence at headquarters, and of the vicious ill#treatment by Japanese guards in the camps, deepened his pre#existing dislike of authority and politicians. He never exhibited much patience with stupidity in any form (especially in his students), and was not markedly more amenable in interactions with colleagues and administrators.

On his return to civilian life, he graduated MD in 1946, worked as a parttime lecturer in pathology in QUB, and then researched beriberi; he experimented on pigs in the university laboratory, in defiance of regulations. He worked with the leading American electrocardiologist while on a scholarship at the University of Michigan (1948–9). In 1951, he returned to the Royal Victoria Hospital (RVH), Belfast, as consultant physician, and began to specialise in cardiology. He introduced his surgical colleagues to the possibilities of the techniques to repair defective or diseased heart valves that were being developed in the USA, and in 1953 and 1957 he published detailed evaluations of the new procedures, acknowledging their role in improving life for patients with chronic heart conditions. At the outset, Pantridge had no interest in coronary artery disease; even as late as the 1950s, older members of the medical establishment took little account of acute myocardial infarctions (heart attacks). The new electrocardiograms confirmed the finding that 90 per cent of heart attack deaths were caused by ventricular fibrillation (serious

disturbance of the heart rhythm), and hospital cardiology departments began to be equipped with defibrillators which delivered an electrical shock to the heart muscle, to restore its normal functioning. In 1963, a pioneering four#bed coronary unit opened in the RVH. Alongside the use of the defibrillator, Pantridge introduced from the US techniques now familiar as CPR: cardiopulmonary resuscitation. The use of these new procedures to stabilise and revive hospitalised patients reduced patient mortality after heart attacks and caused considerable international interest. True to form, however, Pantridge was not at all satisfied with results. His colleague Professor Graham Bull (1918–87) was keen to extend the use of CPR and defibrillation outside the hospital and, despite initial opposition, Pantridge came to realise the implications of the epidemiological data which showed that two#thirds of deaths occurred within two hours of a heart attack, and of course he recognised that attacks did not generally occur in coronary units in hospitals.

To Pantridge it was obvious: defibrillators would save lives, but only if they could be used to treat the heart attack victim almost instantly, wherever the attack had occurred. Existing equipment was expensive, bulky and limited by the necessity of connecting it to mains electricity. With two colleagues, a senior houseman, John S. Geddes, and Alfred Mawhinney, a technician, Pantridge developed a prototype small defibrillator which was powered by two car batteries and required a DC–AC adapter. In the winter of 1965–6, they fitted the device into an old ambulance to produce the first mobile defibrillator, which was in operation from 1 January 1966. It was portable, but only just, at over 70kg (a brawny medical student was one of the original response team, delegated to carry the machine), and Pantridge saw the necessity of reducing the size and weight. By 1968, he had with Professor John Anderson designed a defibrillator that weighed only 3kg, using a miniature capacitor designed for the American space agency, NASA. In the process he challenged the developing assumption that stronger electrical shocks would more easily correct the fibrillation; manufacturers wanted to make bigger, more powerful and more expensive devices. Pantridge's team provided irrefutable data on the suitability of low energy devices, and on the potential damage to the heart caused by higher energy interventions, but it was Pantridge's personal presentation at a manufacturers' meeting in the US that proved crucial. They were left in no doubt as to what he thought of their plans.

With the support of Pantridge's data, campaigners began to recommend that defibrillators should be widely available in the community, and suggested that lay people should be able to use them in emergency. Pantridge saw the importance of ensuring that over#enthusiastic amateurs did not administer defibrillation unnecessarily, and in 1976 adapted an existing implantable device to produce an automatic defibrillator; automatic in the sense that defibrillation would only be delivered if the device detected the lethal arrhythmia of the heart muscle. Alongside his work on electrical and electronic equipment, Pantridge in 1970 made the vitally important suggestion that it should be possible to limit infarct (damage to the heart muscle), and, with the team he trained in Belfast, pioneered other equally significant medical and pharmaceutical treatments, designed like the defibrillation to

be administered if possible 'pre#hospital', by ambulance teams. Exhaustive research confirmed that the earliest application of the appropriate treatment of abnormalities of heart rate and blood pressure and of the autonomic nervous system was indeed beneficial. Pantridge and his team published scores of papers in medical journals and in 1975 with three colleagues he wrote *The acute coronary attack*.

