



## Answer to the Letter to the Editor of K. Minami, et al. concerning “An unexpected connection: A narrative review of the associations between gut microbiome and musculoskeletal pain” by Tonelli et al. (Eur Spine J; 2022: doi:10.1007/s00586-022-07429-y)

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The authors appreciate the interest of Dr. Minami et al. in our manuscript and this important topic. While the literature on the role of the microbiome in disease in general, and the musculoskeletal system in particular, is rapidly evolving, we agree that additional attention should be given to various potential connections that may influence health, such as osteoporosis, as cited by Dr. Minami et al., among other conditions. Though beyond the scope of the published review, which was intended to focus on reviewing the potential mechanisms and contributors that the gut microbiome may have on the musculoskeletal system, there is emerging literature connecting these mechanisms to specific pain conditions. Indeed, a recent review has focused on the role of the gut microbiome specific to osteoarthritis pain, which we agree should also be of great interest to investigators entering this field. In addition, it is interesting to determine

if there is a relationship between the gut microbiome and intervertebral disc isolates that remain debated in terms of their source or significance. Importantly, we enthusiastically agree that more attention should be devoted to understanding the influence that altering the gut microbiome will have on the progression and experience of musculoskeletal pain, especially for potential clinical applications.

We hope these publications stimulate and encourage additional investigators to pursue research in this area and contribute to the growing body of literature.

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