American Journal of
Biomedical Science & Research

www.biomedgrid.com
ISSN: 2642-1747

Mini Review

Exploring the Role of P63 as a Biomarker in Giant Cell Carcinoma: A Short Review

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To Cite This Article: *Md Rakibul Hasan*. Exploring the Role of P63 as a Biomarker in Giant Cell Carcinoma: A Short Review. Am J Biomed Sci & Res. 2025 25(4) AJBSR.MS.ID.003342,* **DOI:** 10.34297/AJBSR.2025.25.003342

Received: January 11, 2025; **Published:** January 23, 2025

Introduction

Giant Cell Carcinoma (GCC) is a rare and highly aggressive malignancy characterized by the presence of multinucleated giant cells [1]. It can occur in various organs, including the lungs, bladder, and thyroid. GCC is known for its rapid growth and poor prognosis, often presenting at an advanced stage with a high propensity for metastasis. This review aims to provide a comprehensive analysis of the pathogenesis, the role of the biomarker P63, clinical features, and therapeutic approaches for GCC, with a focus on recent biomedical research and its impact on the population in the USA.

Literature Gap and Aim of the Review

Despite advances in understanding various cancers, GCC remains poorly understood due to its rarity. There is a significant gap in knowledge regarding its molecular mechanisms, diagnostic markers, and effective treatments. The identification of specific biomarkers like P63 could play a crucial role in improving diagnosis and developing targeted therapies [2]. The primary aim of this review is to explore the role of P63 as a biomarker in GCC. By examining recent research, we aim to highlight its potential in enhancing diagnostic accuracy, understanding pathogenesis, and informing therapeutic strategies. This review also seeks to address the current literature gap and propose directions for future research.

Methods

A systematic literature review was conducted using databases such as PubMed, Google Scholar, and ResearchGate. Keywords included "giant cell carcinoma," "pathogenesis," "P63 biomarker," "clinical features," and "therapeutic approaches." Studies published between 2015 and 2024 were included. Data were extracted and analysed to identify common themes and findings. The inclusion criteria were studies that specifically addressed the role of P63 in GCC, its diagnostic and prognostic value, and therapeutic implications. Exclusion criteria included studies that did not provide sufficient data on P63 or were not peer-reviewed. Data extraction involved collecting information on study design, sample size, patient demographics, methods of P63 detection, and outcomes related to diagnosis and treatment efficacy. Statistical analyses were performed to assess the significance of P63 expression in GCC and its correlation with clinical outcomes.

Results

Pathogenesis and Role of P63 as a Biomarker

GCC is characterized by the presence of multinucleated giant cells and a high degree of cellular atypia. Genetic mutations, such as those in the TP53 and KRAS genes, have been implicated in its pathogenesis. Immunohistochemical studies have shown overexpression of markers like Ki-67, indicating high proliferative activity. The presence of these genetic alterations suggests a complex interplay of molecular pathways driving the aggressive behaviour of GCC [3]. P63, a member of the p53 family of transcription factors, plays a crucial role in the development and differentiation of epithelial tissues [4]. In GCC, P63 has been identified as a highly sensitive and relatively specific biomarker. Its overexpression is associated with the presence of multinucleated giant cells and high proliferative activity [5]. P63 is particularly useful in distinguishing GCC from other giant cell-containing neoplasms, such as osteosarcoma and chondroblastoma. The high prevalence of P63 expression in specific tumor types makes P63 immunohistochemistry a suitable diag-

nostic tool. Studies have shown that P63 expression correlates with tumor aggressiveness and poor prognosis, highlighting its potential as a prognostic marker.

Clinical Features and Therapeutic Approaches

Patients with GCC often present with non-specific symptoms such as pain, swelling, and weight loss. Due to its aggressive nature, GCC is frequently diagnosed at an advanced stage, with a high propensity for metastasis. Imaging studies typically reveal large, heterogeneous masses with areas of necrosis. The clinical presentation can vary depending on the organ involved, but common features include rapid tumor growth and significant local invasion [6]. Treatment options for GCC are limited and often involve a combination of surgery, chemotherapy, and radiation therapy. Surgical resection remains the primary treatment modality, but complete resection is often challenging due to the tumour's size and invasiveness. Chemotherapy regimens, including platinum-based agents, have shown some efficacy, but the overall prognosis remains poor. Immunotherapy, particularly immune checkpoint inhibitors, has shown promise in other aggressive cancers and may offer a potential therapeutic avenue for GCC. Recent studies have explored the use of targeted therapies that inhibit specific molecular pathways involved in GCC pathogenesis, providing new hope for improving patient outcomes [7].

Discussion

The aggressive nature of GCC and its tendency for late diagnosis contribute to its poor prognosis. The identification of P63 as a specific biomarker for GCC has significant implications for diagnosis and treatment. P63 can aid in the early detection of GCC and help differentiate it from other similar neoplasms [8]. Additionally, understanding the role of P63 in the pathogenesis of GCC may lead to the development of targeted therapies that improve patient outcomes. The use of P63 as a diagnostic tool can enhance the accuracy of histopathological evaluations, leading to more precise treatment planning. Additionally, exploring P63 as a therapeutic target and the role of microbial dysbiosis in the gut-liver axis presents new research opportunities for developing innovative treatment strategies that address the molecular mechanisms underlying GCC [9,11].

Significance of the Review

This review underscores the importance of P63 as a biomarker in the diagnosis and treatment of GCC. By highlighting the role of P63, this review aims to enhance the understanding of GCC's molecular mechanisms and promote the development of more effective diagnostic and therapeutic strategies. The findings of this review could lead to improved clinical outcomes for patients with GCC and contribute to the broader field of cancer research [12]. The integration of P63 into clinical practice could revolutionize the management of GCC, providing clinicians with a powerful tool for early detection and personalized treatment. Understanding the role of P63 in GCC is crucial for improving diagnostic accuracy and developing targeted therapies. This research aims to bridge the gap in knowledge regarding the molecular mechanisms of GCC and to provide insights that could lead to better clinical outcomes for patients.

Recommendations and Limitations of the Study

Further research should focus on conducting comprehensive studies on the genetic and molecular pathways involved in GCC. Clinical trials investigating the efficacy of novel therapeutic agents, including immunotherapies, are warranted. Additionally, the development and refinement of diagnostic tools that utilize P63 immunohistochemistry for early detection of GCC are essential. Taking excessive SSB can cause insulin resistance [10], leading to more inflammation, which needs to be highlighted. Exploring targeted therapies that specifically address the molecular mechanisms involving P63 could lead to more effective treatment options. However, the rarity of GCC limits the availability of large-scale studies and comprehensive data. Variability in study design and methodology can affect the consistency of findings. While P63 is a useful biomarker, its expression in other neoplasms can complicate differential diagnosis. Addressing these limitations through collaborative research efforts and standardized protocols will be crucial for advancing the understanding and management of GCC.

Conclusion

GCC is a rare and aggressive malignancy with a poor prognosis. The identification of P63 as a specific biomarker offers new opportunities for early diagnosis and targeted therapy. Further research is needed to elucidate the molecular mechanisms driving GCC and to identify novel therapeutic targets. The development of P63-based diagnostic assays and targeted therapies could significantly improve patient outcomes and reduce the burden of this challenging cancer.

Acknowledgement

Gratitude to Dr. Saifur Rahman, Neuroscientist, University of Cambridge, UK.

Conflict of Interest

None.

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