



Professor John Tarlton
B.Sc.(Bristol), Ph.D.(Bristol)

Professor of Regenerative Medicine

Area of research

Biochemistry and biomechanics of skeletal disease

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Summary

Biochemistry and biomechanics of skeletal disease

My overall research theme is in the physiology, pathology, regeneration and repair of musculoskeletal and connective tissues. This includes research in:

- Regenerative medicine, tissue engineering and stem cell biology
- Biomechanics
- Diet and health
- Bone and joint disease
- Mechanisms of discogenic back pain
- Tissue repair
- Collagen biochemistry
- Colitis
- Animal health and welfare

Research findings

Bone and joint disease: In a recent study we have found that omega-3 fatty acid substantially and significantly reduced the severity of osteoarthritis in a spontaneous disease model, as well as reducing biochemical and metabolic indicators of disease. This was the first (and remains the only) report of any drug or nutraceutical shown to prevent osteoarthritis by influencing the pathological process in spontaneous disease (as against merely affecting symptoms) . Properly followed up, these findings are likely to represent an intervention that could substantially lower the incidence and severity of new cases of human osteoarthritis.

Regenerative medicine: We have recently developed the first ever "stem cell bandage" shown to improve articular cartilage and meniscus repair in the laboratory. This is currently in phase1/2 human clinical trial.

Diet, animal welfare and health: More than three out of five of the EUs 200 million free range laying hens suffer keel bone breakage during their lives. We have recently shown that omega-3 fatty acid supplemented diets can reduce this rate by over 40%, which would potentially represent 80 million fewer hens in the EU suffering this painful condition, with clear welfare and economic benefits.

Mechanisms of pain in intervertebral discs: Back pain is a major health problem in the UK, affecting over two thirds of the population at some stage in their lives. In a recent published study, we have demonstrated how a combination of reduced pressure within the disc, and a change in the extracellular matrix composition is linked to the in-growth of nerves into degenerate discs, which is the cause of the most severe and chronic forms of backpain.

Tissue repair and wound healing: With around 6 million sufferers in the US and 500,000 in the UK, chronic wounds is one of the major health problems affecting the ageing population. One of the principle mechanisms of impaired healing in chronic wounds is the presence of excessive tissue degrading enzymes. In studies performed using surrogate wound fluids, we were able to demonstrate that technologically advanced superabsorbant gel based wound dressings were

able to deplete tissue degrading enzymes, and prevent their ability to degrade extracellular matrix components.

Colitis: Fibrosis is a serious consequence of Crohn's disease, which without surgical resection may be life threatening. In a recently published paper, we have revealed a previously unidentified mechanism which drives fibrosis in this disease.

Tissue repair and wound healing: It has long been believed that there is a strong relationship between disease susceptibility and state of mind. Diabetes effect nearly 300 million adults worldwide, and up to 15% of these will develop foot ulcers. In recent studies we have demonstrated that depression and the ability to cope are linked to the rate of healing in diabetic foot ulcers, revealing a novel disease mechanism and the potential for therapy.

Further information about Dr John Tarlton can be found [here](#).

Biography

Teaches

BVSc Veterinary Science

BSc Veterinary Nursing and Bioveterinary Sciences

John was awarded his PhD in 1998 for research identifying mechanisms of cancer spread. He has since worked in extracellular matrix biochemistry, in areas including bone and joint disease, wound healing, colitis, animal welfare and regenerative medicine. His research has attracted major research funding from BBSRC, DEFRA, Arthritis Research UK, NERC, and Action Medical Research, totalling over £6million over the last ten years. He is currently head of the Matrix Biology Research Group.

Activities / Findings

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Teaching

I lecture on topics of wound healing, stress, inflammation, bone, joint and ligament disease, stem cells, skin, cell adhesion and extracellular matrix remodelling, for the Units - Pathological Basis of Disease (VNBS), Basic Clinical Science (BVSc), Animal Behaviour and Welfare, and Pathological Responses of Cells (CMM). I organise the pathological Basis of Disease unit (VNBS) and the Research Training Element (BVSc).

