

# **Artificial intelligence and machine learning in the analysis of cardiac images: a literature review**

# OBJECTIVE

The aim of this literature review is to elucidate the role of artificial intelligence and machine learning in cardiac image analysis, highlighting its advantages and future perspectives.

# METHODOLOGY

To conduct this review, the virtual PubMed database was utilized as the research source. The following search terms were applied: "Artificial Intelligence AND Machine Learning AND Cardiac Imaging Analysis." Twelve articles were selected.

# DISCUSSION

Artificial Intelligence (AI) refers to the ability of programs and software to perform tasks in an automated manner, often through the analysis of extensive datasets. These software applications employ machine learning algorithms (both supervised and unsupervised) to examine and assimilate patterns in data, enabling decision-making. Deep learning networks have demonstrated the ability to diagnose myocardial infarction (MI) by extracting myocardial motion features from cardiac cine MR sequences, using a discriminative network to distinguish normal tissues from tissues with infarction. In summary, AI proves to be a valuable ally in identifying and accurately predicting the area affected by chronic MI through deep learning and machine learning approaches in contrast-free cardiac MR images. This measurement is performed through the segmentation process of cardiac MR images, analyzing the lengths of the short and long axes of the left ventricle (LV) and the respective ratio between them to determine LV sphericity. Although sphericity is not yet adopted as a determining predictive factor, the utility and applicability of AI and its learning in analyzing factors that are still underconsidered in cardiac image analysis are demonstrated. Its management relies on cardiac images to stratify risk and determine the need for additional intervention, with Stress Echocardiography (SE) being one of the most commonly used non-invasive evaluation methods for coronary artery disease. At the core of this are CNNs (Convolutional Neural Network) which, through image segmentation, can identify contrast and non-contrast images while having the ability to identify new myocardial features related to coronary artery disease in SE, given their learning process under images pre-selected with markers of such pathology.

# CONCLUSION

In conclusion, the integration of artificial intelligence and machine learning into cardiac image analysis holds significant promise for advancing diagnostic capabilities and personalized treatment strategies.

**Key-words:** Cardiovascular diseases; Artificial Intelligence; Cardiac Imaging