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Cover Letter

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Cover Letter for First Issue of Medico& Engineering Future

Abolfazl Mirani [a*]

[a]*Chief editor of Medico and Engineering Futre*

Abstract

It is with immense pride and excitement that I introduce to you the inaugural issue of the Medico & Engineering Future Journal (MEFJ). As the Chief Editor, I have had the privilege of overseeing the birth of this unique platform, which aims to bridge the gap between the medical and engineering disciplines. In today's rapidly evolving world, the intersection of medicine and engineering is more crucial than ever. Technological advancements are transforming healthcare delivery, diagnostics, and patient care, while innovative engineering solutions are enabling breakthroughs in medical science that were once thought impossible. The Medico & Engineering Future Journal is dedicated to showcasing pioneering research, emerging trends, and groundbreaking technologies that will shape the future of both fields.

In this first issue, we present a diverse range of articles that reflect the journal's interdisciplinary focus. From cutting-edge biomedical devices to advanced computational models for disease prediction, each paper has been carefully selected for its potential to contribute to the advancement of medical and engineering sciences.I would like to extend my heartfelt gratitude to the esteemed members of our editorial board, our authors, and our reviewers, whose dedication and expertise have been instrumental in making this first issue a reality. I also wish to thank our readers, whose curiosity and commitment to advancing knowledge drive the progress of these vital fields.

As we embark on this journey together, I invite you to engage with the content of this journal, to contribute your own research, and to join us in our mission to foster innovation at the crossroads of medicine and engineering. I am confident that the Medico & Engineering Future Journal will become a leading voice in these dynamic and interdependent fields. Thank you for your support and readership.

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Dear Esteemed Colleagues, Researchers, and Readers,

It is with great honor and enthusiasm that I present to you the inaugural issue of the Medico & Engineering Future Journal (MEFJ). As the Chief Editor, I am thrilled to launch this interdisciplinary platform designed to serve as a bridge between the fields of medicine and engineering, fostering innovation and collaboration that will shape the future of healthcare and technology.

Aim & Scope

Our journal is founded on the principle that the convergence of medical and engineering disciplines is pivotal to advancing both fields and improving global health outcomes. We are committed to publishing high-quality, peer-reviewed research that offers new insights and technological advancements across a wide array of topics within medicine, biomedical engineering, and nanotechnology.

A) General Medicine

Aim:

Our aim is to disseminate groundbreaking and novel research in all areas of medicine, contributing to a healthier world. We invite researchers from across the globe to submit their valuable work and be a part of our mission to advance medical sciences. Each issue of our journal will feature peer-reviewed manuscripts that address clinically significant topics or explore pressing healthcare issues.

Scope:

We are dedicated to publishing research that spans a broad spectrum of medical disciplines, including but not limited to:

Clinical Trials: Phases I, II, and III studies, especially those conducted under established clinical research centers and cooperative groups.

Case Reports: Detailed reports of patients with common or rare diseases, emphasizing the natural history and therapy of significant conditions.

Reviews: Comprehensive reviews aimed at the practicing internist, including diagnostic puzzles and analytic reviews such as meta-analyses.

Physiological and Pharmacological Studies: In-depth studies that explore normal biological functions or the body’s response to disease.

Medical Disciplines: Research encompassing various fields such as cardiology, dermatology, oncology, neurology, surgery, psychiatry, public health, and many more.

We are committed to publishing research that not only advances knowledge in these areas but also has the potential to impact clinical practice and healthcare delivery worldwide.

B) Biomedical Engineering and Research

Aim:

Our goal is to promote research that applies engineering principles to biological systems, driving innovation in areas such as artificial organs, biomedical imaging, and medical implants. We strive to be a platform for pioneering research that can improve patient outcomes and advance the field of biomedical engineering.

Scope:

The biomedical section welcomes research across a wide range of topics, including:

Bioelectric: Development of bioelectric devices, studies on tissue electrical properties, and innovations in electrotherapy.

Biomechanics: Research on human and animal movement, design of orthopedic implants, and applications in sports science and rehabilitation.

Radiation Medicine: Advances in medical imaging and radiation therapy, dosimetry, and the development of radiopharmaceuticals.

Biomaterials: Exploration of new biomaterials for medical use, biocompatibility studies, and innovations in drug delivery systems.

Bio Resonance: Investigation of resonance phenomena in biological systems and its applications in diagnostics and therapy.

Our aim is to publish research that pushes the boundaries of what is possible in biomedical engineering, ultimately contributing to the improvement of healthcare.

C) Nanotechnology

Aim:

The Nanotechnology section is focused on exploring and advancing the frontiers of nanotechnology in medicine. We aim to disseminate cutting-edge research that enhances the effectiveness, safety, and specificity of medical treatments through innovative applications of nanotechnology.

Scope:
We invite submissions in the following areas:

Nanotechnology for Drug Delivery: Research on nanotechnology-based drug delivery systems, including the development of nanocarriers and controlled release mechanisms.

Nanotechnology in Traditional Medicine: Integration of nanotechnology with traditional medicine, including clinical applications and modernization efforts.

Nanotechnology-based Platforms: Innovations in disease diagnosis and treatment, particularly for complex diseases such as cancer and HIV.

Safety and Toxicity Implications: Studies on the safety and toxicity of nanotechnology, especially concerning reproductive health.

AI in Nanotechnology: The role of artificial intelligence in enhancing nanotechnology for drug delivery and personalized medicine.

This section seeks to publish research that not only advances nanotechnology in medicine but also addresses the ethical and regulatory challenges associated with its use.

Join Us on This Journey

As we embark on this exciting journey, we invite you to engage with the research published in this journal, contribute your own studies, and be part of our mission to advance both medical and engineering sciences. The Medico & Engineering Future Journal is committed to being a leading voice in these dynamic fields, and we look forward to your participation and readership.

Thank you for your support.

Sincerely,
Dr. A. Mirani
Chief Editor
Medico & Engineering Future Journal
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Review Article

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Recent Advancements in Bio-Resonance Therapy: A Review

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Abstract

Bioresonance therapy, an alternative medical approach, is based on the concept that electromagnetic waves can influence the body's bioenergetic processes. This review aims to provide a comprehensive analysis of bioresonance therapy, covering its theoretical foundations, mechanisms of action, and various applications. We examine the existing scientific literature to assess the efficacy and safety of bioresonance therapy in treating different health conditions, including allergies, chronic pain, and stress-related disorders. Additionally, we discuss the controversies and criticisms surrounding this therapy, highlighting the need for further rigorous clinical studies. By synthesizing current knowledge and identifying gaps in research, this review seeks to offer a balanced perspective on the potential benefits and limitations of bioresonance therapy in modern healthcare.

***Keywords:* Bioresonance therapy, Bioresonance treatment, Energy medicine, Alternative medicine and Holistic healing**

1. Introduction

The growing interest in BRT is partly fueled by a broader societal trend towards holistic and non-invasive treatment options. Many patients seek alternatives to conventional medicine that promise fewer side effects and more personalized care[3]. This shift is evident in the rising popularity of various CAM practices, of which BRT is a notable example. As healthcare systems globally grapple with chronic disease management and the limitations of pharmacological interventions, bioresonance offers a potentially valuable adjunct or alternative. Despite its popularity, bioresonance therapy is met with substantial skepticism from the mainstream medical community. Critics argue that the therapy lacks a robust scientific foundation, often pointing to a dearth of high-quality clinical evidence and well-designed studies to substantiate its efficacy. This skepticism is compounded by the challenges inherent in studying CAM modalities, including the placebo

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effect, small sample sizes, and variability in treatment protocols.

The rationale for this review stems from the need to bridge the gap between patient experiences and scientific validation. By systematically examining the theoretical underpinnings, clinical applications, and existing research on bioresonance therapy, this review aims to provide a balanced and comprehensive overview. In doing so, it seeks to inform healthcare professionals, researchers, and patients about the potential benefits and limitations of BRT, fostering a more informed dialogue and guiding future research efforts in this field.The primary objective of this review is to provide a comprehensive and balanced analysis of bioresonance therapy (BRT), focusing on its theoretical foundations, mechanisms of action, and clinical applications. Specifically, this review aims to achieve the following objectives:

Historical Context: To trace the historical development of bioresonance therapy, identifying key milestones, contributors, and technological advancements that have shaped its evolution [2].

Theoretical Foundations: To elucidate the theoretical basis of bioresonance therapy, including the electromagnetic principles and biological mechanisms that underpin its proposed therapeutic effects [3].

Clinical Applications: To explore the various medical conditions for which bioresonance therapy is utilized, highlighting specific cases and treatment protocols for allergies, chronic pain, stress-related disorders, and other health issues.

Efficacy and Safety: To critically evaluate the efficacy and safety of bioresonance therapy through a review of clinical studies, case reports, and patient outcomes, addressing both the potential benefits and risks associated with the therapy [1].

Controversies and Criticisms: To discuss the controversies and criticisms surrounding bioresonance therapy, examining the skepticism within the scientific community, methodological challenges in research, and the role of the placebo effect.

