Paul Greenhaff is Professor of Muscle Metabolism at the University of Nottingham. He is also director of the MRC Versus Arthritis Centre for Musculoskeletal Ageing Research and deputy director of the Centre for Sport, Exercise and Osteoarthritis Research Versus Arthritis, and an active member of the Nottingham NIHR Biomedical Research Centre.

Paul's research interests are centred on the loss of muscle mass and function and the dysregulation of muscle metabolism in ageing, immobilisation, acute trauma and inflammation, and chronic disease. Additionally, strategies (including exercise, nutrition and pharmacological interventions) to offset these negative and pathophysiological events. Current research is focussed on the dovetailing of experimental medicine research approaches with MR imaging to give an integrated multi-organ perspective of human metabolic and physiological adaptation to physical activity and inactivity interventions.

Present Appointment:
Professor of Muscle Metabolism, School Life, University Nottingham.

Previous Appointments:
1987 - 1988 Post-Doctoral Research Fellow, Dept. Environmental and Occupational Medicine, University of Aberdeen.
1988 - 1989 Post-Doctoral Research Fellow, Dept. Comparative Physiology, Animal Health Research Trust, Newmarket.
1989 - 1990 Post-Doctoral Research Fellow, Dept. Clinical Chemistry, Karolinska Institute, Sweden.
1990 - 1991 Lecturer, School of Sport & Exercise Sciences, University of Birmingham.
Visiting Research Fellow, Dept. Clinical Chemistry, Karolinska Institute, Sweden.
1991 - 1996 Lecturer, Dept. Physiology and Pharmacology, University of Nottingham.
1997 – 2000 Reader in Muscle Metabolism, School of Biomedical Sciences, University of Nottingham

Qualifications:
1984 BSc Physiology/Human Performance (1st class Joint Hons, University of Salford).
1987 PhD Medical Science (University of Aberdeen).
2018 Honorary Doctorate in Medicine (University of Copenhagen).

Post-graduate Research Supervision:
Successful supervision of 40 PhD students (1991 – Present). All submitted on-time (apart from 1). Currently Principal or Co-Supervisor for 7 PhD students.

Original Peer Reviewed Publications:
Published >195 peer-reviewed original publications to date (H-index = 88, total citations 28,613), and numerous review articles and book chapters. Relevant original (non-review) publications in last 5 years:

Constantin-Teodosiu D, Cederblad G, Bergström M, **Greenhaff PL**. Maximal-intensity exercise does not fully restore muscle pyruvate dehydrogenase complex activation after 3 days of high-fat dietary intake. Clin Nutr. 2019 Apr;38(2):948-953.

Latimer LE, Constantin D, Greening NJ, Calvert L, Menon MK, Steiner MC, **Greenhaff PL**. Impact of transcutaneous neuromuscular electrical stimulation or resistance exercise on skeletal muscle mRNA expression in COPD. Int J Chron Obstruct Pulmon Dis. 2019 28;14:1355-1364.

Gharahdaghi N, Rudrappa S, Brook MS, Idris I, Crossland H, Hamrock C, Abdul Aziz MH, Kadi F, Tarum J, **Greenhaff PL**, Constantin-Teodosiu D, Cegielski J, Phillips BE, Wilkinson DJ, Szewczyk NJ, Smith K, Atherton PJ. Testosterone therapy induces molecular programming augmenting physiological adaptations to resistance exercise in older men. J Cachexia Sarcopenia Muscle. 2019 10(6):1276-1294.

Constantin-Teodosiu D, Constantin D, Pelsers MM, Verdijk LB, van Loon L, **Greenhaff PL**. Mitochondrial DNA copy number associates with insulin sensitivity and aerobic capacity, and differs between sedentary, overweight middle-aged males with and without type 2 diabetes. Int J Obes (Lond). 2019 44 (4), 929-936.

Atkins R, Constantin-Teodosiu D, Varadhan KK, Constantin D, Lobo DN, **Greenhaff PL**. Major elective abdominal surgery acutely impairs lower limb muscle pyruvate dehydrogenase complex activity and mitochondrial function. Clin Nutr 2020 Jul 14;S0261-5614(20)30353-8. doi: 10.1016/j.clnu.2020.07.006.

