

APRU Global Health Conference 2021

GLOBAL URBAN HEALTH

16-18 November 2021

The University of Hong Kong, Pokfulam, Hong Kong

Abstract No.

Abstract Title

024

Acute changes in knee cartilage and meniscus following long-distance running in habituate runners: A systematic review on studies using quantitative magnetic resonance imaging

Theme

C. Environment, health & active lifestyle

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Background & Methods:

Background: Running is a popular recreational activity, nonetheless, the acute post-race changes of cartilage or meniscus have not been determined. The purpose of this study was to systematically review the acute changes in knee cartilage and meniscus detected by quantitative magnetic resonance imaging (MRI) in habituate runners following long-distance running.

Methods: Literature search was performed on databases of Medline, Cochrane, Embase, ScienceDirect and Web of Science to retrieve relevant studies. Included studies should performed MRI on healthy runners before and after running; only English articles were considered.

| Author | Study design | Running type | Time points of Testing | MRI Type |
|-------------------------|--------------|---------------------------------------|---|--------------|
| Esculier et al., 2019 | case control | 30min on treadmill | Pre-run, 19min, 55min, 91min after running for T2, 31min and 67 min after running for T1r | 3T Philips |
| Cha et al., 2012 | case control | 3.5 mile in 30min on urethane track | pre-run, <10min, 2h after running | 3T GE |
| Mosher et al., 2009 | case control | 30min on asphalt trail | pre-run, immediately after running (<15min) | 3T Bruker |
| Luke et al., 2010 | case control | Marathon | pre-run, <48h, 10-12wks | 3T GE |
| Stehling et al., 2010 | case control | Marathon | pre-run, 48h, 3mon | 3T GE |
| Hesper et al., 2015 | Longitudinal | Marathon | <48h pre-run, <48h, around 4wks | 3T Siemens |
| Kessler et al., 2008 | Longitudinal | 20km | pre-run after 60min rest, <3min, 1h | 1.5T Siemens |
| Kersting et al., 2005 | Longitudinal | 1h running at maximum speed in a park | pre-run, post-run | 1T Philips |
| Kessler et al., 2006 | Longitudinal | 5, 10, 20km on course | pre-run after 60min rest, 3min and 1h after running | 1.5T Siemens |
| Heckelman et al., 2020 | Longitudinal | 3 and 10mile on treadmill | pre-run, immediately and 24h after running, | 3T Siemens |
| Willwacher et al., 2020 | case control | 75min at 2.78 ± 0.38 m/s on treadmill | pre-run, immediately after running | 3T Philips |
| Wang et al., 2020 | Longitudinal | Marathon | pre-run, 10h post-run | 3T Siemens |
| Crowder et al., 2020 | case control | 40min on flat outdoor terrain | pre-run, every 5-min interval in 60min post-run | 3T GE |
| Zhang et al., 2020 | Longitudinal | Marathon | pre-run, 12h and 2mon post-run | 3T Siemens |

Table 1. Characteristics of the included studies

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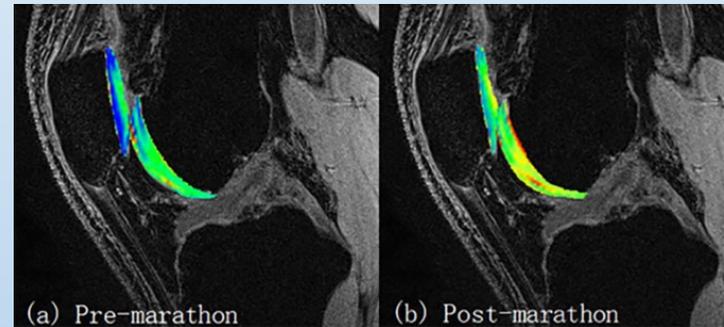
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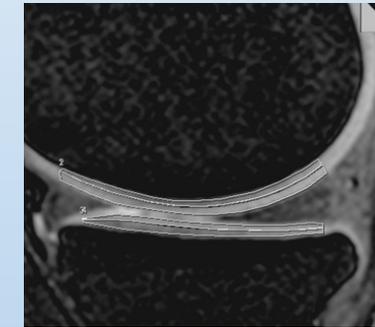
Results & Conclusions:

Results: 1427 articles were screened, and 14 articles were included. Among the included studies, six of them quantitatively measured the changes in volume of the knee cartilage or meniscus. Most studies suggested that the volume decreased after running, and returned to the baseline soon varied from minutes to one hour, and then kept increasing. 10 studies quantitatively measured MRI functional sequences of knee cartilage or meniscus using T2 value, T2 * value and T1 ρ value. T2 (T2 *) would decrease after running and returned to the baseline in a short term; while T1 ρ needs longer time. 5 studies measured subarea for T2 (T2*) value, and found that the superficial and medial subarea changed most after running.

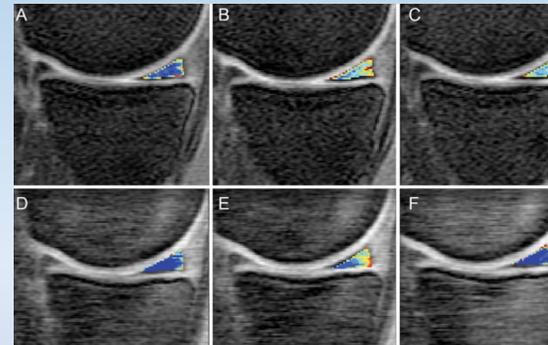
Conclusion: Healthy recreational runners can experience transient changes in the volume and signal of knee cartilage and meniscus after long-distance running. A liquid exchange in cartilage and meniscus was observed after running.



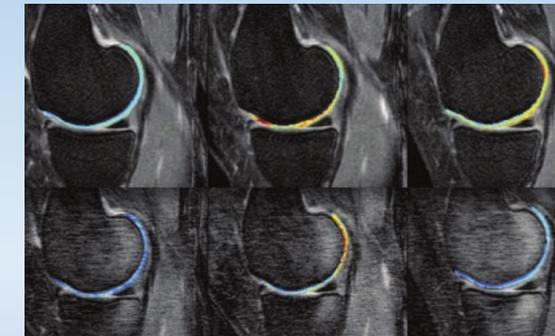
T2 mapping of cartilage, cited from Wang et al. Orthop J Sports Med. 8(8):2325967120943874, 2020.



volume, cited from Hesper et al. Eur J Radiol. 84(2):284-9, 2015.



A-C, T1 ρ of meniscus; D-F, T2 mapping of meniscus, cited from Stehling et al. Skeletal Radiol. 40(6):725-35, 2011.



T1 ρ of cartilage, cited from Luke et al. Am J Sports Med. 38(11):2273-80, 2010.