Sydney Ringer: physician, physiologist and pharmacologist

This year marks the centenary of the death of Sydney Ringer, whose name crops up daily in clinical hospital practice. I have often asked my new entries of anatomy demonstrators at Guy's: 'have you seen Ringer's solution used?', to which most of them reply in the affirmative. I follow this up by asking if any of them know its composition and I am usually met with a profound silence. In fact, using modern units, it contains Na 148, K 4, Ca 2 and Cl 156 mmol/litre. Today, Ringer's lactate is often used, which is made up of Na 130, K 4, Ca 2, Cl 109 and lactate 28 mmol/litre. This is very similar in composition to the more commonly used Hartmann's solution. Finally, I ask if anyone can tell me who Ringer is or was, and this, to date, I have invariably found to be a strictly no-go area.

Sydney Ringer was born in Norwich in 1835. His father, a non-conformist, was a successful tradesman, and Sydney's two brothers both became wealthy as merchants in the Far East. Ringer served a brief apprenticeship to a local medical practitioner, then went to University College, London, in 1854 and qualified MB in 1860. He was bright and hard-working; 3 years after qualifying, he obtained both his Doctorate of Medicine and Membership of the Royal College of Physicians and was appointed assistant physician at University College Hospital, and here he spent the whole of his subsequent career. He also served as assistant physician at the University College Children's Hospital and at the nearby Great Ormond Street Children's Hospital for a number of years.

Successively he was appointed professor of materia medica, pharmacology and therapeutics, professor of principles and practice of medicine and finally, in 1887, Holmes professor of clinical medicine, a post he retained until 1900, the year of his retirement. In 1885 he was elected a Fellow of the Royal Society, not a common honour for a clinician. Ringer did not excel as a formal lecturer but was an excellent and popular teacher at the bedside on teaching rounds, being able to develop a lucid and systematic analysis of a clinical problem as this was presented to him. He was noted for his kindness (which was often anonymous), and for his punctuality, but he was shy and retiring.

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His 'Handbook of Therapeutics', which was published in 1869, gave a concise and practical guide to the action of drugs with indications for their use. It became a popular classic and went through 13 editions in Ringer's lifetime.

Ringer was a prodigious worker. His rounds at University College Hospital would be followed by work in his physiology laboratory, which he established and maintained, with a laboratory assistant, across the road at University College, before going off to see patients in his consulting rooms. This, in turn, would often be followed by a further visit to his laboratory. It is recorded that, late one evening, finding the entrance to the College locked, Ringer climbed the railings to get in and complete his work – not common behaviour for a professor in Victorian London!

Ringer's physiology studies were inspired by William Sharpey, who had the chair of Anatomy and Physiology at University College, and by Michael Foster. These were the early days of 'modern' physiology and the standard research tools that we take for granted were just being developed. For example, Ringer was greatly aided by that pioneer physiologist Karl Ludwig (1816–95), successively Professor of Physiology at Marburg, Zurich, Vienna and Leipzig, who introduced the rotating drum recording technique and perfusion of isolated organs in the 1860s, methodologies that were essential for many of Ringer's investigations. These included studies of the clotting of blood, muscle contraction and conduction of impulses in peripheral nerves.

Ringer used the isolated perfused frog's heart preparation for much of his work. First 0.75% saline was used, then other substances were introduced into the perfusate, including blood and albumin. His observation that calcium is necessary to maintain normal heart beat is said to result from his laboratory technician, on one occasion, using tap water instead of distilled water in making up the perfusate. The surprisingly good cardiac action was found, on careful analysis, to be caused by the fact that London tap water in those days contained about as much calcium as blood did!

Ringer's observations, that calcium is important in maintaining cardiac contraction, together with studies of the effects of other ions on the heart, and his description of the solution that bears his name, which best sustains living tissues removed from the circulation, were published in a long series of papers in the *Journal of Physiology* from 1875 to 1895. Ringer was predeceased by his wife, who died in 1897, and by one of his two daughters. He died in 1910, 100 years ago, following a stroke, and was buried alongside his wife and daughter. So now, there is no excuse for not knowing the origin of Ringer's solution and its composition. BJHM

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