He was professor of cardiology in QUB (honorary professor from 1982) and terrified scores of future physicians; none of them was likely to forget him, as much because of his wit, forceful personality and uniquely demanding ward rounds as on account of his medical knowledge and skill. His autobiography records fascinating anecdotes concerning his military career, acquaintances and events in his later life; his housekeeper apparently foiled an attempt by the IRA to kidnap him in 1975.

'The Pantridge plan' was particularly well known in the US and Canada, as well as in South American countries. There was considerable media interest in CPR, and instances of the use of the defibrillator were chronicled in lay publications as well as in the medical papers, especially in 1972 when former US president Lyndon B. Johnson suffered a heart attack at his daughter's home and was defibrillated by his doctor. As a direct result of Pantridge's work and of his status in the medical community, the healthcare industry in the US was revolutionised by the introduction of the mobile coronary care unit in the years after 1965. One authority noted that in 1967 'one could not stand erect in a North American ambulance. Hearses, limousines and station wagons transported the ill and injured#Frank was unequivocally the father of emergency medicine in North America' (Crampton). It is also claimed that the role of paramedics, latterly so important in the US system, would not have developed as it did without the existence of the cardiac ambulance. Pantridge originally insisted that junior doctors on rotas should go out with ambulances, but in America firemen and other lay professionals were given medical training. Defibrillators were widely available in many locations in the community in the UK and Ireland and other countries from the 1990s onwards and are known to have saved many lives.

The RVH success in significantly lowering coronary mortality in Belfast, and the growing international acclaim, had initially almost no effect on policy in Great Britain. Astonishingly, Pantridge's recommendations in a classic article in the *Lancet* in 1967 were for years afterwards ignored or attacked by the medical establishment and by health service administrators; not until 1990 were all ambulances in the United Kingdom furnished with defibrillators and staff trained to use them, and as a result thousands may have died unnecessarily early. (By contrast, paramedic#staffed mobile coronary care started in Dublin in 1967.) In parallel with this lack of interest and even opposition to the Pantridge plan, the UK medical establishment was slow to honour Pantridge personally. In 1978, he was appointed CBE, but he was never offered a knighthood; he was made a fellow of the Royal College of Physicians in 1962, but did not receive the honorary degree of D.Med.Sc. from QUB until 2001. The University of Ulster awarded him an honorary D.Sc. in 1981, and

he was elected an honorary fellow of the Royal College of Physicians of Ireland in 1970. His privately published autobiography, *An unquiet life* (1989), had four editions; Pantridge was very well known in Northern Ireland, and his Ulster readers particularly appreciated the acerbity of his comments on contemporaries and events.

Pantridge did not marry, and he became somewhat reclusive in old age. His heart had been damaged by beriberi, and as a younger man he had been unconcerned about cardiovascular risk factors. As a result, he himself had to undergo a quadruple heart bypass operation, but later took ironic pleasure in outliving his surgeon. He died 24 December 2004. A street in west Belfast was named in his honour. Lisburn city council and the Pantridge Trust commissioned a statue placed outside Lisburn Civic Centre in 2006; it represented him beside his defibrillator. Local fundraising provided funds to place a portrait of Frank Pantridge in the Great Hall of QUB, with the surplus moneys going to cardiovascular research. The portrait's unveiling ceremony was part of an international symposium in his honour, in May 2009, with proceedings published in a 2010 supplement to the *Ulster Medical Journal*.

J. F. Pantridge, *An unquiet life: memoirs of a physician and cardiologist* (1989); Mary G. McGeown, 'The thirtieth anniversary of pre#hospital coronary care in Belfast', *Ulster Medical Journal*, lxv, no. 1 (May 1996), 3–4; *Ir. Times*, 8 Jan. 2005; Bill Duff, 'Frank Pantridge', *Guardian*, 6 Jan. 2005; Alun Evans, 'Frank Pantridge', *British Medical Journal*, cccxxx (April 2005); *Ulster Star*, 26 Jan. 2006; *WWW*; Alun Evans, 'Frank Pantridge, the father of emergency medicine', *Queen's Donor Newsletter* (2009), 6; Philip Jevon and Jawad M. Khan, *ECGs for nurses* (2009), 12; Richard S. Crampton, 'Frank's legacy from a north American perspective', and Desmond Julian, 'Frank's legacy from a European perspective', *Ulster Medical Journal*, lxxix, suppl. 1 (2010), 4–6; Munk's Roll, vol. xii, http://munksroll.rcplondon.ac.uk; 'St Malachy's church, Hillsborough' (photograph of grave) (http://photobucket.com); 'Roll of honorary fellows 1798–2008', Royal College of Physicians of Ireland; websites accessed June 2010