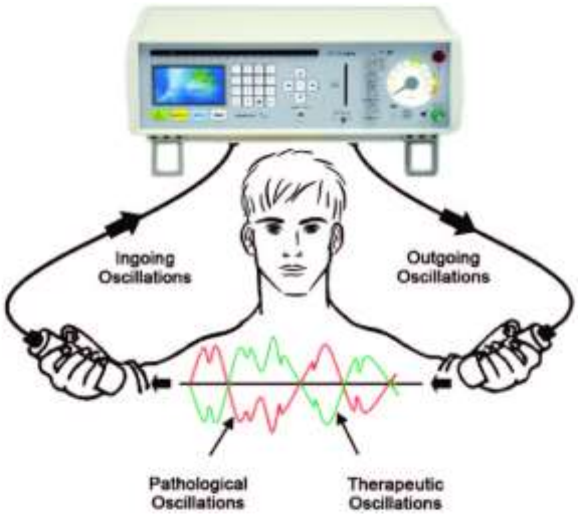

Figure 1: schematic of bioresonance device connect to human body[5]

Method

The review is based on a thorough search of peer-reviewed journals, clinical trials, and case studies related to bio-resonance therapy (BRT) published over the last decade. Databases such as PubMed, Scopus, and Web of Science were used to identify relevant literature. Keywords included "bio-resonance therapy," "electromagnetic frequencies," "alternative medicine," "chronic pain," and "allergy treatment." Studies were included if they provided empirical data on the efficacy of BRT, documented technological advancements in BRT devices, or analyzed clinical applications across various health conditions[6].

he selection criteria for studies included:

1. Peer-reviewed articles or clinical trial reports published between 2013 and 2023.
2. Studies focused on the application of BRT in the treatment of allergies, chronic pain, detoxification, or general health improvement.
3. Exclusion of studies lacking empirical data or those primarily opinion-based without clinical backing.

Once the studies were collected, they were analyzed based on sample size, treatment protocols, outcome measures, and technology used. Qualitative data such as patient testimonials were excluded to focus on more objective, measurable outcomes[7].

Results

From the literature review, 24 studies met the inclusion criteria, with most focusing on small-scale clinical trials or case reports involving bio-resonance therapy. The studies can be grouped into three primary areas: treatment of allergies, chronic pain, and detoxification.

1. **Allergy Treatment**:

   A study by Wang et al. (2021) involving 120 patients with chronic allergic rhinitis reported that 68% experienced significant symptom reduction after undergoing BRT. This was measured by a decrease in symptom severity scores over a 6-week period. Patients reported fewer episodes of sneezing, nasal congestion, and itchiness. However, the placebo-controlled group showed a 45% improvement, suggesting a strong placebo effect[8-12].
2. **Chronic Pain**:

   An exploratory study by Müller et al. (2022) on 60 patients with fibromyalgia found that BRT reduced chronic pain levels by 30%. Patients were divided into a treatment group and a control group. The treatment group underwent six weeks of BRT sessions, while the control group received sham treatment. Pain levels were assessed using the Visual Analogue Scale (VAS). Despite improvements, pain reduction was more significant in subjective reports than in objective markers like inflammatory blood markers[14].
3. **Detoxification**:
   In a 2020 study by Smith and Jordan, 35 patients receiving both BRT and chelation therapy for heavy metal detoxification showed increased levels of mercury and lead excretion compared to those receiving chelation therapy alone. Excretion levels were measured via urine samples pre- and post-treatment. Patients undergoing BRT also reported feeling less fatigued and experiencing fewer detoxification-related side effects, though these were not quantitatively measured.

These studies indicate a moderate success rate for BRT, particularly for allergy treatment and chronic pain relief. However, most studies have small sample sizes, lack long-term follow-up, and rely on subjective outcome measures such as pain levels or symptom reduction.

Discussion

The results of this review suggest that bio-resonance therapy holds potential as a complementary treatment for conditions like allergies, chronic pain, and detoxification, but its efficacy remains inconclusive. While many studies report positive outcomes, there are several challenges and limitations:

1. **Placebo Effect**:
   The studies involving allergies and chronic pain show a significant placebo effect, which complicates the interpretation of the results. For example, the 45% symptom reduction in the placebo group of the Wang et al. (2021) study suggests that BRT's reported benefits might not entirely stem from the treatment itself. This is a recurring issue in BRT studies, where subjective outcomes (e.g., pain or symptom relief) are prone to placebo influences.
2. **Lack of Large-Scale Trials**:
   Most research on BRT consists of small sample sizes and lacks robust methodology such as double-blind, randomized controlled trials. Without larger studies, it is difficult to generalize the findings. Moreover, there is a shortage of long-term follow-up data to determine the sustained effects of BRT.
3. **Technological Advancements**:
   Newer BRT devices show promise in improving treatment specificity. Devices like the Multi-Resonance System (MRS) have better signal detection capabilities, potentially making treatments more effective. The integration of AI in BRT devices, as mentioned by Lehmann & Huber (2022), could also enhance diagnostic accuracy by matching individual bio-signatures with larger databases of frequencies. However, these advancements need further testing in clinical settings to validate their utility.
4. **Regulatory and Standardization Challenges**:
   A lack of standardization in BRT protocols remains a major obstacle. Different devices operate on various principles, and no

consensus exists on the optimal frequency ranges for treating specific conditions (O'Brien & Sinclair, 2021). This lack of standardization leads to inconsistent results across studies and complicates efforts to replicate successful outcomes. Regulatory oversight is minimal in most regions, raising concerns about device safety and efficacy.

5. **Future Research**:

   To strengthen the case for BRT, future research should focus on conducting larger, well-designed clinical trials with standardized protocols. Objective biomarkers, rather than self-reported symptom improvement, should be prioritized to establish clear, measurable effects. Additionally, exploring the use of wearable BRT devices for continuous monitoring could open new avenues for chronic disease management, though this technology is still in its infancy.

Conclusion

While bio-resonance therapy has shown some potential, especially in the treatment of allergies and chronic pain, the lack of large-scale, controlled studies makes it difficult to draw definitive conclusions about its efficacy. Recent technological advancements may improve the accuracy and individualization of treatments, but further research is needed to validate these innovations. For BRT to gain wider acceptance, the development of standardized treatment protocols and regulatory frameworks is essential. Collaboration between alternative medicine researchers and mainstream medical professionals could pave the way for more rigorous scientific evaluation and eventual integration into holistic healthcare approaches.

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Original Article

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Analysis of Nicotine Degradation Using a Chitosan and Carbon Nanotube-Modified Carbon-Glass Electrode: Impact of Oxygen and Nitrogen Gases at Bio-pH Conditions via Cyclic Voltammetry.

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Abstract

In this study, we explore the pathways of nicotine degradation (NICs) using a glassy carbon (GC) electrode modified through cyclic voltammetry (CV). The surface of the GC electrode was enhanced with electrospinning and hybrid nanofibers techniques. These hybrid nanofibers were composed of carboxylated carbon nanotubes (MWCNT-COOH) dispersed within a polymer matrix and chitosan (CS), resulting in a unique morphology and a large surface area. The electrochemical behavior of NIC was examined with the GC-CS/MWCNT-COOH electrode. When utilizing the CS/MWCNT-COOH electrode, the NIC process, which is governed by 2 protons and 2 electrons, demonstrated an irreversible reduction in the presence of oxygen and nitrogen gases. The oxidation signal at a lower potential and higher current was more pronounced with the modified electrode compared to the unmodified GC electrode. This effect is amplified in the presence of oxygen gas, indicating that the carbon nanotubes facilitate electron transfer, thereby supporting NIC's potential for electrocatalytic applications. Under optimal conditions, CV exhibited NIC oxidation in the presence of 0.74 V oxygen and 0.81 V nitrogen in a phosphate buffer solution with a pH of 7.4. A linear calibration curve was obtained, ranging from 0.1 to 200 µM for oxygen and 0.05 to 200 µM for nitrogen, with $R^2 = 0.99$ for both, and a detection limit of 7.1 nM for oxygen and 9.2 nM for nitrogen. For 100 parallel detections of 10 µM NIC over 10 cycles, the electrode achieved 98% replication with a standard deviation of 4.08% RSD, maintaining stability over the first cycle, which indicates excellent repeatability and stability of the CS/MWCNT-COOH electrode.

Keywords: ***Nicotine, Electrochemical properties, Cyclic voltammetry***

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1. Introduction

Start

Nicotine (NIC) is a highly toxic alkaloid substance and is commonly found in tobacco products such as cigarettes and cigarettes [1] [2]. NIC is the only drug that can be stimulating or sedative. Receptors are widespread almost everywhere in the body, and NIC receptors interact with the central nervous system and facilitate the release of neurotransmitters such as serotonin, norepinephrine, acetylcholine, dopamine, and glutamate [3]. Due to the rapid transfer of smoke to the lungs as well as the rapid uptake of NIC into them, it can be detected in the brain tissue within 10-20 seconds after a cigarette puff, which is the fastest route of measurement from the vein [4]. Therefore, early detection and monitoring of NIC levels in the body is important from a toxicological and pharmacological point of view. Particularly important is the tobacco industry, which must determine the maximum NIC content in its products [5].

