

Report of Sabbatical Leave Activity for Seth W. Donahue

Sabbatical Leave: 2007/08 academic year

Host Institutions: Trinity College Dublin (TCD) and the Royal College of Surgeons Ireland (RCSI)

Proposed activity: Develop collaborations on bone research

Accomplishments:

- 1) Received training on micro-computed tomography (uCT) analyses of bone at TCD. Performed uCT analyses on hundreds of rat bone samples that were treated with a novel drug, which was developed by my company (Aursos, Inc, www.aursos.com), which was incorporated during this sabbatical. These data were used for an NIH STTR application which was submitted during the sabbatical, subsequently funded, and recently completed; the Phase II application is pending. Several conference proceedings were presented on this work and the journal paper will be submitted in January 2010. I also brought an MTU PhD student to train on this system and obtain data, which resulted in the following publication:

M.E. McGee-Lawrence, S.J. Wojda, L.N. Barlow, T.D. Drummer, A.B. Castillo, O. Kennedy, J. Auger, H.L. Black, O.L. Nelson, C.T. Robbins, S.W. Donahue. Grizzly bears (*Ursus arctos horribilis*) and black bears (*Ursus americanus*) prevent trabecular bone loss during disuse (hibernation). *Bone*, 2009, 45:1186-91.

- 2) At RCSI I collaborated with several researchers on bone tissue engineering projects and organized video conferences between my research group at MTU and the group at RCSI. This collaborative work resulted in the following publication:

C. Jungreuthmayer, S.W. Donahue, M.J. Jaasma, A.A. Al-Munajjed, J. Zanghellini, D.J. Kelly, F.J. O'Brien. A comparative study of shear stresses in collagen-glycosaminoglycan and calcium phosphate scaffolds in bone tissue-engineering bioreactors. *Tissue Eng Part A*, 2009, 15(5):1141-9.

- 3) I attended and presented research at several European conferences:

S. W. Donahue, M. E. McGee, K. Simoni. Anabolic Activity of Black Bear PTH. International Bone & Mineral Society Davos Workshops: Bone Biology & Therapeutics, Davos, Switzerland.

C. Jungreuthmayer, N. A. Plunkett, M. J. Jaasma, S. W. Donahue, A. A. Al-Munajjed, D. J. Kelly, F. J. O'Brien. A comparative numerical 3D CFD study of two tissue engineering scaffolds subjected to fluid flow in a perfusion bioreactor. 16th Congress of the European Society of Biomechanics, Lucerne, Switzerland. Abstract published in Journal of Biomechanics 41(S1): S475.

S. W. Donahue, M. E. McGee, A. B. Castillo, A. Maki, L. Barlow, O. L. Nelson, C. T. Robbins. Hibernating grizzly bears prevent disuse osteoporosis. The 14th Annual Conference of the Section of Bioengineering, Royal Academy of Medicine in Ireland.

C. Jungreuthmayer, M.J. Jaasma, S.W. Donahue, A.A. Al-Munajjed, D.J. Kelly, F.J. O'Brien. A comparison of collagen-gag and calcium phosphate scaffolds subjected to fluid flow in a flow perfusion bioreactor - a 3d numerical fluids dynamics study. The 14th Annual Conference of the Section of Bioengineering, Royal Academy of Medicine in Ireland.