

# Workshop

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## Nieuwe inzichten in de fractuurrevalidatie

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# Permissive Weight Bearing

- Hulpvraag op participatieniveau als uitgangspunt.
- “Lezen” fractuur en daarop beleid afstemmen
- Kennis van belasting van activiteiten
- Hydrotherapie
- Weegschalen
- Normaalgang benaderen

# “Lezen” fractuur en daarop beleid afstemmen



Gammanail

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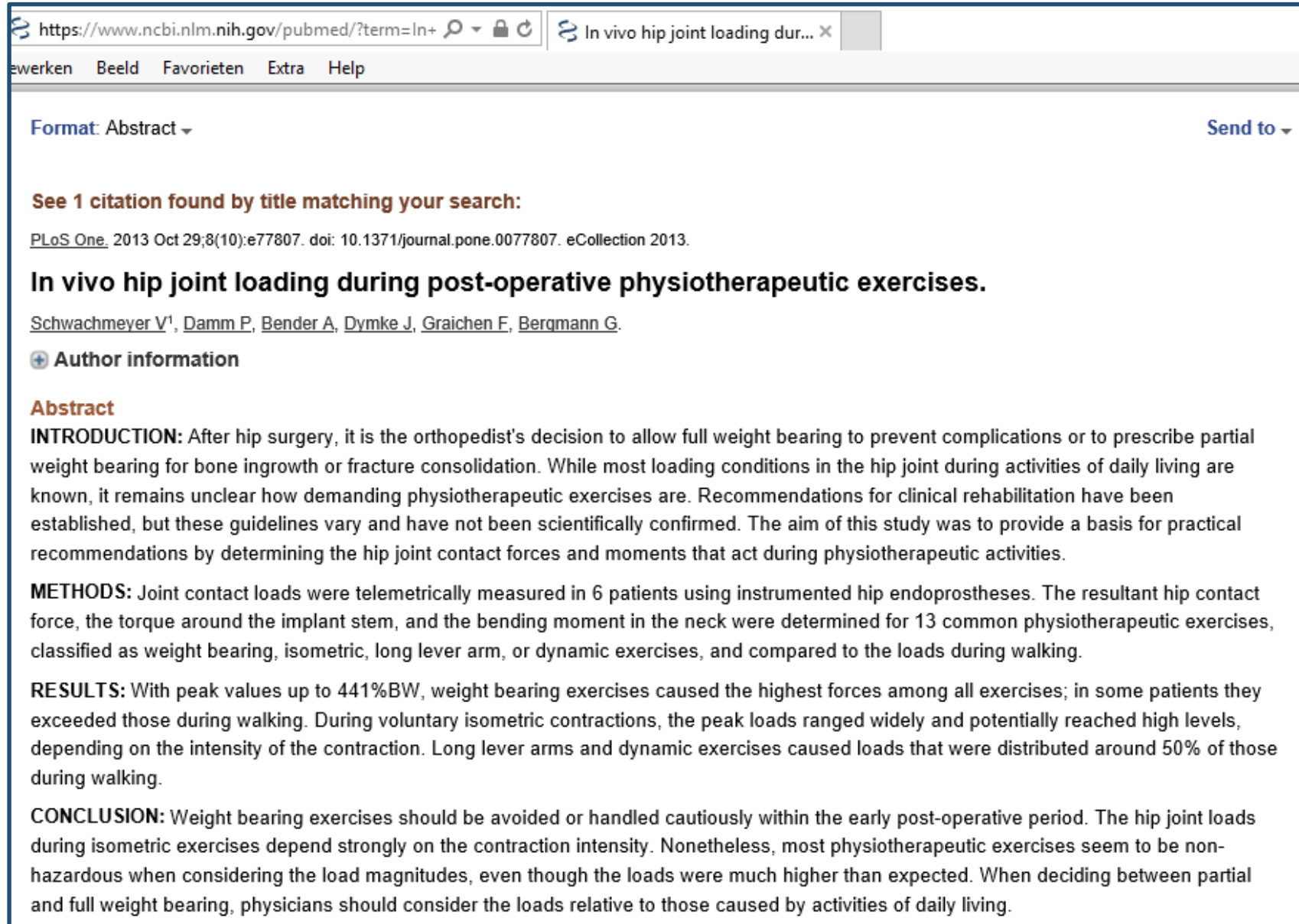
Intramedullaire pen

