Reply to the letter to the editor of João Luiz Pinheiro Franco

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We would like to express our appreciation of the comments to our paper “Modic changes (MC) and their associations with clinical findings” [10]. In our paper, we compare several clinical findings in people with Modic Changes and Disc Degeneration, degeneration only and no MRI findings. The main suggestion in the letter is that Modic Type 1 and Type 2 are different in relation to histopathological findings and should therefore be treated as two distinct subgroups in future studies (REF letter). We do agree with this notion. In our analyses we did not find statistically significant differences and, therefore, we did not report Modic Type 1 and 2 separately. However, in relation to the clinical picture (association with low back pain (LBP)), the distinction between different types of MC is challenging. Several factors such as classification of MC, observer variability and the clinical outcomes could influence the reporting of Modic changes and thus affect the results of the studies.

Observer variability

Most papers refer to the definitions given by Modic in 1988 [14, 15]. In several studies the observer variability has been reported as rather large for each of the separate studies [3, 7, 8, 10–12, 16–18]. However, based on our experiences

with the classification of MC, we have discovered (not surprisingly) that there can be wide variations in the interpretation of MC and when to report it as a significant finding. This is supported by results from a study of 60 individuals without LBP with two observers where one observer paid more detail to the smaller signal changes and thus reported a higher prevalence of MC than the other observer, who only reported “blatant end plates changes” [21]. Therefore, there is a need for more specific and advanced definitions in the future. From our Nordic Consensus Group, we have suggested a new classification system in order to secure uniform definitions. This system is easy to use and has been tested for reliability with convincing results [5].

Modic type 1 and type 2

In the letter to the editor, it is suggested that Modic Changes Type 1 are more strongly associated with low back pain (LBP) than Type 2. In a systematic literature review, Jensen et al. found an overall association between Modic and LBP [6]. It is true that in several studies the estimates are higher for type 1, when it has been reported [1, 9, 13, 20]. But in other studies, the opposite seems to be the case [2, 19, 22] when we extract the specific data from the papers. However, in none of the studies, the differences in estimates of association with LBP for types 1 and 2 are statistically significant. Furthermore, in some studies, the associations become not statistically significant when analyzed separately due to small subgroups [2, 19]. However, based on the sparse evidence from biological material from Modic changes type 1 and type 2, it is still reasonable to assume, that Modic Type 1 is more painful than type 2. As mentioned in the letter to the editor, at least in one study

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patients with type 1 and 2 changes respond differently to surgical treatment [4].

Conclusion

The histopathological and epidemiological evidence available on different types of MC is still limited and inconclusive due to the relative small number of high quality studies. To be able to report different types of Modic changes specifically, we suggest the use of a reliable classification system and studies on larger cohorts to minimize the statistical uncertainty.