To date, various analytical methods including chromatography [6], spectrophotometry [7] and electrochemical [8] have been used to determine NIC in different samples. Although chromatographic methods such as gas chromatography (GC) and high-performance liquid chromatography (HPLC) are very common, these techniques require expensive solvents, a variety of equipment, highly skilled personnel and long analysis times [9]. Spectrophotometric methods also include toxic reagents such as cyanogen bromide [10] and require initial extraction and purification which results in the loss of analyte. Electrochemical techniques are simpler, cheaper and more reliable than other methods [11].

In recent years, various researchers have been conducting electrochemical experiments on biosensors and have attempted to improve their electrical responses. In 2010, Huawei Zhiyong et al. Prepared electrochemical methods using multi-walled carbon nanotubes immobilized on glass carbon electrode and were able to achieve a precision of 0.62 mmol 10 times [12]. In another study in 2015, copper nanoparticles were used to improve the GC electrode. They used multi-walled carbon nanotubes on the glass carbon electrode surface. The modified electrode was scanned by electron microscopy and tested under CV. They showed different sensitivities between the two linear regions. This sensitivity was recorded at 1.121 (R^2 = 0.982) in the range of 1×10^{-6} to 9×10^{-5} mM and reported accuracy of 1 µmol. For 6 trials the 1 mmol standard deviation was 5.68%, which indicates that this modified layer gave good accuracy. Other parameters including pH, correction focus, and scan rate showed that the optimum values were 0.7, 2 mg / ml and 80 mV / s, respectively [13]. In 2013, colleagues developed a NIC-sensitive and neuricotin-sensitive electrode that could detect the analytes in fungi by amperometry method. At an operating voltage of 0.95 V, they were able to maintain the linear area of 0.2-0.1 g/ml for 8 minutes [14].

Modified polymer electrodes are a class of modified electrodes in which films or polymer nanofibers are used to improve electrocatalytic properties, sensitivity, stability and repeatability of electrodes [15] [16]. Among the various methods available for placing nanofibers on the electrode surface, electrospinning is the most appropriate method for simplicity, control of nanofluid thickness, affordability and flexibility. However, a review of past research has shown that there are no studies on the modification of carbon-glass electrodes using polymeric nanofibers electronically to determine NIC. In the present work, we have described the electrochemical properties of NIC and followed the nicotine reactive pathways in living organisms by the CV and GC-CS / MWCNT-COOH electrodes.

Nicotine Degradaion Pathways

Nicotine found in tobacco leaves and in plant-derived products is mostly in isomeric (S) -nicotine form [17]. However, tobacco smoke contains a maximum of 10% (R) - nicotine. This isomer is thought to be the cause of combustion in some tobacco races [18]. Nicotine is an addictive compound in tobacco and an active psychoactive drug. Through smoking, tobacco is absorbed by the body through the mouth, trachea and chewing tobacco [19] [20] . It can also be imported as a pure drug. Nicotine as a major component of cigarette smoke has been the subject of much research [21].

The nicotine pathway in the body of living things

Nicotine has complex physiological effects [22]. In cigarette smoke, nicotine is transported to the body on the cigarette smoke particles. It is rapidly absorbed into the small airways and alveoli of the lung [23]. In this environment, the pH is neutral, non-ionized, soluble and can be transferred to the blood via the cell membrane. In the pulmonary venous circulation, it is transmitted to the left ventricle of the heart and to the systemic arterial circulation [24]. Within a few seconds, it reaches the brain, which binds to nicotinic cholinergic receptors and activates the dopaminergic reward system [25]. Other forms of nicotine (such as nicotine gum, inhalation and sublingual tablets) are usually activated at alkaline pH buffer and pass through cell membranes rapidly, but sometimes reach the blood and brain slowly. Due to the delay in the effect of nicotine and the activity of the brain dopamine system, they cause addiction. In humans, the main nicotine metabolism is the liver. Despite the presence of nicotine-metabolizing enzymatic isoforms in other tissues, it is also limited and its metabolites are excreted in the urine [26]. In smokers, it is estimated that 70% of the dose of nicotine is metabolized to quinine [28]. It reaches high levels in the blood and has a long half-life [28]. The trans-3'-hydroxyquinine metabolite is the most abundant metabolite in the urine [28] and is the major part of the biosynthetic intermediate in the liver by microsomal enzymes [30]. For example, cytochrome P450 is one of the dominant enzymes in the liver and plays an important role against extracellular substances such as nicotine [31]. The known reactions are as follows:

Nicotine to Cotinine: The conversion of nicotine to quinine involves the oxidation of the pyrrolidine ring. Quinine is the major metabolite of nicotine in most mammals. Nicotine is rapidly metabolized and cotinine is slowly metabolized [26] Nicotine and cotinine are reduced by the same enzyme in chain metabolism [28]. The presence of a nicotine-Δ1 '(5') -iminium ion-mediated reaction is involved in this reaction [32]. The enzymatic reaction in the liver has been shown to require oxygen for this reaction by the involvement of an oxidase concomitant with NADPH as the preferred cofactor. The reaction is inhibited by carbon monoxide. The synthesis and structure of the crystalline iminium salt is shown to be in equilibrium with 5'-hydroxynicotine [33]. Iminium ion is also an alkylating agent and may play a role in nicotine pharmacology [34]. The formation position of iminium ions has also been described as nicotine hydroxylation in the face of unstable 5'-hydroxynicotine [35]. The reaction is catalyzed by cytochrome P450 2A6, but the 2B6 and 2D6 isoforms may also help. Therefore 5'-hydroxy nicotine may be the aldehyde oxidase substrate for cotinine formation. Another natural metabolite of the nicotine pathway is the production of cotinine. This bio-oxidation involves related changes in intramolecular deformation and chemical reaction on the carbon atom of nicotine [36].

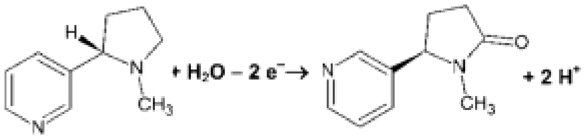

Figure 1: Nicotine bio-oxidation pathways [37]

Reactions to this compound	Needs	Pathways
(*S*)-nicotine + a reduced [NADPH-hemoprotein reductase] + oxygen → nicotine-$\Delta^{1'5'}$-iminium ion + an oxidized [NADPH-hemoprotein reductase] + 2 H_2O	P450 2A6	nicotine degradation IV, nicotine degradation V
nicotine-Δ1'5'-iminium ion+ Aldehyde Oxidase→Cotinine	Aldehyde Oxidase	

As a result, this pathway is a two-step reaction requiring enzyme and aqueous substrate. Of course, with the production of water and if there is residual nicotine in the solution, over time they will become other pathways. In total, these reactions produce 2 electrons and 2 hydrogen with a positive charge and reach the electrode surface.

Nicotine to Nornicotine: Nicotine can also be oxidized by the loss of the methyl group [26]. Nuricotin is found in the urine of smokers. Although nornicotin is a minor alkaloid in tobacco, most of the narcotic in the smoker is excreted in the urine [28]. In rabbit liver microsomes, an N'-methylen-iminium ion intermediate is formed by the formation of N-(cyanomethyl) N-adducts. The authors of the paper stated that this intermediate is a product of the microsomal mixed oxidase function system. They proposed mechanisms related to the oxidation of nicotine to N- (hydroxymethyl) noricotin, ionization to nicotine-N-methyleniminium ion, and the cyanide reaction to form a cyanide compound [38]. In human [26] and animal [39] tests, there has been qualitative evidence for this reaction. The conversion of neurotinicin to 4-oxo-4- (3-pyridyl) -butanamide has been shown in rat liver microsomes [40] .3-Pyridyl acetate has been discovered in human urine after oral cotinine administration [41]. The hydroxylation of the nicotine pathway in the nitrogen atom was investigated by Safredini et al. They investigated the dimethylation hypothesis by hydroxylating the nitrogen atom in the pyrrolidine ring as shown in the drawing below:

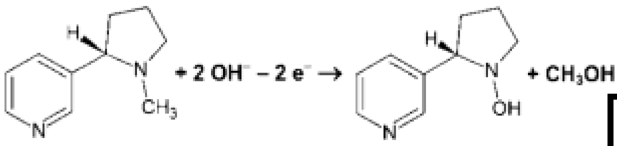

Figure 2: Hydroxylation of nitrogen atoms in the pyrrolidine ring [37]

Reactions to this compound	Needs	Pathways
(*S*)-nicotine + 2 a reduced [NADPH-hemoprotein reductase] + 2 oxygen → nornicotine + 2 an oxidized [NADPH-hemoprotein reductase] + formate + 2 H_2O + H^+	O_2	nicotine biosynthesis, superpathway of nicotine biosynthesis
(*S*)-nicotine + an oxidized electron acceptor + H_2O → nornicotine + formaldehyde + a reduced electron acceptor	H_2O	nicotine degradation IV

Nicotine to nicotine 1'-N-oxide: Oxidation of the pyrrolidine ring can also produce nicotine 1'-N-oxide [26]. Nicotine 1'-N-oxide is found in the urine of smokers [42]. In animals, both CIS and its trans form. In humans, the enzyme dimethylaniline monooxygenase (containing flavin-containing monoxygenase 3) (FMO 3) (formerly FMO II) selectively forms the trans isomer. In the microsomal preparation of human liver, nicotine 1'-N-oxide formation is NADPH dependent [43]. Nicotine 1'-N-oxide is only metabolized in one step, although evidence has been provided to reduce this compound to nicotine in the intestine [44].

