Radiogenomics: The Integration of Radiology with Genomics in Cancer

OBJECTIVE

This study aims to explore the relevance of radiogenomics in medicine, especially in fields such as interventional oncology, seeking to understand the integration of radiological and genomic data to enhance the diagnosis, prognosis, and treatment of various pathologies.

METHODOLOGY

To achieve the proposed objectives, a review was conducted using the PubMed database with the search terms "Radiogenomics" AND "Genomics" AND "Cancer." The final selection included ten articles for analysis.

DISCUSSION

Radiogenomics, by integrating complex data from medical images and genomic information, emerges as a multidisciplinary approach promising to revolutionize the understanding and treatment of diseases, especially in the challenging field of oncology. With the rise of precision medicine, the genetic profile of tumors becomes essential for guiding specific treatments, and radiogenomics fills this gap by providing more detailed information about the molecular characteristics of tumors, going beyond traditional histological analysis. The application of Artificial Intelligence (AI) in radiogenomics is a promising aspect. The AI's ability to analyze large sets of radiological and genomic data, identifying subtle patterns and correlations, significantly enhances predictive capabilities in clinical medicine. The rapid evolution of machine learning techniques and the sophistication of algorithms contribute to a more precise and efficient interpretation of data. In the quest for more individualized medicine, radiogenomics shifts the role of imaging from mere diagnostics to rich sources of additional information. However, the lack of standardization in image analysis, the scarcity of representative samples, and the need for external validation of results are substantial obstacles. Interobserver variability in the interpretation of imaging by humans is also a concern. To advance in radiogenomics, it is suggested that future studies incorporate multiple elements, including genomic data, images, and clinical outcomes. The implementation of standardized protocols, the pursuit of more representative samples, and multidisciplinary collaborations are crucial steps to ensure external validity and generalization of radiogenomic findings.

CONCLUSION

Radiogenomics represents a significant advancement in medicine, especially in oncology, by allowing the combination of genomic and radiological data for a better understanding of the molecular and phenotypic characteristics of tumors.

Key-words: Radiogenomics; Oncology; Artificial Intelligence