Celebrating the Professional Life of Professor Kevin D. Tipton (1961–2022)

Oliver C. Witard, Arny A. Ferrando, and Stuart M. Phillips

1Centre for Human & Applied Physiological Sciences, King’s College London, London, United Kingdom; 2Arkansas University, Little Rock, AR, USA; 3McMaster University, Hamilton, ON, Canada

This invited editorial celebrates the distinguished professional life of Professor Kevin D. Tipton, who sadly passed away on January 9, 2022. Professor Tipton made an outstanding contribution to the scientific field of sport nutrition and exercise metabolism over an exceptional 30-year career. He dedicated his academic career to understanding the response of muscle protein metabolism to exercise and nutrition. The impact of his work is far-reaching with application to athletes in terms of promoting training adaptation, recovery, and performance, alongside clinical implications for injury management and healthy aging. Notable scientific contributions included the first in vivo human study to demonstrate the role of orally ingested essential amino acids in stimulating muscle protein synthesis during acute post-exercise recovery. This finding laid the foundation for future studies to interrogate the response of muscle protein synthesis to the ingestion of different protein types. Professor Tipton’s work also included investigating the maximally effective dose and timing (regarding exercise) of ingested protein for the stimulation of muscle protein synthesis. Kevin will be remembered fondly by academics, applied scientists, and students across the sport nutrition and exercise metabolism community as a leading researcher in the field, a critical thinker, and an inspirational teacher. His mission was to educate the next generation of exercise scientists by sharing his distinct wealth of knowledge accrued over three decades. Above all else, Kevin was kind, generous (with his time and knowledge), honest, and incredibly social. He was a unique character and will be greatly missed among our community but certainly never forgotten.

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Professor Kevin Dale Tipton was born in Oklahoma City and raised in Lexington, Kentucky. His bachelor’s degree in Biological Sciences was earned at the University of Kentucky and included an elective module in Russian language. He proceeded to earn a master’s degree in Marine Biology at the University of South Florida. Here, Kevin worked as a U.S. observer on a Russian fishing boat. True to form, Kevin took an unorthodox route into exercise science.

Kevin earned his doctorate in Nutritional Sciences from Florida State University and Auburn University, Alabama. He was the proud recipient of the College Doctoral Scholarship awarded for academic excellence. Alongside being the joker of the pack, Kevin had a conscientious side and achieved top grades throughout his education. In true style, Kevin accepted the award at the College Dean’s annual faculty meeting (a pucka venue!) dressed in his finest attire—an open neck rugby shirt, rugby (short) shorts, and a substantial ponytail.

After Auburn, Kevin accepted a postdoctoral research fellow position at the University of Texas Medical Branch (UTMB) in Galveston, Texas. This role soon transitioned into a fully tenured faculty position. Under the guidance of Professor Robert Wolfe, Kevin developed into an outstanding and discerning scientist. He was never “married” to an idea, choosing to be informed by the data set that he or others had garnered. This mantra set him apart from many other scientists in the field. Kevin was always keen to respectfully critique the extent of one’s conclusions, again considering the data set presented, the methods used to generate that data set, and the context of the study. He was a strong advocate of critical appraisal. Kevin also was an outstanding team player at UTMB. Professor Wolfe identified his strengths at devising new research questions and communicating these ideas in writing. Hence, Kevin was banished from spending too much time in the laboratory. He built an international reputation in all aspects of tracer methodology and protein metabolism during his time in Galveston. Indeed, several of Kevin’s finest papers were produced during this period, as highlighted below (see “Oh Galveston” section). Hence, from Oklahoma to Kentucky (via Wisconsin), Kentucky to Florida, Florida to Alabama and then Texas, Kevin was “about as American as you could get.”

After 10 productive years in Galveston, in 2005, Kevin ventured over the Atlantic and accepted a Senior Lecturer position at the University of Birmingham, England. He joined forces with Professors Askar Jeukendrup and Anton Wagenmakers, providing the final piece (protein metabolism) in the “metabolism puzzle.” The trio (alongside Sarah Aldred, Andy Blannin, and Francois Xavier-Li) formed the Exercise Metabolism Research Group. Kevin continued to make significant contributions to the field of muscle protein metabolism (see “The University of Birmingham, England, 2005–2011” section) and mentored PhD students and postdoctoral research fellows in his unique style with energy, enthusiasm, and considerable wisdom. Another natural habitat for Kevin was the classroom, where he excelled in his teaching duties, inspiring the next generation of exercise scientists. Ahead of his time, Kevin was an innovative teacher and a strong advocate of the flipped classroom approach over a traditional didactic lecture style. He even garnered evidence to support his argument.

Kevin’s next stop was the University of Stirling in his soon-to-be beloved bonnie wee Scotland. In 2011, and long overdue, he accepted a Chair in Health and Exercise Sciences and finally
became a full professor. He was incredibly proud to follow in his father’s footsteps as Professor Tipton (Junior). A buoyant Professor Tipton immediately founded the Physiology, Exercise and Nutrition Research Group at Stirling. In doing so, he demonstrated leadership qualities that even he did not realize he had. Alongside Professor Stuart Galloway, Kevin set up a series of studies intending to characterize the biological fate of fish oil-derived omega-3 polyunsaturated fatty acids in humans, again with a focus on muscle protein metabolism (see “The University of Stirling, Scotland, 2011–2019” section).

A brief tenure at Durham University rounded off a distinguished 30-year academic career before Kevin spent 12 months (almost to the day) as Research Lead for the Institute of Performance Nutrition. Kevin was never one to take too much notice of metrics. Nevertheless, he amassed an impressive 102 scientific publications (according to Scopus), 31 of which have been cited >100 times and include a staggering 180 coauthors. To date, his work has been cited a remarkable 10,792 times (and counting) and his h index is 47—whatever that means! Kevin was an understated and humble (most of the time!) exercise scientist. However, the remainder of this editorial is dedicated to highlighting some of his outstanding scientific contributions to the field of protein metabolism, as presented in chronological order. Personal tributes to Professor Tipton’s outstanding career are presented at https://journals.humankinetics.com/page/Tribute-Kevin-Tipton to accompany this editorial.

“Oh Galveston”

Glen Campbell’s song may have put Galveston on the map for many, but for those interested in protein metabolism, Galveston was home to the UTMB, the Shriner’s Burns Hospital, and most importantly, to the laboratory of Dr. Robert (Bob) Wolfe. By Kevin’s admission, Galveston was where things started to “cook” scientifically. With the guidance and mentorship of Bob Wolfe and the support of Arny Ferrando, Kevin’s use of stable isotopes in investigating muscle metabolism began. Kevin was teamed with Stu Phillips and longtime friend and research assistant extraordinaire Dr. David (DJ) Doyle Jr. During this time, Kevin amassed >40 papers during a prolific 10-year period at UTMB. Studies were primarily aimed at discovering the regulation of muscle protein metabolism and include papers that can only be described as citation classics (Ferrando et al., 1998; Phillips et al., 1997, 1999; Tipton, Ferrando et al., 1999). By his own estimation, Kevin also conducted some work that he would lament was not read, or at least was not cited enough, including a 24-hr long infusion trial that showed, for the first time, that resistance exercise and essential amino acid ingestion over a 24-hr period resulted in a net protein balance that reflected the acute (3 hr) protein synthetic response (Tipton et al., 2003). That same paper featured a collaboration with longtime friend and colleague Dr. Elisabet Borrsheim, who now has a successful research program at the University of Arkansas for Medical Sciences in Little Rock.