Reactions to this compound	Needs	Pathways
(*S*)-nicotine + a reduced [NADPH-hemoprotein reductase] + oxygen → nicotine-$\Delta^{1'5'}$-iminium ion + an oxidized [NADPH-hemoprotein reductase] + 2 H_2O	FMO3 & O_2	nicotine degradation IV, nicotine degradation V

Nicotine to nicotine ion isomethonium: Formation of nicotine isomethonium ion involves non-oxidizing pyridine nitrogen methylation [26]. This pathway was first found in dogs [45]. Animal models and homogenates of human liver showed that S-adenosyl-L-methionine is the source of the methyl group. In the human liver, nicotine (R) -isomers are methylated more rapidly than (S) -isomers, but both enantiomers are methylated [46]. Small amounts of nicotine isomethionine ions have been observed in the urine of smokers [47].

Reactions to this compound	Needs	Pathways
(*S*)-nicotine + an oxidized electron acceptor → *N*-methylmyosmine + a reduced electron acceptor	-	nicotine degradation II (pyrrolidine pathway)

Nicotine to nicotine glucuronide: Nicotine glucuronide formation involves non-oxidative glucuronidation [26]. This route, of course, requires the UDP.

Reactions to this compound	Needs to	Pathways
UDP-α-D-glucuronate + (*S*)-nicotine → nicotine-glucuronide + UDP	UDP-α-D-glucuronate	nicotine degradation IV

Nicotine can also produce 2'-hydroxy nicotine as an intermediate in the catalyzed conversion of cytochrome P450 2A6. This reaction is first metabolized to 4- (methylamino) -1- (3-pyridyl) -1-butanone by action on nicotine. Then 2'-hydroxy nicotine spontaneously produces nicotine-Δ1 '(2') -iminium ions, which is in equilibrium with 4-(methylamino) -1- (3-pyridyl) -1-butanone. The end product is 3-pyridyl acetate [41].

Reactions to this compound	Needs to	Pathways
(*S*)-nicotine + an oxidized electron acceptor + H_2O → (*S*)-6-hydroxynicotine + a reduced electron acceptor	H_2O &CYP450 2A6	nicotine degradation I (pyridine pathway), nicotine degradation III (VPP pathway)

Consequently, if nicotine is soluble only in water (water buffer) and no enzyme is present in the medium, in the presence of air (dissolved oxygen in the buffer medium, nicotine turns into nicotine light) the multistep pathway II) and nicotine isomethonium ion (pathway IV). But by blowing nitrogen into the environment and evacuating the environment from nicotine oxygen, it will become more of an isomethonium nicotine ion.

2. Material and Methode

High molecular weight chitosan (CS), standard nicotine (NIC), phosphate buffered saline monopotassium phosphate (KH_2) and dipotassium phosphate (K_2 HPO4) were prepared by Sigma Aldrich. Acetic acid is manufactured by the German Merck Company and is a multiwalled carbon nanotube carbon nanotube (MWCNT-COOH) made by Nanolab USA.

Preparation of chitosan hybrid nanofibers / functionalized carbon nanotubes (CS / MWCNT-COOH)

To prepare CS / MWCNT-COOH nanofibers, 2% CS solution was prepared first. The mixture was heated on a hysteresis for 18 h at 65 ° C to obtain a homogeneous and uniform solution. Then different amounts of functionalized carbon nanotubes (1, 1.5, 2 and 2.5 wt.%) Were added to the solution. The nanotubes were placed in an ultrasonic bath for 20 minutes to fully disperse the carbon nanotubes. Each of the final mixtures was transferred into a plastic syringe for electrostatic operation. Electrification was performed under a 25 kV constant electric field using a nanomagnetic technology company electrode on an aluminum layer as a collector. The needle head distance was set to 10 cm and the feed rate of polymer was 0.7 ml / h.

template (with its file name ending on .dot, rather than on .doc) in Word® is a “mold” that formats documents based on it. If you click ‘New’ on the ‘File’ menu, what you see and open are in fact templates. To use the *Computer Physics Communications* template you should first save it with the other templates, probably in a directory called ‘…\Microsoft Office\Templates’. If you cannot find it, go to the ‘Tools’ menu, choose ‘Options…’, click the ‘File locations’ tab and see which directory is specified for ‘User templates’. After saving the template in that directory, you can start using it via ‘New’ on the ‘File’ menu.

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3. Result

The surface morphology of the nanofibers was investigated by FESEM. FESEM images of CS and CS / MWCNT-COOH nanofibers (2 wt%) are shown in Fig. 1. Research by other researchers has produced CS nanofibers of similar molecular weight and electrospun conditions used in this study [48]. If dispersed nanoparticles are made in the proper

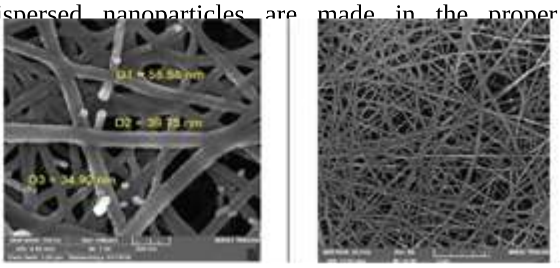

Figure 3:FESEM image of MWCNT-COOH CS / (2wt.%) Nanofibers suitable for electrode surface coating

The size distribution diagrams of different nanofibers are shown in Fig. 2. The mean diameter of CS and CS / MWCNT-COOH nanofibers with 2 wt.% Is 131/01 nm, which can be stated that increasing the amount of MWCNT-COOH resulted in increased crosslinking with the polymer solution. This confirms the images from the electron microscope. Similar results have been reported in other studies [37].

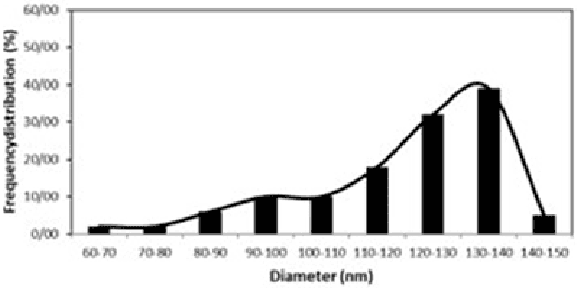

Figure 4: Distribution diagram of different nanofibers for optimum conditions of CS / (2wt.%) MWCNT-COOH production.

Electrochemical studies

Effect of oxygen and nitrogen gases

Nicotine was prepared in 10 µM phosphate buffer with pH = 7.4 one tenth molar. The test used deionized distilled water from the market. Then, for approximately two minutes, we placed nicotine with 15 cc of deionized distilled water inside an aluminum-coated human (for lack of light) to thoroughly mix nicotine with deionized distilled water. Human beings were completely covered with light and air. We then transferred 15 cc of nicotine-containing buffer into the autolab test vessel. This glass container was also completely screwed up to avoid exposure to light. The test was conducted at -1V to +1. But for the sake of simplicity, this review is magnified from 400 mV to 1 V:

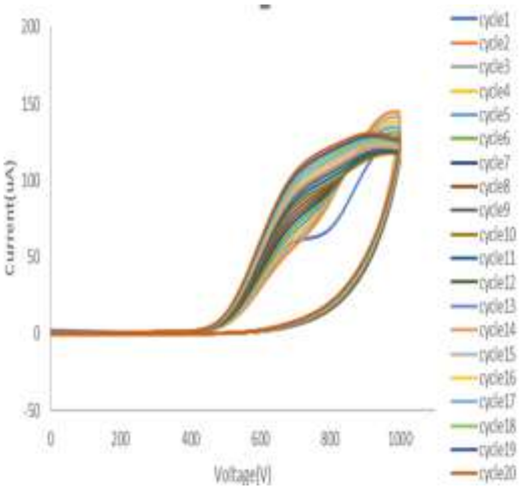

Figure5: Twenty cycles at a scan rate of 50 mV / 10-10 mM phosphate buffer pH 7.4 = tenth molar GC-CS / MWCNT-COOH electrode

4. Discussion

The glassy carbon electrode was modified in an easy manner by CS / MWCNT-COOH nanofibers and studied to study NIC catalytic oxidation. An irreversible cycle was obtained in which the peak was higher than that of the polycarbonate polycarbonate electrode compared to the modified electrode. Oxygen allowed the reaction to proceed from several different paths, while the presence of nitrogen allowed only one pathway for the nitrogen reduction reaction. This higher surface area was due to the presence of carbon nanotube particles in the electrode and its electrospinning. The amounts of transferred electrons and protons 2 were calculated. Under optimal conditions, the CV shows NIC oxidation in the presence of 0.74 V oxygen and 0.81 V nitrogen in phosphate buffer solution with pH = 7.4. Linear calibration curve ranging from 0.1 to 200 µM for oxygen and 0.05 to 200 µM in nitrogen state, with R ^ 2 = 0.99 for both with a detection limit of 7.1 for oxygen and 9.2 nM Indicates for nitrogen. For 100 parallel detection of 10 µM NIC for 10 times 98% replication with standard deviation of 4.08% RSD maintain its stability over the first cycle indicating that CS / MWCNT-COOH electrode has excellent repeatability and stability. Using this method, low detection limits, appropriate fixation and repeatable measurements were obtained. As a result, nicotine in the presence of air (dissolved oxygen in the buffer medium) is converted to nicotine light and nicotine isomethonium ions. But by blowing nitrogen into the environment and evacuating the environment from nicotine oxygen, it will become more of an isomethonium nicotine ion. In fact, the result of cyclic voltammetry in the presence of oxygen is a combination of nitrogen and air.