volledig belastbaar



<http://www.startpuntradiologie.nl/basiskennis/fractuurleer/>

# Kennis van belasting van activiteiten



The image shows a screenshot of a web browser displaying a PubMed search result. The browser's address bar shows the URL: <https://www.ncbi.nlm.nih.gov/pubmed/?term=In+>. The search term is "In vivo hip joint loading dur...". The browser interface includes a search bar, a "Format: Abstract" dropdown menu, and a "Send to" button. The search results section indicates "See 1 citation found by title matching your search:". The citation is from *PLoS One*, 2013 Oct 29;8(10):e77807. doi: 10.1371/journal.pone.0077807. eCollection 2013. The title of the article is "In vivo hip joint loading during post-operative physiotherapeutic exercises." The authors listed are Schwachmeyer V<sup>1</sup>, Damm P, Bender A, Dymke J, Graichen F, Bergmann G. There is a link for "Author information". The abstract is divided into sections: **INTRODUCTION:** After hip surgery, it is the orthopedist's decision to allow full weight bearing to prevent complications or to prescribe partial weight bearing for bone ingrowth or fracture consolidation. While most loading conditions in the hip joint during activities of daily living are known, it remains unclear how demanding physiotherapeutic exercises are. Recommendations for clinical rehabilitation have been established, but these guidelines vary and have not been scientifically confirmed. The aim of this study was to provide a basis for practical recommendations by determining the hip joint contact forces and moments that act during physiotherapeutic activities. **METHODS:** Joint contact loads were telemetrically measured in 6 patients using instrumented hip endoprostheses. The resultant hip contact force, the torque around the implant stem, and the bending moment in the neck were determined for 13 common physiotherapeutic exercises, classified as weight bearing, isometric, long lever arm, or dynamic exercises, and compared to the loads during walking. **RESULTS:** With peak values up to 441%BW, weight bearing exercises caused the highest forces among all exercises; in some patients they exceeded those during walking. During voluntary isometric contractions, the peak loads ranged widely and potentially reached high levels, depending on the intensity of the contraction. Long lever arms and dynamic exercises caused loads that were distributed around 50% of those during walking. **CONCLUSION:** Weight bearing exercises should be avoided or handled cautiously within the early post-operative period. The hip joint loads during isometric exercises depend strongly on the contraction intensity. Nonetheless, most physiotherapeutic exercises seem to be non-hazardous when considering the load magnitudes, even though the loads were much higher than expected. When deciding between partial and full weight bearing, physicians should consider the loads relative to those caused by activities of daily living.

# Hydrotherapie

<https://www.ncbi.nlm.nih.gov/pubmed/?term=Do>

Hip « OrthoLoad

Does aquatic exercise reduce h...

Does aquatic ex...

werken Beeld Favorieten Extra Help

## See 1 citation found by title matching your search:

[PLoS One](#). 2017 Mar 20;12(3):e0171972. doi: 10.1371/journal.pone.0171972. eCollection 2017.

## Does aquatic exercise reduce hip and knee joint loading? In vivo load measurements with instrumented implants.

[Kutzner J<sup>1</sup>](#), [Richter A<sup>1</sup>](#), [Gordt K<sup>1</sup>](#), [Dymke J<sup>1</sup>](#), [Damm P<sup>1</sup>](#), [Duda GN<sup>1</sup>](#), [Günzl R<sup>2</sup>](#), [Bergmann G<sup>1</sup>](#).

### Author information

### Abstract

Aquatic exercises are widely used for rehabilitation or preventive therapies in order to enable mobilization and muscle strengthening while minimizing joint loading of the lower limb. The load reducing effect of water due to buoyancy is a main advantage compared to exercises on land. However, also drag forces have to be considered that act opposite to the relative motion of the body segments and require higher muscle activity. Due to these opposing effects on joint loading, the load-reducing effect during aquatic exercises remains unknown. The aim of this study was to quantify the joint loads during various aquatic exercises and to determine the load reducing effect of water. Instrumented knee and hip implants with telemetric data transfer were used to measure the resultant joint contact forces in 12 elderly subjects (6x hip, 6x knee) in vivo. Different dynamic, weight-bearing and non-weight-bearing activities were performed by the subjects on land and in chest-high water. Non-weight-bearing hip and knee flexion/extension was performed at different velocities and with additional Aquafins. Joint forces during aquatic exercises ranged between 32 and 396% body weight (BW). Highest forces occurred during dynamic activities, followed by weight-bearing and slow non-weight-bearing activities. Compared to the same activities on land, joint forces were reduced by 36-55% in water with absolute reductions being greater than 100%BW during weight-bearing and dynamic activities. During non-weight-bearing activities, high movement velocities and additional Aquafins increased the joint forces by up to 59% and resulted in joint forces of up to 301%BW. This study confirms the load reducing effect of water during weight-bearing and dynamic exercises. Nevertheless, high drag forces result in increased joint contact forces and indicate greater muscle activity. By the choice of activity, movement velocity and additional resistive devices joint forces can be modulated individually in the course of rehabilitation or preventive therapies.

# AFBOUW LOOPHULPMIDDELEN

