Obesity is one of the most obvious manifestations of the global epidemic of sedentary lifestyles and excessive energy intake. Obesity can increase the risk of developing musculoskeletal pain and negatively affects hormones, and fertility potential. Very limited is known about the triangle of obesity, pain, and fertility and further investigations are crucial to offer better management strategies. This study aimed at finding the possible effect of separate and co-existing conditions of obesity and pain on male fertility potential while assessing the ability of the Lactobacillus rhamnosus PB01 probiotic supplementation as a novel strategy to reverse the negative effects of the mentioned complications. This PhD project comprised of both human and animal phases. The human phase was based on chronic pain patients and pain-free healthy matched controls, select-recruited to create two equal subgroups of normal weight (lean) and overweight. Sperm concentration, motility groups, kinematic parameters, DNA fragmentation index and morphology were assessed and compared by computer aided sperm analysis (CASA). Pressure pain thresholds (PPTs) were measured by a handheld pressure algometer in pre-defined points. The animal phase was performed on normal weight and diet-induced obesity (DIO) models of C57BL/6NTac male mice, which were randomly divided into two equal sub-groups receiving a single daily dose (1x10⁹ CFU) of L. rhamnosus (test group) or physiological saline (control group) and the same diet for 4 weeks. Sensitivity to mechanical stimulation was assessed by an electronic Von Frey device every two weeks. Serum total antioxidant capacity (TAC), reproductive hormones levels, and lipid profiles were assessed by enzyme linked immunosorbent assay (ELISA). Results of the human phase demonstrated that PPT values were generally lower in the overweight chronic pain patients group compared to the respective control groups; however, the deference remained insignificant. Lean men with chronic musculoskeletal pain demonstrated a significantly lower percentage of progressively motile sperm and insignificantly lower concentration, lower normal morphology, and higher DNA fragmentation levels. The overweight chronic pain group had a tendency towards a lower concentration and percentage of progressively motile sperm and significantly lower kinematic parameters (VCL, STR and WOB) compared to the overweight control groups. In the animal phase, the DIO group had a reduced serum TAC, while probiotic supplementation was found to increase TAC in both DIO and normal control groups. The DIO group demonstrated a clear reduction in several kinematic parameters (VCL, VSL, VAP, STR and LIN) including the percentage of progressive motile sperm, which were reversed proportionally in the DIO probiotics supplemented group. Collectively, the human phase demonstrated a negative effect of chronic pain and obesity on the male fertility potential in lean humans. Due to the overlapping effects of obesity and chronic pain on the sperm characteristics, the statistical analysis of the results in this study cannot conclude a solid opinion on the possible effect of chronic pain on sperm quality in co-existing conditions of pain and overweight. Further research in overweight and lean chronic pain patients is required to confirm this hypothesis. The animal phase demonstrated that the oral supplementation of Lactobacillus rhamnosus PB01 can be suggested as a potential innovative approach for the management of weight and nociception, while also positively affecting the male fertility potential, especially in cases of obesity. This study supported the hypothesis of “potential positive effect of probiotics” on weight and pain management, and “sperm quality”, which may be further pursued as a possible strategy in the treatment of subfertile obese men.
To fulfill the requirements for the PhD degree, Fereshteh Dardmeh has submitted the thesis: “Management of low Male Fertility potential affected by obesity and chronic pain with Lactobacillus Rhamnosus PB01”, to the Faculty Council of Medicine at Aalborg University. The Faculty Council has appointed the following adjudication committee to evaluate the thesis and the associated lecture:

Professor Erik Ernst  
Aarhus University  
Denmark

Professor Aloisi Anna Maria  
University of Siena  
Italy

Chairman:  
Associate Professor Linda Pilgaard  
Aalborg University  
Denmark

Moderator:  
Professor Hans Ingolf Nielsen  
Aalborg University  
Denmark

The PhD lecture is public and will take place on:

Friday 26 May 2017 at 13:00  
Fredrik Bajers Vej 7D, D2-106, Alborg University  
9220 Aalborg Ø

Program for PhD lecture on  
Friday 26 May 2017  
by  
Fereshteh Dardmeh

Management of low Male Fertility potential affected by obesity and chronic pain with Lactobacillus Rhamnosus PB01

Chairman:  
Associate Professor Linda Pilgaard

Moderator:  
Professor Hans Ingolf Nielsen

13.00 Opening by the Moderator
13.05 PhD lecture by Fereshteh Dardmeh
13.50 Break
14.00 Questions and comments from the Committee  
Questions and comments from the audience at the Moderator’s discretion
16.00 Conclusion of the session by the Moderator

After the session a reception will be arranged