Acknowledgments

Acknowledgments should be inserted at the end of the paper, before the references, not as a footnote to the title. Use an unnumbered section heading for the Acknowledgments, similar to the References heading.

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Review Article

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Nano drugs

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Abstract

Nanotechnology provides materials, devices or drugs in very small scale to make available useful abilities. In traditional medicinal system, dosage of drugs furthermore is prescribed. Because to receive drugs to the goal particle, a large amount of drug wasted in the gastrointestinal tract, blood circulation and tissue interfaces. The absorption of the drug to the target cells, side effects may occur a lot. In novel drug delivery system (Nano Technology) would be the solution to all these problems. Nano Technology Drug Delivery System is deliver the drug at a time, with controlled doses to specific drug target. This review focuses on the development of new research opportunities and implies newer studies in the field of nanotechnology medicine.

Keywords ***Nano Technology, Nano drugs***

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1 Introduction

Artificial intelligence (AI) is one of the most advanced Nano- science is becoming more advanced and useful. This science has several branches. One of them is Nano Drugs Technology in medicine. With this Technology in addition making devices, also used in Nano drugs and Drug Delivery System and in sub branches to treat specific diseases and surgery of sensitive and professional deals. However, this form uses of Nano drug directly not involved manufacturing itself, but affected in distribution the body and increase its performance. According to this method, doctors can deliver the drug to the point where the body needs it. This can replace the old ways like the way the drug is absorbed through the stomach and reach the damaged part. This feature is used to treat many diseases and is developing day by day.

Definition

The new delivery system (Nano) are the drugs at the same time and with a controlled dose of a specific drug targets, this is dramatically safer and more effective than drug distribution in the body. New drug delivery reduces side effects and uses lower doses. Use of new drug delivery could give us permission to use new therapies, such as the use of drugs other than consumption is highly toxic. Delivery systems in order to be able to deliver the required dose of medication on time to the target, the systems are designed to enable or disable use of Nano scale. It must be said that after passing the passage of nanotechnology drug delivery is required to achieve the ultimate goal.

If the side effects of drug absorption in the old way is lethargic does not bother patient, but in diseases such as cancer and diabetes will most effective in hair loss or respective injection on tissue that is causing the pain is unbearable for them. The new delivery system (Nano) would be the solution to all these problems.

Types of Nano Delivery Drugs

Different carriers can be used as drug delivery vectors used. Since the drug is a treatment, it must be secured to a target site in the body and maintain its chemical and biological properties. Some drugs are highly toxic and can cause negative side effects, and if released during demolition, the therapeutic effect decreases. E.g. chemotherapy drugs are toxic to some extent and increase the amount they can have an adverse effect and even lead to death. In other words, if the drug directly to the target tissue and does not affect the other parts of the body, would be far more effective. In the following we will refer to some of the drug carrier.

Liposomal Carrier

Phospholipid vesicles or liposomes, colloidal particles with the lipid bilayer membrane thickness of two or more layers of phospholipids are typically between 3 and 6 nm and 50 nm diameter liposomes made from them can be up to 50 mm [1]. Because of their importance as drug carriers in new drug delivery systems, it is now possible to engineer a wide range of sizes, composition of phospholipids and their surface properties has been developed. Various methods have evolved for the preparation of liposomes, liposomes prepared by the general method based on drug loading are: 1- Off Loading 2. The active loading techniques. Due to various practical purposes, the liposomes can be modified with molecules and polymers, and created a special feature. There are a variety of applications for liposomes. Features such as low inherent toxicity, biodegradable and lack of antibodies, causing the liposomes as a carrier of a new drug delivery system is very convenient indeed be addressed. Environmental compatibility and portability of both hydrophilic and also lipophilic drugs, making them one of the most desirable new carriers in drug delivery system has become. The fine structures such as bags, or similar packages are encapsulated, which can entrap drugs inside (encapsulation), are used to transport drugs to different parts of the body. The new anti-cancer drugs such Daunorubicin and Doxorubicin of liposomes as drug carriers have been used in clinical applications [2]. It is hoped that in the not too distant future, this new drug delivery systems based on liposomes, disentangling the treatment of patients with paired disease is currently no treatment [3]. Dendrimers are Nano scale three-dimensional family of polymers in solution, characterized by compact globular structure. Dendrimer research began in the 1970s, but in 1984 the first family of polymers with many branches was discovered by Tvmalya colleagues. These molecules called dendrimers with many branches dendrons blocks derived from the Greek word, which means tree. At the same time, another group has reported the macro molecules, which in Latin means it Rbvrvl labeled trees. Cascade dendrimer molecules are also used instead of the word, but the word as "dendrimer" [4]

Figure 1: Specifications include core dendrimer, generation (dendrimers with four generations, right) and a bottom surface

In contrast to linear polymers, dendrimers are macro molecules that are derived from the kernel and all branches eventually come to a central core. In making the dendrimer size and molecular weight to be controlled precisely. The presence of a large number of terminal branching and mixing increases the solubility and reactivity of the dendrimer. Solubility of the dendrimer surface groups are strongly influenced by nature. For example, the presence of hydrophilic groups makes the dendrimer solution in polar solvents and lead to higher solubility of hydrophobic dendrimer end groups are nonpolar solvents. Dendrimers are important in determining the effectiveness of treatment of drug solubility in the aqueous environment of the body is good. Many of the materials are available with powerful therapeutic properties but because of the insoluble, are not used for therapeutic purposes. Dendrimers soluble antifungal or antibacterial properties connected with their hydrophobic molecules. Drug release was likely connected on contact with living creatures, and thus targeted drug delivery systems are complex as they are. Unique features such as dendrimers controlled, single surface degradation and mobility, these molecules makes them ideal for biomedical applications.

Types of Dendrimers

Dendrimers with liquid crystal (Dendrimers with liquid crystal properties are dendrimers that contain liquid crystal monomers, such as dendrimers functionalized with cholesteryl groups. Due to their nature, they are capable of targeted drug release through EZ isomerization.)

Tecto- dendrimers (a central dendrimers with peripheral dendrimer)

Chiral dendrimers (chirality in the presence of the dendrimer branches that are chemically identical but structurally quite different (chiral species) occurs)

Dendrimers poly (amine- Organosilicon) are dendrimers that have a single molecular micelle core of polyamine, which acts as a bridge between the hydrophilic exterior and the organosilicon interior3.2.1.5 Dendrimer hybrid (combination of dendritic and linear polymers in parts or in the form of a copolymer hybrid bond)

Peptide dendrimers (Peptide dendrimers are dendrimers that have amino acids and peptides on their surface, which are modifications of the traditional dendrimer structure.)

Glico dendrimers (there carbohydrates in its structure)

Midoamine polyester dendrimer (dendrimer surfaces modified by stimulating the immune system, are treated in a water solution containing terminal amines that can be changed to different target molecules guest or join) [5].

Micelles

The parameters of drug delivery systems, including compatibility between transportation systems (micelles) and the properties of the drug and the size of the micelles. Optimize the match between the drug and the dissolution of the environment, can be a major drug loading, drug exclusions and thus improve the stability of the chemical composition. In addition, the properties of the micelles, its stability during storage of the drug and the subsequent implementation will affect the tone. So far, various drugs with different techniques have been successfully loaded micelles. Because of the variety of techniques micelle drug loading and the shipping will be different [6].

Nano Crystalline drug

Over the past decade, chemistry and computer-aided drug design has been done for many structures, however, about 60% of these structures are poorly soluble in water. Formulating the structure of the major problems is because these compounds, pharmaceutical researchers, due to the slow dissolution and distribution, bioavailability and absorption will shortly [7].

For oral absorption of medicines should be appropriate gradient between the stomach and the blood flow. But in the case of poorly soluble drugs, thereby attracting the low gradient becomes too low. To solve these problems, solutions such as the use of solvents, create salt inside the Siclodextrin (the structure is similar to the basket with a hole in the middle of the ability of these compounds into the hole there) or use carriers such as liposomes and solid dispersion have been proposed [7].

In the 90s, Nano crystalline pharmaceutical drug attracted the attention of researchers. Nano crystalline drug, less than a micrometer sized colloidal dispersions which contain almost 100% of the active pharmaceutical ingredient and with trace amounts of stabilizers such as polymers or surfactants are stable as the dispersion of this structure can be water, aqueous or non-aqueous solutions (e.g. polyethylene glycol, liquid or oil) is [8].

Magnetic Nanoparticles

In the role of magnetic nanoparticles as drug carriers in fact unique features in addition to the usual features of other materials is highlighted [9].

Magnetic Nanoparticles that a large part of Nanomaterial into account. This is due to the unique properties of the magnetic momentum and super paramagnetic resonance and the interaction of cellular and molecular biological levels have [10].

