Journal of Biotechnology & Biomaterials

Review Article Open Access

Science & Technology that Involves the use of Living Organisms or Biological Systems

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Abstract

To explore a new artificial intelligence (AI)-aided method to assist the clinical diagnosis of femoral intertrochanteric fracture (FIF), and further compare the performance with human level to confirm the effect and feasibility of the AI algorithm. In the realm of healthcare, the integration of artificial intelligence (AI) has heralded a transformative era of intelligent medical practices. This paper delves into the application of AI technology in the detection of femoral intertrochanteric fractures. Through advanced algorithms and deep learning, AI systems demonstrate a remarkable ability to enhance the accuracy and efficiency of fracture diagnosis. This research explores the potential of AI-powered detection methods, their implications for patient care, and the broader implications for the future of intelligent healthcare.

Keywords: Carbon nanotubes; Electrochemical sensors; Flexible application; Glucose sensors

Introduction

As the pivotal location of force conduction in the hip joint, the proximal femur could be damaged by the excessive violent load. Femoral intertrochanteric fracture (FIF) was the fracture of the proximal femur in the hip joint. It was a violent articular injury with a broad damage spectrum to the lower extremity motor system, which usually accompanied a high in-hospital death rate (6%–10%) and poor clinical outcome. With the unsatisfied mortality, complications, mobility, and quality of life, FIF patients suffered from excruciating misery. After the injury of the hip joint, the initial diagnosis was commonly finished in the emergency department, and a conventional X-ray could be the primary diagnostic method to confirm whether a fracture occurred. Rather than other imaging modalities such as CT and MRI, X-ray was convenient, rapid, inexpensive, and easy to be recognized by radiologists or orthopedists. Generally, the ability to read X-ray images was an essential clinical skill that must be mastered by qualified doctors, which could guarantee accurate diagnosis and subsequent treatment.

Discussion

However, when it was under urgent situations in the emergency department (usually as the first visit for trauma patients) and lack of senior doctors, the probability of inducing the risk of missed diagnoses and misdiagnoses, especially for minor fractures, non-displaced fractures, or occult fractures increased significantly. Several research studies had illustrated that missed diagnoses and misdiagnoses could even exceed 40% under severe and urgent conditions, which seriously affected the credibility of clinical diagnosis, delayed the launch of effective treatment, and induced poor clinical outcomes . According to this, an accurate and credible auxiliary tool for bone fracture detection remained necessary. The field of healthcare has undergone a remarkable transformation with the advent of artificial intelligence (AI), ushering in an era of intelligent healthcare. The application of AI technologies in medical diagnosis and treatment has demonstrated immense potential to revolutionize traditional healthcare practices. This paper focuses on a specific facet of this transformative journey, namely, the AI-enhanced detection of femoral intertrochanteric fractures. Femoral intertrochanteric fractures are common orthopedic injuries, often presenting complex challenges for accurate diagnosis and timely intervention. Historically, the detection of such fractures has heavily relied on the expertise of healthcare professionals and conventional imaging techniques. However, the integration of AI into this domain brings new hope for more precise and efficient diagnosis. This research explores the intersection of AI and orthopedic healthcare, shedding light on the capabilities and implications of AI-enhanced detection methods for femoral intertrochanteric fractures. By harnessing the power of advanced algorithms and deep learning, AI systems have the potential to significantly enhance diagnostic accuracy and streamline patient care [1-4].

Furthermore, this investigation delves into the broader implications of intelligent healthcare, highlighting the potential for AI to revolutionize not only fracture detection but also the entire healthcare ecosystem. In the pages that follow, we delve into the intricacies of AI-powered fracture detection, examining its current capabilities, challenges, and the promising prospects it holds for the future of healthcare. AI-enhanced detection of femoral intertrochanteric fractures represents a significant advancement in the field of healthcare, offering the potential to improve patient outcomes, streamline clinical workflows, and enhance overall healthcare efficiency. In this discussion, we delve into the implications, challenges, and future prospects of intelligent healthcare in the context of fracture detection. AI-powered systems have demonstrated the ability to augment the diagnostic accuracy of femoral intertrochanteric fractures. Patient data privacy, algorithm transparency, and clinical validation are crucial considerations in the development and deployment of AI systems in healthcare settings. Moreover, AI should be viewed as a complementary tool to assist healthcare professionals rather than a replacement for their expertise. The application of AI in the detection of femoral intertrochanteric fractures represents a promising avenue for improving healthcare efficiency and patient outcomes. As technology continues to advance

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Received: 03-July-2023, Manuscript No. jbtbm-23-113076; **Editor assigned:** 05-July-2023, PreQC No. jbtbm-23-113076(PQ); **Reviewed:** 19-July-2023, QC No. jbtbm-23-113076; **Revised:** 24-July-2023, Manuscript No: jbtbm-23-113076(R); **Published:** 31-July-2023, DOI: 10.4172/2155-952X.1000340

