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OBITUARY

Obituary: in memory of the scientific career of Professor Roger C Harris

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Professor Roger Harris (right) with his long-time friend and mentor Professor Eric Hultman at the 2010 Creatine in Health, Medicine and Sport Conference in Cambridge, UK (picture courtesy of Professor Ron Maughan).

The academic community mourns the loss of Professor Roger Charles Harris, who passed away suddenly on 1st December 2024, at the age of 80 years. Professor Harris' novel and scientifically impactful research has left far reaching impacts in the fields of muscle metabolism and sports nutrition, including ground-breaking method development contributions in the mid-1970s. Athletes worldwide, both recreational and professional, use nutritional supplements such as creatine and beta-alanine, the foundations, of which, are based upon Roger's pioneering research.

Roger was born and grew up in Coventry, a city in central England, in 1944, before moving to Aberystwyth to study for his BSc, MSc, and PhD in Biochemistry at the University of Wales. North Wales was a place that Roger continued to enjoy visiting long after his studies were completed. In 1968, Roger joined Professors Eric Hultman and Jonas Bergstrom at St Eriks Hospital in Stockholm, Sweden, having read their pioneering human volunteer research centred upon the development and application of the muscle biopsy technique in muscle glycogen and high energy phosphate metabolism during exercise and recovery (Bergström and Hultman 1966; Bergström et al. 1967; Hultman et al. 1967). Here Roger became a key part of the world-leading Clinical Chemistry Research Group that later moved to the Karolinska Institute at Huddinge Hospital, and where he developed a deep appreciation and understanding of muscle and exercise biochemistry. This was instrumental to his subsequent ground-breaking scientific contributions, and where he started his 43-year collaboration with his friend and mentor, Eric Hultman. Importantly, this early work involved the development and introduction of methodologies that would be game changing in muscle metabolic research, and which have had an impact far beyond exercise metabolism (Harris et al. 1974).

From the mid-1970s onwards, Roger and colleagues published research focussed upon muscle energy metabolism in the context of human muscle fatigue and recovery, and over the subsequent 20 years accumulated substantial evidence (alongside friends and colleagues), that led to the recognition that muscle fatigue development during short-term, high-intensity exercise in humans was, at least

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in part, associated with the inability of skeletal muscle to maintain a high rate of anaerobic ATP production from phosphorylcreatine breakdown, particularly in fast-twitch muscle fibres. This body of evidence catalysed further research, culminating in the early 1990's with the publication of a seminal paper (Harris et al. 1992) demonstrating the elevation of muscle creatine content following dietary creatine monohydrate supplementation in human volunteers, which was subsequently shown to enhance high intensity exercise performance (Greenhaff et al. 1993). The rest, as they say, is history, as this body of work, which emanated directly from fundamental metabolic research, kick-started abundant further research and commercial activity centred upon creatine monohydrate supplementation in the context of exercise performance.

Whilst maintaining research collaborations with colleagues at the Karolinska Institute, Roger moved to the Animal Health Trust in Newmarket, UK in 1983, to lead the muscle biochemistry section of a recently established research team, headed by Dr. David Snow, to investigate the effects of varying intensities of exercise and training in horses. With the assistance of PhD students and colleagues, several papers were produced, including a pivotal paper on ATP depletion and IMP production at a threshold level of exercise intensity (Harris et al. 1991). Studies also involved other athletic animals, the greyhound and racing camel. During his time at the Animal Health Trust and continuing to collaborate with his Swedish colleagues, Roger started to consider the role of histidine and carnosine in skeletal muscle (Harris et al. 1990; Sewell et al. 1992; Dunnett and Harris 1997), in addition to continuing studies relating to creatine supplementation. This body of research stimulated studies to increase the pH buffering capacity of skeletal muscle by administering histidine itself and then histidine containing dipeptides to horses. In his later years at the Animal Health Trust, Roger became involved in a series of studies that aimed to improve the welfare of horses competing under adverse environmental conditions, primarily to help in alleviating concerns for the 1996 Olympic Games in Atlanta (Marlin et al. 1996). As a byline to Roger's time at the Animal Health Trust, it was amusing to see Roger's interaction (a type of fear) as he moved from working with bipeds to a large quadruped.

Following on from the work at the Animal Health Trust, in the early to mid-2000's, whilst working with PhD students and colleagues at the University of Chichester (UK), Roger was instrumental in developing and conducting studies, largely supported by Dr John Wise and funded by Natural Alternatives International (NAI), to show that beta-alanine supplementation could increase skeletal muscle carnosine content in humans (Harris et al. 2006). Subsequently, studies showed positive benefits of beta-alanine supplementation for high-intensity exercise performance and capacity and has, in turn, spawned additional investigative efforts in examining beta-alanine's potential role as an effective dietary supplement for soldiers, older adults and various clinical population groups [for a review see Artioli et al. 2019]. The scientific impact of these investigations stimulated several international scientific conferences, allowing the fast-growing number of investigators studying beta-alanine metabolism to gather and share their scientific experiences. Roger's efforts with NAI were the cornerstone of developing industry sponsored events to promote science dissemination and impact.

Roger had a unique ability to captivate students, early-career researchers, and senior research scientists through his outstanding knowledge and orating skills. It was easy to "talk shop" with Roger and to learn by having a simple conversation that evolved into a teaching or research moment as it continued. Roger will also be remembered for his gentle nature, sense of humour and dry wit, his love of Scandinavia, and spending time on his boat.

The scientific community has lost a giant of muscle metabolism and many of us have lost an inspirational colleague, mentor and friend.

Data availability There are no data associated with this article.

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