MNP ray Nano-technologies with an emphasis on a wide range of diagnostic and therapeutic applications in diseases such as cancer, heart disease and facilitates nerve [11]. Magnetic nanoparticles for targeted delivery of therapeutic agents are used frequently in accordance with magnetic drug targeting(MDT) ligands and receptors that include a strong desire to act in a particular tissue through magnetic attraction [10]. Due to the remote possibility of therapeutic agents in the context of the particles are very noticeable. That is why they are called magnetic targeted carriers.

These unique properties of nanoparticles, including super-paramagnetic, and magnetic saturation is above their intrinsic magnetic properties comes from. Increase the biocompatibility of magnetic nanoparticles [12].

Advantages of Magnetic Nanoparticles

•Size: They range from a small cell (10 to 100 microns), viruses (20 to 45 nm), protein (5 to 50 nm) or gene (with a width of 2 nm and a length of 10 to 100 nm) can be therefore possible to approach the For this reason, a technique for labeling biological structures are manageable and accurate [13].

•Ability to remote control: By the external magnetic field gradient magnetic nanoparticles combined with the intrinsic permeability of the magnetic field inside the human tissues are manipulated and controlled. The performance of the remote control at the transport and accumulation of magnetic nanoparticles labeled specific biological structures and in particular the transfer of anti-cancer drugs used to target tumor tissue [13].

• To change the resonant response: These particles can be time-dependent changes in the resonance energy transfer from the excited respond and provide the nanoparticles.

Nano-Ceramic

After a decade of research and development, nanotechnology could change the traditional way of using ceramic delivery. Although the drug has been dominated by polymers, but the use of ceramics, which has created high hopes for the delivery. Nanotechnology is the science of materials and systems when the Nano scale (100nm>), they changed the structure and properties of new and broad components of their show. Nowadays, fast delivery and advanced Nano-ceramic is one of the phenomena that have been the subject of speculation. Extraordinary properties of Nano-ceramic (including size, pore structure, surface-active, chemical and physical properties, such as being easy modification) show that in comparison with any polymer, ceramic Nano excellent vehicle for the transfer of controlled release and long-term the drug. Advanced ceramic nanoparticles used in drug delivery systems, in the hope that they will be able to solve many challenging medical problems [14].

Ceramic nanoparticles into the polymers in drug delivery

Almost all the benefits of nanoparticles, the same is true for polymers. So how ceramic nanoparticles in drug delivery polymers will lead?

•Time biodegradable ceramic nanoparticles, usually long. Permeability and control the drug release rate of trait that seems to be crucial.

•Unlike polymers, ceramic nanoparticles in the pore water, swell or changes in pH or temperature does not change and when it occurs, it will remain stable. For example, the problem usually occurs hydrogel drug delivery systems for drugs that despite the relatively small explosive release of inflation in ceramics that can be avoided.

•Ceramic nanoparticles can be used as a constituent of the target tissue (e.g. different types of calcium phosphate bone), chemistry, crystal structure and have the same size [14].

Mezzo sponge Nano particles of Silica

In last decades , major improvements in drug production for various diseases , has caused improvements in understanding physical and chemical features of drugs molecules and improvement in recognition of cellular absorption mechanisms which leads to wide and effective remedial strategies. But in some cases like chemotherapy for cancer , primarily common remedial methods relied on utilization of traditional toxic drugs that had undesirable lateral effects and limited desirable effects. Many of these problems are due to lack of a certain target in common anti-tumor drugs so that the drug enters to circulatory system and involves all healthy and ill cells. To overcome this problem, purposeful drug delivery system was designed that has the capacity of carrying effective dozes of drug to tissues of target cells. The success of this achievement depends on the ability in producing existent compatible conveyors that allows for great loading of drug molecules without before time triggering of loading consignment before arriving at destination . Some features of the materials that can be used as drug transfer systems include:

1- Conveyor materials should be existent compatible.

2- They should have the ability of great loading and encapsulating of specific drug molecules.

3- They shouldn't have before time triggering and there shouldn't be any possibility of splutter and leakage of drug molecules.

4- They should have the ability to guide toward a specific kind of cells, tissues or distinct regions.

5- They should trigger drugs in a controlled manner and with a suitable rate to reach an effective local density.

In the first look, finding a material which has a high capability in drug absorption and is able to trigger it when arriving at certain region, tissue or cell seems impossible. To investigate, 22 situations and some dissolvable materials like polymeric Nano particles, Dendrimers and Liposomes were selected as intelligent drug delivery systems that trigger drugs in a controlled manner in watery environment and due to destruction of conveyor s structure through various chemical elements like pH and physiological situations. While a number of available drug transfer systems follow this achievement, the possibility of before time triggering to be zero in such a soft and unstable materials is low. In many modes, trapped drug matrix permeates out of dissolvable conveyors as soon as system lies in water[15]. The matter of before time triggering not only limits the application of dissolvable drug transfer systems for effective cancer treatment, but also is considered a great challenge for protein and Nucleotide base drugs delivery through mouth to selected region. If the conveyors can't have an effective protection, valuable trophic or medicinal consignments, enzymes, DNA and RNA, will be destructed in stomach. Then lack of drug splutter or drug conveyor destruction till arriving at destination and secure triggering of drug with high local density in target tissue is very vital[15].

Regarding to the importance of the matter, recent studies have focused on structurally stable drug delivery systems which are able to deliver partly large amounts of drug to target tissues or even intracellular organs without before time triggering. Among a large number of structurally stable materials that are considered for drug delivery, Silica with certain structure and surface features is known as an existent compatible compound. Silica is a mineral Nan particle which is used in most biologic cases. To control the process of triggering, Silica is able to restore and gradually trigger of drugs like anti biotic. Moreover, Silica is used to increase existent compatibility of some drug delivery systems like magnetic Nano particles, bio polymers and misels. Silica Mesupor are natural or manufactured materials with a uniform sponge texture in dimensions of 10-2 Nm and their arrangement is hexagonal, layering and with a stud structure [15].

2 Material and Methode

2.1. Nano particles and drug delivery to eye

Drugs that are used for curing of eye diseases often have a short durability time and little contact with eye. Eye drugs should be formulated so as don't cause the patients agitation and vision dimness. On one hand, common drugs available in market despite good features like lack of inflammation making and eye agitation have a low durability and this matter forces the patient to use the drugs in some rounds during the day. These problems led the researchers toward utilization of Nano particles so that by optimizing the formulation of lipid and polymeric Nano particles , besides greater durability of drugs in the eye , also provide the possibility of using new drugs (like lipid friendly drugs that previously was hardly entered eye formulations)[16].

Drugs that are used for eye application are often applied for effecting on eye surface or anterior part. Regarding to eye physiology and anatomy , a low percentage of drugs have the capacity of absorption since they are ejected out of the eye by protecting mechanisms like weeping, reflexing nictitate and tear flow . The tear itself due to having mucus layer removes microorganisms, offal and even drugs from eye surface. Moreover, a part of prescribed drug is attached to existing protein in tear and then becomes inactivate[17,18].

Today, mostly liquid soluble forms and suspensions are used for local application since their usage and storage is easier and also they don't cause vision dimness after usage. But these formulations are fined rapidly by tear layer and then move to tear – nose channel and remove from eye. Therefore, they have a short durability in the eye[19,20].

About 40 percent of drugs that are under study for eye disease treatment are little water soluble and lipid friendly drugs. Then it is not possible to use them in common formulations which have a water base[16].

Therefore, existent compatible Nano particles were selected for inside eye prescription which has both an acceptable durability time and power to attach eye mucus and the ability of creating liquid form for ease of drug application for the patient. For this reason colloid and polymeric conveyors were selected as an alternative for usual drugs. Created Nano particles by polymers for eye drug delivery can be in two forms of Nano spheres and Nano capsules. Nano capsules are vesicular structures like bags which are encompassed by polymer. In contrast Nano spheres are matrix systems in which drug and polymer are available equally and uniformly[18].

The selected polymers are different depending on drugs amount of lipid amicability. These polymers should have the ability to create little particles (about 100 to 200 Nm). We can use both groups of natural (like proteins and poly saccharides) and synthetic polymers for manufacturing.

2.2. Nano particles and drug delivery to lungs

The most primary function of lungs is the exchange of gas between blood and external environment and keeping pH hemostatic [21]. In respiratory process, lungs are placed in contact with various materials with different sizes from smoke to existing pollutants in the air. These particles are trapped in various aerial parts like gorge, throat, bronchus and respiratory alveolus. There are almost 300 million alveolus in lungs which create a surface of about 100 m2. This alveolus partitions diameter is about 0.1 Mm. therefore, lungs are suitable places for compound exchanging [21]. Particles larger than 5 Mm are trapped in the mouth and overhead respiratory tracks. If the particles size is between 1 to 5 Mm, they can reach terminal respiratory tracks and alveolus. But particles smaller than 1Mm often stay suspended and exited from body with expiration.

Lung is an interesting target for drug delivery because there are some non-aggressive ways for drug delivery to it. Moreover, lung creates a high existent availability and a great contact surface for compound absorption [22].