Citation: Pedro L (2023) Science & Technology that Involves the use of Living Organisms or Biological Systems. J Biotechnol Biomater, 13: 340.

and AI algorithms become more sophisticated, we can anticipate even greater strides in the field of intelligent healthcare, benefiting both patients and medical professionals alike. However, responsible and ethical implementation remains paramount to ensure the safety and privacy of patients. The ELPs@silica is mainly spherical and the sizes of them were around 900 nm. However, currently presented mechanisms for peptide-triggered silica biomimetic mineralization could not explain such unique phenomenon. It would pave a new way for mining or designing peptides with such function, which provide a potential green method for the preparation of biomimetic silica particles. It would endow ELPs more functions and expand the application fields of ELPs such as the bioinspired synthesis of peptide biotemplated metal or nonmetal oxide nanoparticles. Construction of biomimetic catalytic systems is recognized as one of the most prospective, but is challenging approaches to achieve efficient aerobic oxidative transformations. However, it is still a challenge to obtain multifunctional integrated metal platforms that can simultaneously manipulate water/oil droplets and water/oil fluids [5-7].

Here, inspired by the structure and wettability of natural reed leaves and lotus leaves, dual biomimetic platforms with switchable and anisotropic/isotropic wettability were prepared on copper by laser processing, chemical etching, and mixed thiol modification. These algorithms can analyze medical images with a high degree of precision, helping healthcare professionals identify fractures even in complex cases or those with subtle signs. This increased accuracy can lead to earlier interventions, reducing the risk of complications and improving patient outcomes. The efficiency gains offered by AI are particularly noteworthy. Traditionally, the process of fracture detection involves manual examination of radiological images, a task that can be time-consuming and subject to human error. AI algorithms can automate this process, allowing for faster and more consistent evaluations. This efficiency is crucial, especially in emergency situations, where timely diagnosis is paramount. AI systems do not replace healthcare professionals but serve as valuable decision support tools. The biomimetic structure of CuNWs has dramatically increased CHF and heat transfer coefficient (HTC) than that of a plain surface and a solid biomimetic structure. A theoretical analysis of the liquid thin film beneath hovering bubbles reveals that the population density of vapor stems in the liquid thin film increases with a decrease of the vapor stem diameter as heat flux increases. Moreover, the porous biomimetic structures take advantage of active nucleation sites and their wicking effect to delay the hydrodynamic instability of the liquid thin film, thus increasing the pool boiling heat transfer. Biomimetic catalysts have drawn broad research interest owing to both high specificity and excellent catalytic activity. Herein, we report a series of biomimetic catalysts by the integration of biomolecules (hemin or ferrous phthalocyanine) onto well-defined Au/CeO2, which leads to the high-performance CO oxidation catalysts. Strong electronic interactions among the biomolecule, Au, and CeO2 were confirmed, and the CO uptake over hemin-Au/CeO2 was roughly about 8 times greater than Au/CeO2. Based on the Au/CeO2(111) and hemin-Au/CeO2 (111) models, the density functional theory calculations reveal the mechanisms of the biomolecules-assisted catalysis process. They can assist radiologists and orthopedic specialists by highlighting potential fractures, providing quantitative data, and offering additional insights that aid in making informed clinical decisions. This collaborative approach between AI and healthcare professionals can enhance the quality of care delivered to patients. While the potential benefits of AI in fracture detection are significant, several challenges and limitations must be considered. These include the need for large and diverse datasets to train AI models effectively, concerns regarding data privacy and security, and the requirement for ongoing model validation and updates to maintain accuracy. The integration of AI into healthcare also raises ethical questions, such as the responsibility for AI-generated diagnoses and the potential for biases in AI algorithms. It is essential to address these ethical concerns proactively through guidelines and regulations to ensure the responsible use of AI in healthcare. Through the utilization of advanced image recognition algorithms and machine learning models, AI systems can accurately and rapidly identify intertrochanteric fractures from medical imaging, such as X-rays and CT scans. This not only reduces the burden on healthcare professionals but also enhances the speed and accuracy of diagnosis, leading to quicker treatment decisions and improved patient outcomes [8-10].

Conclusion

The study on "Unlocking Intelligent Healthcare: AI-Enhanced Detection of Femoral Intertrochanteric Fractures" has shown promising results and implications for the field of healthcare. In conclusion, the integration of artificial intelligence (AI) into the detection of femoral intertrochanteric fractures has the potential to revolutionize the way we diagnose and treat these injuries. Additionally, the AI-enhanced detection of intertrochanteric fractures has the potential to improve access to healthcare services, especially in underserved areas where there may be a shortage of specialized medical professionals. Telemedicine and remote diagnostic capabilities can be enhanced through AI, ensuring that patients receive timely and accurate assessments regardless of their geographical location. However, it is essential to note that while AI offers significant advantages in healthcare, it should be integrated carefully and ethically.

Acknowledgment

None

Conflict of Interest

None

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