Mallinson JE, Taylor T, Constantin-Teodosiu D, Billeter-Clark R, Constantin D, Franchi MV, Narici MV, Auer D, **Greenhaff PL**. Longitudinal hypertrophic and transcriptional responses to high-load eccentric-concentric vs concentric training in males. Scand J Med Sci Sports. 2020 Aug 6. doi: 10.1111/sms.13791.

Ward TJC, Lindley MR, Ferguson RA, Constantin D, Singh SJ, Bolton CE, Evans RA, **Greenhaff P**L, Steiner MC. Submaximal eccentric cycling in people with COPD: acute whole-body cardiopulmonary and muscle metabolic responses. Chest. 2021 Feb;159(2):564-574.

Chee C, Shannon CE, Burns A, Selby AL, Wilkinson D, Smith K, **Greenhaff PL**, Stephens FB. Increasing skeletal muscle carnitine content in older individuals increases whole-body fat oxidation during moderate-intensity exercise. 2021 Jan Aging Cell. 2021 Jan 19:e13303. doi: 10.1111/acel.13303.

Burns AM, Nixon A, Mallinson J, Cordon SM, Stephens FB, **Greenhaff PL**. Immobilisation induces sizeable and sustained reductions in forearm glucose uptake in just 24 h but does not change lipid uptake in healthy men. J Physiol. 2021 Feb 17. doi: 10.1113/JP281021.

Latimer LE, Constantin-Teodosiu D, Popat B, Constantin D, Houchen-Wolloff L, Bolton CE, Steiner MC, **Greenhaff PL**. Whole-body & muscle responses to aerobic exercise training and withdrawal in ageing & COPD. Eur Respir J. 2021 Sep 29:2101507. doi: 10.1183/13993003.01507-2021.

Brook MS, Wilkinson DJ, Tarum J, Mitchell KW, Lund JL, Phillips BE, Szewczyk NJ, Kadi F, **Greenhaff PL**,

Smith K, Atherton PJ. Neither myonuclear accretion nor a myonuclear domain size ceiling is a feature of the attenuated hypertrophic potential of aged human skeletal muscle. Geroscience. 2022 Sep 9. doi: 10.1007/s11357-022-00651-y.

Shur NF, Simpson EJ, Crossland H, Chivaka PK, Constantin D, Cordon SM, Constantin-Teodosiu D, Stephens FB, Lobo DN, Szewczyk N, Narici M, Prats C, Macdonald IA, **Greenhaff PL**. Human adaptation to immobilization: Novel insights of impacts on glucose disposal and fuel utilization. J Cachexia Sarcopenia Muscle. 2022 Sep 4. doi: 10.1002/jcsm.13075.

Crossland H, Brook MS, Quinlan JI, Franchi MV, Phillips BE, Wilkinson DJ, Maganaris CN, **Greenhaff PL**, Szewczyk NJ, Smith K, Narici MV, Atherton PJ. Metabolic and molecular responses of human patellar tendon to concentric- and eccentric-type exercise in youth and older age. Geroscience. 2023 Feb;45(1):331-344. doi: 10.1007/s11357-022-00636-x.

Trim WV, Walhin JP, Koumanov F, Turner JE, Shur NF, Simpson EJ, Macdonald IA, **Greenhaff PL**, Thompson D. The impact of physical inactivity on glucose homeostasis when diet is adjusted to maintain energy balance in healthy, young males. Clin Nutr. 2023 Apr;42(4):532-540. doi: 10.1016/j.clnu.2023.02.006.

PHOSP-COVID Collaborative Group. Prevalence of physical frailty, including risk factors, up to 1 year after hospitalisation for COVID-19 in the UK: a multicentre, longitudinal cohort study. E Clinical Medicine. 2023 Mar 11;57:101896. doi: 10.1016/j.eclinm.2023.101896.

C-MORE/PHOSP-COVID Collaborative Group. Multiorgan MRI findings after hospitalisation with COVID-19 in the UK (C-MORE): a prospective, multicentre, observational cohort study. Lancet Respir Med. 2023 Sep 22:S2213-2600(23)00262-X. doi: 10.1016/S2213.

Mallinson JE, Wardle SL, O'Leary TJ, Greeves JP, Cegielski J, Bass J, Brook MS, Wilkinson DJ, Smith K, Atherton PJ, **Greenhaff PL**. Protein dose requirements to maximize skeletal muscle protein synthesis after repeated bouts of resistance exercise in young trained women. Scand J Med Sci Sports. 2023 Dec;33(12):2470-2481. doi: 10.1111/sms.14506.

Editorial Board Membership

Journal of Physiology Reviewing Editor (2001 – 2007; 2010 – 2013; 2016 - 2023)
Journal of Physiology Senior Editor (2023 – Present)
European J. of Applied Physiology (1995 – 2004)
Acta Physiologica (2005 – Present)
Section Editor Scan J Medicine & Science in Sports (2009 – 2023)

Research Funding:

Maintained continuous research funding for >30 years from government, charities and industry. Listed below are active grants and all other major grants active in the last five years, starting with the most recent).

Nottingham NIHR Biomedical Research Centre. **Greenhaff PL** (PA) CoIs Ollivere B, Atherton P, Francis S Smith K, Simpson EJ. Does administration of an anabolic agent speed up and increase the magnitude of muscle mass, metabolic and functional recovery in hip fracture patients. £258,520. 2023- 2027 10% time.

BBSRC. **Greenhaff PL** (PA), Atherton P, Francis S, Gowland P, Simpson EJ, Wilkinson D. Concurrent multi-organ responses to chronic physical activity and inactivity intervention to increase research discovery in human health and wellbeing. £1,711,437. 2023-2028. 10% time.

MRC. Bolton C, **Greenhaff PL** (Co-PI). The Post-hospitalisation COVID-19 study (PHOSP-COVID). Consortium – tier3 study. Muscle weakness in PHOSP-COVID patients. £65,771. 2021-2023.5% time

Defence Science and Technology Laboratory, **Greenhaff PL**. The impact of trauma and related inflammation on skeletal muscle fuel and protein metabolism. £290,414. 12/2019 – 11/2023. 5% time.

BBSRC. Szewczyk N (PA), **Greenhaff PL**, Constantin-Teodosiu D. Examining the impact of inactivity and diet on muscle health with age in C. elegans. £324,963**.** 11/2018- 10/2021. 5% time

Ministry of Defence. **Greenhaff PL** (PA), Atherton PJ, Wilkinson D. Evaluating protein dose requirements for women in ground close combat roles. £250,931. 04/2018-06/2021. 10% time.

Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis. Batt M (PA), **Greenhaff PL** (amongst 25 Co-Investigators). £1,998,627 renewal, 01/2018-04/2025. 5% time.

Crohn's and Colitis UK, Moran G (PA), Serres S, Francis S, **Greenhaff PL**. Non-invasive approaches to identify cause of fatigue in inflammatory bowel disease patients. £118,379. 08/2017-07/2021. 5% time.

MRC/Arthritis Research UK Centre for Musculoskeletal Ageing Research. Lord J (PA), **Greenhaff PL**. £2,000,000 renewal, 08/2017-06/2025. 10% time

NIHR Nottingham Biomedical Research Centre. £23.5 million of which £4 million is secured to a Musculoskeletal Disease theme (Gladman J (PA), Metabolism strand lead **Greenhaff PL**) 04/2017–10/2022. 10% time

Defence Science and Technology Laboratory, **Greenhaff PL** (PA), Constantin-Teodosiu D. The impact of trauma and related inflammation on skeletal muscle fuel and protein metabolism. £399,214, 01/2017 – 11/2019. 5% of time.

BBSRC, IA Macdonald (PA), **Greenhaff PL**, Narici M, Stephens F, Szewczyk N. Determination of the time-course of development of insulin resistance, and associated molecular and muscular adaptations, during prolonged bed-rest. £602,301, 01/2017 – 03/2019.