

Internship offer
M2 Musculo-Skeletal system, Locomotion, Exercise (MuSkLE)

Title of the Internship: Effect on bone of physical training and nutritional supplementation in microgravity analog model in rat.

Laboratory (name, n°, website): SAINBIOSE, U1059, <http://sainbiose-lab.fr/>

Research team (name, website): LBTO, Bone loss prevention group, http://sainbiose-lab.fr/research-2/lbto_team/

Supervisor to contact (name, email address): Marthe ROUSSEAU, marthe.rousseau@univ-st-etienne.fr

Project description including a short introduction, aim/objectives and methods/approach to be used

Many countermeasures to the musculoskeletal deconditioning happening in microgravity and partial gravity have been studied including physical exercise and nutritional supplementation.

Nacre, also called mother-of-pearl, is a natural raw material of marine origin. It is the inner part of the shell of marine molluscs (co-product of pearl farming). A process for the preparation of nacre powder has been developed and made it possible to obtain pure nacre powder in which the active principles are preserved. Nacre compounds may act on bone remodeling as reported in 2012 by Kim et al. in a mouse model of ovariectomy-induced osteoporosis (Kim et al., 2012). Nacre powder and water-soluble nacre extract limit the loss of bone mass when administered orally, slowing bone remodeling significantly higher than that of calcium carbonate thanks to the active ingredients it contains (Nguyen et al., 2022, 2023).

In this context, nacre powder has been associated with HMB and L-ergothionein as nutritional supplementation as a complement to physical exercise to limit musculoskeletal deconditioning caused by microgravity in a rat model.

Investigations during this internship will be focused on bone and will be done using microcomputed tomography (micro-CT), confocal microscopy and light sheet.

References:

[-The role of nacreous factors in preventing osteoporotic bone loss through both osteoblast activation and osteoclast inactivation.](#) Kim H, Lee K, Ko CY, Kim HS, Shin HI, Kim T, Lee SH, Jeong D. Biomaterials. 2012 Oct;33(30):7489-96. doi: 10.1016/j.biomaterials.2012.06.098. Epub 2012 Jul 16. PMID: 22809648

[-Protective Effect on Bone of Nacre Supplementation in Ovariectomized Rats.](#) Nguyen DK, Laroche N, Vanden-Bossche A, Linossier MT, Thomas M, Peyroche S, Normand M, Bertache-Djenadi Y, Thomas T, Marotte H, Vico L, Lafage-Proust MH, **Rousseau M.** JBMR Plus. 2022 Jul 15;6(9):e10655. doi: 10.1002/jbm4.10655. eCollection 2022 Sep. PMID: 36111203

[-Dietary supplementation with nacre reduces cortical bone loss in aged female mice.](#) Nguyen DK, Vanden-Bossche A, Laroche N, Thomas M, Linossier MT, Peyroche S, Farlay D, Follet H, Laquerrière P, Lafage-Proust MH, Thomas T, Vico L, Marotte H, **Rousseau M.** Exp Gerontol. 2023 Dec;184:112337. doi: 10.1016/j.exger.2023.112337. Epub 2023 Nov 29. PMID: 38006949

Skills required:

- Histology and bone biology is a plus
- General knowledge of quality management rules and methods
- Statistics
- Interpersonal skills, ability to work in a team, network, and communicate