References

1. Albert HB, Kjaer P, Jensen TS, Sorensen JS, Bendix T, Manniche C (2007) Modic changes, possible causes and relation to low back pain. *Med Hypotheses* 70:361–368
2. Braithwaite I, White J, Saifuddin A, Renton P, Taylor BA (1998) Vertebral end-plate (Modic) changes on lumbar spine MRI: correlation with pain reproduction at lumbar discography. *Eur Spine J* 7:363–368
3. Chung CB, Vande Berg BC, Tavernier T et al (2004) End plate marrow changes in the asymptomatic lumbosacral spine: frequency, distribution and correlation with age and degenerative changes. *Skeletal Radiol* 33:399–404
4. Esposito P, Pinheiro-Franco JL, Froelich S, Maitrot D (2006) Predictive value of MRI vertebral end-plate signal changes (Modic) on outcome of surgically treated degenerative disc disease: results of a cohort study including 60 patients. *Neurochirurgie* 52:315–322
5. Jensen TS, Sorensen JS, Kjaer P (2007) Intra- and interobserver reproducibility of vertebral endplate signal (modic) changes in the lumbar spine: the nordic modic consensus group classification. *Acta Radiol* 48:748–754
6. Jensen TS, Karppinen J, Sorensen JS, Niinimäki J, Leboeuf-Yde C (2008) Vertebral endplate signal changes (Modic change): a systematic literature review of prevalence and association with non-specific low back pain. *Eur Spine J* [Epub ahead of print]. doi:10.1007/s00586-008-0770-2
7. Jones A, Clarke A, Freeman BJ, Lam KS, Grevitt MP (2005) The Modic classification: inter- and intraobserver error in clinical practice. *Spine* 30:1867–1869
8. Karchevsky M, Schweitzer ME, Carrino JA, Zoga A, Montgomery D, Parker L (2005) Reactive endplate marrow changes: a systematic morphologic and epidemiologic evaluation. *Skeletal Radiol* 34:125–129
9. Kjaer P, Leboeuf-Yde C, Korsholm L, Sorensen JS, Bendix T (2005) Magnetic resonance imaging and low back pain in adults: a diagnostic imaging study of 40-year-old men and women. *Spine* 30:1173–1180
10. Kjaer P, Korsholm L, Bendix T, Sorensen JS, Leboeuf-Yde C (2006) SSE Award Winning Paper 2006: modic changes and their association with clinical findings. *Eur Spine J* 15:1312–1319
11. Kokkonen SM, Kurunlahti M, Tervonen O, Ilkko E, Vanharanta H (2002) Endplate degeneration observed on magnetic resonance imaging of the lumbar spine: correlation with pain provocation and disc changes observed on computed tomography diskography. *Spine* 27:2274–2278
12. Kuisma M, Karppinen J, Niinimäki J et al (2006) A three-year follow-up of lumbar spine endplate (Modic) changes. *Spine* 31:1714–1718
13. Kuisma M, Karppinen J, Niinimäki J et al (2007) Modic changes in endplates of lumbar vertebral bodies: prevalence and association with low back and sciatic pain among middle-aged male workers. *Spine* 32:1116–1122
14. Modic MT, Steinberg PM, Ross JS, Masaryk TJ, Carter JR (1988) Degenerative disk disease: assessment of changes in vertebral body marrow with MR imaging. *Radiology* 166:193–199
15. Modic MT, Masaryk TJ, Ross JS, Carter JR (1988) Imaging of degenerative disk disease. *Radiology* 168:177–186
16. Mulconrey DS, Knight RQ, Bramble JD, Paknikar S, Harty PA (2006) Interobserver reliability in the interpretation of diagnostic lumbar MRI and nuclear imaging. *Spine J* 6:177–184
17. Peterson CK, Gatterman B, Carter JC, Humphreys BK, Weibel A (2007) Inter- and intraexaminer reliability in identifying and classifying degenerative marrow (Modic) changes on lumbar spine magnetic resonance scans. *J Manipulative Physiol Ther* 30:85–90
18. Raininko R, Manninen H, Battie MC, Gibbons LE, Gill K, Fisher LD (1995) Observer variability in the assessment of disc degeneration on magnetic resonance images of the lumbar and thoracic spine. *Spine* 20:1029–1035
19. Schenk P, Laubli T, Hodler J, Klipstein A (2006) Magnetic resonance imaging of the lumbar spine: findings in female subjects from administrative and nursing professions. *Spine* 31:2701–2706
20. Toyone T, Takahashi K, Kitahara H, Yamagata M, Murakami M, Moriya H (1994) Vertebral bone-marrow changes in degenerative lumbar disc disease: an MRI study of 74 patients with low back pain. *J Bone Joint Surg Br* 76:757–764
21. Weishaupt D, Zanetti M, Hodler J, Boos N (1998) MR imaging of the lumbar spine: prevalence of intervertebral disk extrusion and sequestration, nerve root compression, end plate abnormalities, and osteoarthritis of the facet joints in asymptomatic volunteers. *Radiology* 209:661–666
22. Weishaupt D, Zanetti M, Hodler J et al (2001) Painful lumbar disk derangement: relevance of endplate abnormalities at MR imaging. *Radiology* 218:420–427