Galveston also marked a milestone in any developing scientist’s career as he transitioned from lead- or co-author to a corresponding or senior author. For Kevin, this happened with the publication of another of his now-famous works—“Milk Ingestion Stimulates Net Muscle Protein Synthesis Following Resistance Exercise” (Elliott et al., 2006). The results from that paper still intrigue many today as to the mechanism underlying milk’s anabolic properties. While that publication may have been the first, it was most certainly not the last of Kevin’s senior author papers. In Galveston, Kevin gained more than knowledge, experience, and mentorship; he gained lifelong friends and colleagues who continued to work with him for the rest of his life. Those whose lives he touched in Galveston will remember Kevin as much more than a scientist.

The University of Birmingham, England (2005–2011)

The transition from Galveston to Birmingham in terms of research outputs was far from seamless for Kevin. However, with considerable determination and stubbornness (he had plenty), he continued to contribute new knowledge to the field of muscle protein metabolism utilizing stable isotopic tracer methodology. GlaxoSmithKline funded a trio of laboratory controlled acute metabolic studies in trained young men (Breen et al., 2011; Witard et al., 2014). Study 1 characterized the dose–response of muscle protein synthesis (MPS) to ingested whey protein at rest and following exercise in resistance-trained men (Witard et al., 2014). Consistent with a previous study that administered egg protein (Moore et al., 2009), a plateau in the MPS response was reached at 20 g of ingested whey protein. The additional amino acids provided by the 40 g dose were primarily oxidized or excreted. Collectively, these data formed the consensus recommendation that 20 g of high-quality protein in any given serving was sufficient for the maximal stimulation of MPS (Moore et al., 2009; Witard et al., 2014). Always open-minded and curious, Professor Tipton revisited this question 2 years later (Macnaughton et al., 2016).

Due to recent advances in tracer methodology, it was now possible to measure high-resolution, fraction-specific rates of muscle protein synthesis, differentiating between myofibrillar and mitochondrial muscle proteins (Wilkinson et al., 2008). Throughout his career, Professor Tipton strived to remain at the cutting edge of tracer methodology. Accordingly, Study 2 investigated the influence of coingesting protein with carbohydrate following endurance exercise on the stimulation of muscle myofibrillar and mitochondrial protein synthesis rates (Breen et al., 2011). Data generated from this study refuted his hypothesis and demonstrated that protein–carbohydrate co ingestion stimulated an increased response of muscle myofibrillar, but not mitochondrial, protein synthesis rates following prolonged cycling. Professor Tipton was quick to acknowledge that the slower turnover rate of muscle mitochondrial (vs. myofibrillar) proteins, coupled with the relatively short 4-hr measurement period, likely contributed to this surprising observation.

In 1999, Tipton and colleagues demonstrated that orally ingested essential amino acids, rather than nonessential amino acids, were stimulatory for muscle protein synthesis following exercise (Tipton et al., 1999). In contrast, nonessential amino acids were not necessary to stimulate in vivo rates of muscle protein synthesis (Tipton, Gurkin et al., 1999). At this time, the assumption was that ingestion of branched-chain amino acids alone would stimulate muscle protein synthesis during exercise recovery. However, much to the annoyance of Kevin, this claim was not substantiated with scientific data. Professor Tipton would caution that while branched-chain amino acids, particularly leucine, provide the signal to switch on the muscle protein synthetic machinery (Anthony et al., 2000), a full complement of all essential amino acids would be necessary to stimulate an increased response of muscle protein synthesis. In 2017, the Tipton laboratory demonstrated, for the first time, that branched-chain amino acid ingestion alone stimulates muscle protein synthesis rates following resistance
exercise in humans (Jackman et al., 2017). However, the magnitude of this response was less than the response reported to a dose of intact (whey) protein containing similar amounts of branched-chain amino acids (Churchward-Venne et al., 2014; Witard et al., 2014). Taken together, these results demonstrate that branched-chain amino acids exhibit the capacity to stimulate muscle protein synthesis; however, a full complement of essential amino acids is necessary to stimulate a maximal response of muscle protein synthesis following resistance exercise.