Memberships

Organisations

[Veterinary Pathology and Infection and Immunity](#)

[Animal Welfare and Behaviour](#)

Research areas

- [Animal Welfare and Behaviour](#)
- [Infection and Immunity](#)

Research: Cross cutting research

- [Global Food Security](#)

Research: Infection and Immunity

- [Mucosal Immunology](#)
- [Inflammation, Injury and Repair](#)

Research: Animal Welfare and Behaviour

- [Risk Factors and Solutions](#)

Selected publications

- Stefanakis, E, Al-Abbasi, M, Harding, I, Pollintine, P, Dolan, P, Tarlton, J & Adams, M, 2012, '[Annulus fissures are mechanically and chemically conducive to the ingrowth of nerves and blood vessels](#)'. *Spine*, vol 37., pp. 1883-1891
- Bailey, JR, Bland, PW, Tarlton, JF, Peters, IR, Moorghen, M, Sylvester, PA, Probert, CSJ & Whiting, CV, 2012, '[IL-13 promotes collagen accumulation in Crohn's disease fibrosis by down-regulation of fibroblast MMP synthesis: a role for innate lymphoid cells?](#)'. *PLoS ONE*.
- Knott, L, Avery, N, Hollander, A & Tarlton, J, 2011, '[Regulation of osteoarthritis by omega-3 \(n-3\) polyunsaturated fatty acids in a naturally occurring model of disease](#)'. *Osteoarthritis and Cartilage*, vol 19., pp. 1150 - 1157
- Tarlton, J, Avery, N, Wilkins, L & Knott, L, 2011, '[Omega-3 \(n3\) fatty acid supplemented diets reduces bone breakage and increases bone strength in free range laying hens](#)'. *British Poultry Abstracts*, vol 7., pp. 72 - 73
- Zamli, Z, Cartwright, C, Cook, W, Torlot, G, Vassilevskaja, K, Kawamoto, T, Kawamoto, K, Brown, KR, Tarlton, J & Sharif, M, 2011, '[Longitudinal study of cartilage and subchondral bone changes in a spontaneous animal model of knee OA](#)'. *Osteoarthritis and Cartilage*, vol 19 (Suppl 1), pp. 159 - 166
- Tarlton, J & Knott, L, 2011, '[Omega-3 \(n-3\) Polyunsaturated Fatty Acids in Regulating Disease in a Spontaneous Model of](#)'. in: *International Cartilage Repair Society*.
- Pabbruwe, MB, Kafienah, W, Tarlton, JF, Mistry, S, Fox, DJ & Hollander, AP, 2010, '[Repair of meniscal cartilage white zone tears using a stem cell/collagen-scaffold implant](#)'. *Biomaterials*, vol 31., pp. 2583 - 2591

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Recent publications

- Buijs, S, Booth, F, Richards, G, McGaughey, L, Nicol, CJ, Edgar, J & Tarlton, JF, 2018, '[Behavioural and physiological responses of laying hens to automated monitoring equipment](#)'. *Applied Animal Behaviour Science*, vol 199., pp. 17-23
- Toscano, M, Booth, F, Richards, G, Brown, S, Karcher, D & Tarlton, J, 2018, '[Modeling collisions in laying hens as a tool to identify causative factors for keel bone fractures and means to reduce their occurrence and severity](#)'. *PLoS ONE*, vol 13.
- Earley, NF, Meakin, LB, Parsons, KJ, Tarlton, J & Hall, JL, 2017, '[Mechanical properties of 6 finger-trap suture techniques](#)'. *Veterinary Surgery*, vol 46., pp. 765-772

[View complete publications list](#) in the University of Bristol publications system

Courses

Professor Tarlton currently teaches 2 courses: