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# USE OF MACHINE LEARNING IN OSTEOARTHRITIS RESEARCH: A SYSTEMATIC LITERATURE REVIEW

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## 2022 OARSI WORLD CONGRESS POSTER ABSTRACTS

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### USE OF MACHINE LEARNING IN OSTEOARTHRITIS RESEARCH: A SYSTEMATIC LITERATURE REVIEW

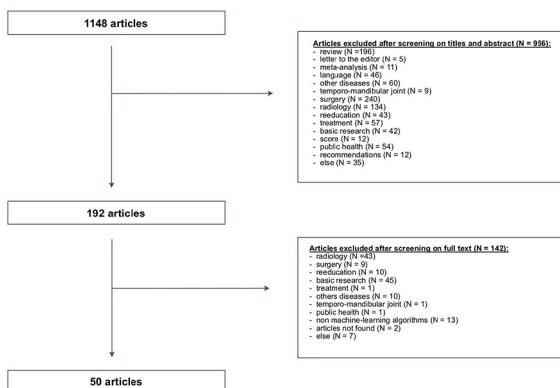
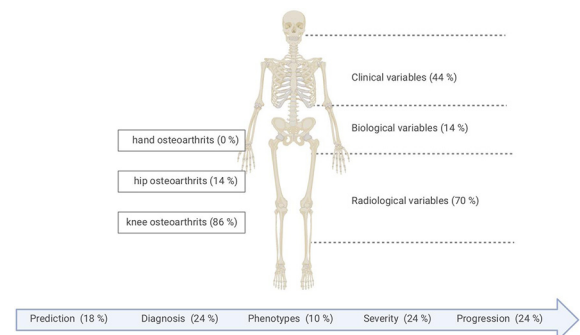
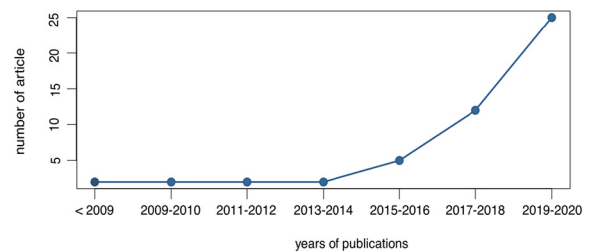
M. Binvignat<sup>1,2</sup>, V. Padoia<sup>2</sup>, A.J. Butte<sup>2</sup>, K. Louati<sup>1</sup>, D. Klatzmann<sup>1</sup>, F. Berenbaum<sup>1</sup>, E. Mariotti-Ferrandiz<sup>1</sup>, J. Sellam<sup>1</sup>. <sup>1</sup>Sorbonne Université, Paris, France; <sup>2</sup>UCSF, San Francisco, CA

**Purpose:** The aim of this systematic literature review is to provide a comprehensive and exhaustive landscape of the use of Machine Learning (ML) in the clinical care of Osteoarthritis (OA).

**Methods:** A systematic literature review has been performed in July 2021 using the Medline database with key words and MeSH terms. For each selected article, the number of patients, the ML algorithms used, the type of data analyzed, the training and validation methods were collected.

**Results:** From 1,148 screened articles, 50 were sampled, selected, and analyzed (figure 1). Most of these articles were published after 2017 (figure 2). Twelve articles were related to diagnosis, 9 to prediction, 5 to phenotyping, 12 to severity and 12 to progression. The number of patients included ranged from 18 to 40,118. Deep learning (DL) was used in 32 % of cases. Radiological image analyses involved 70 % of the studies. Knee OA was studied in 86 % of these articles while 14 % involved the hip. None were on hand OA. Most studies were done on the same cohort since data from the Osteoarthritis Initiative (OAI) have been used in 48 % of articles whereas the MOST and the CHECK cohort were respectively used in 10 % and 6 % of the articles. External validation was provided in only 10 % of articles.

**Conclusions:** This study provides an up-to-date overview of ML approach in clinical OA research and will help to enhance and improve the application of ML in this field (figure 3)



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### MACHINE LEARNING AND RADIOMICS IDENTIFY NOVEL BIOMARKERS OF BONE LOSS

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**Purpose:** Altered bone turnover is a factor in many diseases including osteoarthritis (OA), osteoporosis, inflammation, and viral infection. The absence of obvious symptoms and insufficiently sensitive biomarkers in the early stages of bone loss limits early diagnosis and treatment. Therefore, it is urgent to identify novel, more sensitive, and easy-to-detect biomarkers which can be used in the diagnosis and prognosis of bone health. Our previous data using standard micro-computed tomography ( $\mu$ CT) measurements showed that SARS-CoV-2 infection in mice significantly decreased trabecular bone volume at the lumbar spine, suggesting that decreased bone mass, increased fracture risk, and