The University of Stirling, Scotland (2011–2019)

How much protein should larger athletes ingest after exercise for the maximal stimulation of muscle protein synthesis? This question was the practical question that Professor Tipton was asked more often than not at the numerous national/international conferences that he graced. Of course, this question referred back to the previous studies demonstrating a 20 g dose of protein to maximally stimulate muscle protein synthesis after exercise, at least in the cohort of 75–80 kg body mass resistance-trained young men that were studied (Moore et al., 2009; Witard et al., 2014). Again funded by GlaxoSmithKline, Professor Tipton designed an experimental study to answer this question (Macnaughton et al., 2016). Two groups of resistance-trained young men were recruited. On average, Group A possessed 59 kg of lean body mass as measured by dual-energy X-ray absorptiometry, whereas Group B possessed 77 kg of lean body mass. Both groups received either a 20 or 40 g whey protein bolus immediately following a single bout of resistance exercise. Unlike previous studies that utilized leg-only resistance exercise, this study employed whole-body resistance exercise with latissimus dorsi pulldown, shoulder press and biceps curl exercises added to leg press and leg extension. The working hypothesis was that muscle protein synthesis rates would be greater in the “higher lean body mass” group than the “lower lean body mass” group when 40 g of whey protein was ingested. Lo and behold, no differences in MPS were observed between groups suggesting that amount of muscle mass possessed by the individual does not impact the maximal effective protein dose for stimulation of muscle protein synthesis. However, once these data were collapsed irrespective of group, further statistical analysis revealed a greater response of muscle protein synthesis with the ingestion of 40 versus 20 g of whey protein. Hence, when combined with previous work that utilized leg-only resistance exercise (Moore et al., 2009; Witard et al., 2014), these data suggest that the volume of muscle activated during exercise (whole body vs. split routine) may impact the maximal effective protein dose for stimulation of muscle protein synthesis. Hence, optimizing the protein for maximal stimulation of muscle protein synthesis may be considered more complex than originally thought.

The University of Stirling is home to the world-renowned Institute of Aquaculture. Always opportunistic, Professor Tipton embarked on a series of studies to understand the biological fate and metabolic action of fish oil-derived omega-3 polyunsaturated fatty acids. As a logical first step, the research group characterized the temporal changes in human skeletal muscle and blood lipid composition with fish oil supplementation (McGlory et al., 2014). This study revealed that more than 4 weeks of high-dose (5 g/day) fish oil supplementation was required to maximize omega-3 poly-unsaturated fatty acids incorporated into the skeletal muscle cell. The next step was to investigate the anabolic potential of fish oil supplementation in resistance-trained young men. Previous proof of principle studies had reported an increased stimulation of MPS under simulated fed (intravenous infusion of amino acids and insulin) conditions following 8 weeks of fish oil supplementation (Smith et al., 2011a, 2011b). Professor Tipton designed a more physiologically relevant study that combined resistance exercise with the ingestion of 30 g of whey protein (McGlory et al., 2016). Under these conditions, fish oil supplementation failed to augment the response of muscle protein synthesis in resistance-trained young men. Hence, these data suggested that fish oil supplementation does not confer an anabolic advantage under resistance exercise and protein feeding conditions.

Closing Remarks (A.A. Ferrando, S.M. Phillips, and O.C. Witard)

While this review highlights Professor Tipton’s scientific contributions, those who knew him best will tell you that among his greatest gifts were his generosity, humor, and his friendship. He was the type of friend that always had your back, of whom you could ask almost anything, and who was always there when needed. He was extremely generous, loyal, and honest. Above all, you could not spend more than 5 min with Tipper without laughing. In fact, despite all his admirable attributes, humor was among his best. No matter the topic, a wisecrack or joke soon surfaced. Often, his humor would be self-deprecating, as he never took himself too seriously. At times, it could be cerebral for some. However, above all, it was ALWAYS there for you to enjoy. That ever-present laugh and humor will be badly missed. His friendship will be missed even more. Rest in peace, our dear friend.

References