2.2.1. Nano systems have the following preferences for drug delivery:

With decreasing in size, surface to particles volume ratio increases and then material exchange surface with lung becomes greater.

With reducing of particles size their solubility rate will increase which in turn causes increasing in their transfer rate in surrounding environment.

Distribution of partly equal doze to all lungs alveolus is possible.

Nano particles have a controlled triggering of drugs.

They are suitable for transferring of large molecules like proteins.

The possibility of drug entrance to cells increases regarding to particles size[21,23]

Lung transfer of Nano particles is a non-aggressive method which can be used with remedial aim to lung cells.by formulating of drugs as Nano particles besides stability, easier usage of drug is possible for the patient. With direct inhalation of drug to respiratory system further drug usage and lateral effects due to drug transfer to other tissues id avoided. Main feature of using this technic is transferring of drugs like insulin and proteins into body through inspiration which in turn can be promising of movement toward treatment of diseases like diabetes with the aid of alternative methods for insulin injection. The only problem of drug delivery with Nano technology to lung is the fortune of these particles and their fast removing from respiratory system, that this problem can be solved through limiting of Nano particles in dissolvable coverage and amplifying of particles surface to desired extent for staying in lung. Lung cancer and phthisic are still considered medic hocus pocus in the world. It is hoped that by using Nano technology drug delivery methods to this tissue would improve and a big step is gaited in the direction of relating diseases treatment [21,22,23].

2.3. Nano particles and drug delivery to cancer

Cancer is still considered one of the most challenging diseases. With the extension of knowledge about this illness, great improvements had also occurred for treatment. Nevertheless, toxic effects of chemotherapy drugs are still enumerated one of treatment difficulties since these drugs frequently act in a non-appropriate way. During two last decades new drug delivery systems had been invented that to some extent had been able to obviate the problems relating to chemotherapy. Among these systems are Nano particles including mineral and organic compounds. Some of these systems have now opened their way to drug market and many others are spending their preclinical stages. Many of new Nano particles had removed cellular resistance and provided a new arena for cancer treatment [24].

Regarding to great benefits of Nano structures like the ability to carry several drugs simultaneously and reduction of toxicity with remedial aim to cancerous cells, these structures have attracted the attention of many scholars. Moreover, various kinds of conveyors are utilizable for production of Nano particles and many of them are approved by FDA. There are many methods to supply these structures too. As a result of these features, Nano technology has created a great potential for cancer treatment which can move from research laboratory to the patient s bedside [25].

2.4. Nano particles and drug delivery to brain

Man's brain is the most sensitive and complex organ of the body which is protected by a very efficient barrier called blood brain barrier (BBB). This barrier has a good capability for defending brain cells against blood contents and existing toxic compounds. But this same barrier limits the entrance of drugs to brain. To have drug access to brain tissue, we can use inter medullar injections which is of course limited to certain regions of the brain and is reckoned an aggressive method. Non aggressive methods are the best ways for drug delivery to brain. Regarding to great blood contact surface with brain (about 20 m2) it is expected that the drugs have the capacity of absorption through this way. Hereon, Nano drugs are used for transferring of those drugs that have a little permeation to brain cells. Regarding to small size of these particles, they can freely move in blood vessels and enter brain tissues [17].

2.5. Nano particles and drug delivery through skin

In order to improve drug transfer through skin, various chemical and physical technologies are invented. One sample of these technologies is the utilization of Nano particles in drug delivery. To optimize drug delivery, first we should be familiar with the skin s physiology and use methods that are appropriate with cells of this spread structure of body. Regarding to very small size of compound entrance ways to skin (less than 10 Nm) , for providing Nano particles formulations compounds should be used that can help entrance of materials to deeper layers of the skin. Compounds like surfactants are known in Nano particles formulation as a factor for optimizing material absorption through skin. It is for this reason that surfactants are used in the structure of most Nano particles which have found the capability of local usage (like lipid Nano particles and polymeric Nano particles).

2.5.1. Benefits of local drug delivery through skin

Man's skin covers his entire body s surface and causes the creation of contact between body and surrounding environment. This spread surface is readily available and therefore is selected as an easy and non-aggressive way for drug delivery. Local drug delivery from skin s surface has some advantages comparing to other ways including utilization of high drug density on skin, reduction of systematic usage of drug and then reduction of lateral effects, possibility of long term drug presence on the surface and reduction of usage times especially for drugs with short longevity, easy and without pain usage and increase in the patients accompaniment [26].

Success of a new formulation depends on the amount of drug transfer to target tissue along with little effects and ease of utilization by the patient. Local usage of drugs has many benefits such as controlling of drug triggering, more accompaniment of the patient and high absorption surface. Of course, drug skin transfer requires certain attentions to nature and function of effect spot. It should be remembered that the main skin function is protection against entering of strange materials. Therefore, Nano particles entrance to skin will be difficult. But with optimization of Nano particles formulations, we can cause their transfer to skin and suitable drug delivery to tissues.

2.6. Nano particles and edible drug delivery

Edible drug delivery is considered the most common way of drug transfer since it is a non-aggressive way for the patient though reaching to required remedial density for some drugs due to low solubility, short time stability and low amount of entering drug to blood with the help of edible method are enumerated among problems of this method. To remove these problems, Nano particles are used that can protect drugs from destruction in digestion system and convey them to suitable place for treatment. Some samples of these particles are polymeric Nano particles, solid lipid Nano particles and Nano crystals that in optimized state each can increase the amount of absorbed drug and cause increasing drug durability time and its stability in digestion system[27].

Many of drug molecules are transferred successfully with high absorption capacity through this way. Of course, some drugs have some problems for edible absorption like low solubility and stability. Entrance of these drugs into Nano particles can obviate some of these problems and cause more stability and drug absorption in digestion system. Large numbers of barriers existing in digestion system are considered as a difficulty in drug delivery but there are Nano structures like phlegm adhesive particles too which was able to improve drug delivery with assistance of these same barriers. Despite great improvements, edible drug delivery is a very vast scope among various drug delivery systems which still needs more research [28].

2.7. Magnetic Nano particles in medic imaging

Unique features and benefits of magnetic Nano particles cause their superiority as contrast factors in magnetic resonance imaging (MRI). MRI work basis is based on coaction between magnetic field and endobiotic protons. Studies have shown that the utilization of magnetic Nano particles in MRI has a better image contrast and provides the possibility of imaging in molecular and cellular levels [29].

2.7.1. advantages of magnetic Nano particles as contrast factors

They have a low toxicity and are existent compatible, for example in usage of oxide Iron since its amount comparing to body Iron is very low, it is metabolized according to physiologic Iron hemostatic mechanisms and it doesn’t lead to a great change in the amount of hepatic enzymes and oxidative stress and moreover, usage of coverage on surface reduces its toxicity.

They have a long term presence in blood and by using coverage on surface, particles clearance can be delayed and blood presence time can be increased.

They have the ability to carry various hydrophobic drugs like paclitaxel and doxorubicin to tissues.

3 Conclusion

Nano technology is a multipurpose scientific phenomena, including the construction and use of materials, tools, Nano-scale system is, in fact, means of access to infrastructure and the use of such phenomena at the molecular level with the new function. Perhaps the most important fields of nanotechnology today that it has broken many pharmacy that has led to the emergence of new drug delivery.

Owes its remarkable success of new drug delivery nanoparticles which in turn owes features such as:

1. High capacity for transporting drugs

2 very large active surface for reaction

3 small for the passage of blood levels

4. Ability to target tissue accumulation

5. The low toxicity

Pharmaceutical industry in terms of delivery, through nanotechnology has been remarkable. The disease, diabetes and cancer side effects that cause hair loss and complications will be caused by repeated injection of tissue that is painful for the patient, is unbearable, but the thought of nanotechnology in drug delivery solutions.

This method can reduce the doses used for the continued encouragement of the correct drug regimen. Better use of delivery, allowing the use of new therapeutic techniques. The new technology also makes it possible to use highly toxic drugs.

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Review Article

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Using Artificial Intelligence to Improve Clinical Decision-Making and Nursing Care

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Abstract

This article examines the role of artificial intelligence (AI) in clinical decision-making and patient care. With advancements in AI technologies such as machine learning and artificial neural networks from the 1960s to the present, significant improvements have been made in the field of nursing and healthcare. However, challenges such as data quality, result interpretation capabilities, and ethical issues still persist. Training nurses and adhering to accuracy and caution when using AI are of paramount importance.

This article is a review conducted using the PRISMA approach. Twelve articles were selected and reviewed after searching publications from databases like MEDLINE, EMBASE, PubMed, CINAHL, Scopus, Web of Science, and Cochrane from 2016 to 2024. The results indicate that predictive analysis technologies using AI have significantly advanced nursing care, but challenges like data quality, result interpretation, and ethical issues remain.

The discussions emphasize the importance of teamwork among nurses and the development of ethical and quality infrastructures for AI use in nursing care. These issues necessitate further research and an enhanced understanding in these domains.

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1 Introduction

Artificial intelligence (AI) is one of the most advanced technologies of the 21st century and plays a crucial role in the evolution of clinical decisions and patient care. In the last decade, nurses and healthcare professionals have faced increasing challenges such as a lack of human and financial resources, increased healthcare demand, and the complexity of diseases. AI can help reduce the burden and challenges of healthcare systems.

Historical and Current Context

AI has a long history in medicine and healthcare. Since the 1960s, rule-based expert systems have been used to diagnose and treat diseases. With recent advances in machine learning and neuroscience, AI can now perform more complex tasks, such as clinical decision-making and predicting outcomes. Studies show that AI can assist in the diagnosis and treatment process, analyze disease risk factors, manage patient information, and improve clinical decisions, alongside nurses.

The Role of Artificial Intelligence

AI enables the collection, review, and analysis of vast amounts of data. It can participate in the diagnosis and treatment process, analyze disease risk factors, manage patient information, and improve clinical decisions. Machine learning and artificial neural networks provide the capacity to analyze big data and build predictive models that help nurses identify risks and implement effective changes in patient care plans.

Literature Review

Several studies have investigated the impact of AI as a support tool to empower nurses in clinical decisions and to provide effective and safe patient care. AI can assist nurses in the simultaneous monitoring of patients, providing access to patient information, performing administrative tasks, and managing daily heavy workloads, thus allowing more time for direct patient care.

Gaps in Research

Despite the progress in AI applications in nursing, there is a significant gap in the training of nurses regarding the qualifications required to use AI-based tools. Nurses need the ability to evaluate and interpret the results obtained from AI tools in patient care. Effective AI use requires an understanding of its benefits, limitations, and risks.

Research Objectives and Questions

The purpose of this study is to identify the primary roles of nurses in AI usage and the necessary skills to exploit AI capabilities to improve healthcare. The following questions are addressed:

1. What qualifications and capabilities are necessary for the successful use of AI in nursing?

2. To what extent are nurses prepared to use AI tools?

3. How can nurses' training be enhanced to empower them in using AI?

The Importance of Research

The training of nurses in the qualifications and capabilities required for effective AI use is crucial. Properly empowering nurses to use AI tools can help strengthen their pivotal role in patient care and ensure patient safety.

Introduction of Main Variables

The main variables in the reviewed studies on artificial intelligence to improve clinical decision-making and nursing care are:

- Clinical decision-making: Using AI to improve clinical decision-making in patient care, including diagnosing patients, predicting complications, and formulating better treatment strategies.

- Patient care: Using AI to monitor and manage patient care, including providing guidance and empowering microclimate managers to mitigate risks associated with immobility pressures.

- Training and improving knowledge: Providing training related to AI for nurses and creating suitable educational environments for improving knowledge and skills related to AI.

- Technology development: Conducting research and development in AI to enhance care processes, increase diagnostic accuracy, improve nurses' resource and time management, and improve healthcare and treatment quality.

These variables demonstrate the broad importance of using AI in nursing care and enhancing the performance and quality of healthcare services.

Confirmation and Contradiction:

The use of AI in nursing care can directly improve clinical decisions and patient care. This technology can aid in the accurate and rapid diagnosis of diseases, predict complications, and offer suitable treatment solutions, thus helping nurses provide better care and improve the efficiency and quality of nursing services. Conversely, the use of AI may be accompanied by challenges and risks, such as incorrect or insufficient information, the need for clinical interpretation of AI-generated results, privacy and trust concerns, and a lack of expertise in AI. These issues can lead to difficulties in successfully implementing AI in nursing care.

Due to these confirmations and contradictions, it is necessary to use AI in nursing care carefully and cautiously. To resolve these contradictions and optimize AI usage, more education and awareness for nurses are needed, along with the establishment of appropriate policies and solutions to manage risks and challenges associated with AI in nursing care

2 Material and Methode

This review article is based on the PRISMA approach. A search was performed in MEDLINE, EMBASE, PubMed, CINAHL, Scopus, Web of Science, and Cochrane databases from 2016 to 2024 using keywords related to "Artificial Intelligence," "Clinical Decision-Making," and "Nursing Care" alone or in combination.

Initially, 2570 articles were identified between 2016 and 2024. Studies outside the target topic were excluded.

Findings: After completing the search and removing duplicates, the titles and abstracts of 45 articles were examined, and ultimately 12 articles were selected for in-depth study.

The inclusion criteria for articles were research articles, systematic review articles, and practical reports about the use of AI in nursing or the examination of skills required by nurses to use AI-based tools. Exclusion criteria were articles not available, duplicate articles, and articles that reviewed AI in general.

First, abstracts of relevant articles were extracted. Articles that seemed relevant were selected for full-text review. Information from each article, including authors' details, publication year, country of publication, purpose, method, and research findings, was recorded. Informative articles related to the role of AI in nursing, the qualifications nurses need to use AI-based tools, and the upcoming challenges in this field were presented.

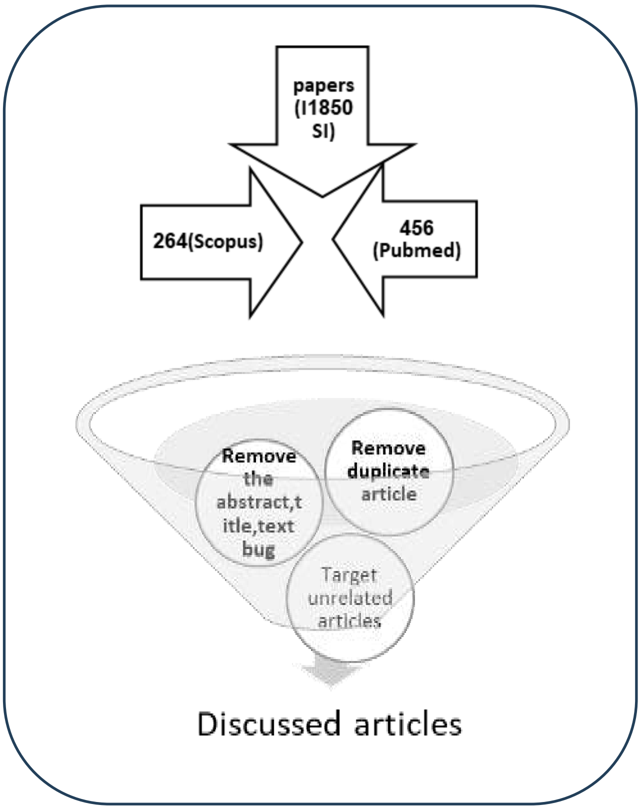

Figure-1:PRISMA flow chart

3 Discussion

The review provides a comprehensive view of AI-based technologies in nursing over the past decade, focusing on the development stage of these technologies. The main technology used in the studies was predictive analysis using various AI methods. While most technologies were evaluated as roadmaps for intended uses, there were concerns about their validation and effectiveness in real clinical settings.

A key finding from the literature review was the lack of evaluation of outcomes related to the quality of care, patient satisfaction, organization of nursing care, and other important aspects of nursing practice. The primary goal of using AI technologies was to reduce the nursing workload, but this goal was not evaluated in any of the articles. This indicates a need for comprehensive frameworks to evaluate and examine the impact of AI technologies on various aspects of clinical decision-making and nursing care more closely.

Another critical issue highlighted in the review is the limited involvement of clinical staff in the use and analysis of AI technologies. To develop user-centered technologies, it is essential to include nursing expertise at all stages of technology development. Additionally, the absence of discussions about the ethical issues of AI use in nursing in the articles is a serious concern, showing that the ethical dimensions of AI technologies in improving clinical decisions need consideration.

The studies also pointed out challenges related to data quality and documentation in electronic health records, which can affect the deployment of AI technologies in nursing. Reliance on incomplete or inaccurate data sources can result in a skewed and inadequate distribution of AI technologies, affecting the expectations of underrepresented social groups. Therefore, ensuring the quality and completeness of data in electronic health records is crucial for the successful implementation of AI technologies in improving clinical decision-making and nursing care.

4 Conclusion

Overall, the review of various aspects of AI in improving clinical decision-making and nursing care focuses on the development of AI tools, and most studies view the use of AI positively. However, concerns about the actual implementation and effectiveness of AI in clinical settings have been raised. Another issue is the lack of participation and collaboration of the clinical staff, which is a challenge in advancing the use of AI.

Training on the use of AI for users is essential and should be incorporated at all staff levels so that in the near future, we can enhance clinical decision-making and nursing care through AI.

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From Traditional to Cutting-Edge: A Review of Dental Equipment Evolution

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Abstract

This article explores the evolution of dental equipment, from traditional tools to modern cutting-edge technology, highlighting key advancements that have shaped contemporary dental practices. By tracing the development of essential dental instruments, this review provides insights into how these innovations have improved patient care, increased efficiency, and transformed the field of dentistry. The discussion also examines the implications of these changes for future dental practices, with a focus on both the benefits and challenges posed by adopting new technologies.

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1. Introduction

The field of dentistry has witnessed remarkable advancements over the years, with dental equipment evolving from rudimentary tools to sophisticated, high-tech devices. This evolution has been driven by the need to enhance patient care, improve procedural efficiency, and expand the capabilities of dental practices. Historically, dental tools were simple and manually operated, such as hand mirrors, forceps, and manual drills. These instruments, while functional, had significant limitations in terms of precision, patient comfort, and the complexity of procedures that could be performed [1].

As the medical field advanced, so too did the technology available to dentists. The introduction of electric-powered equipment in the mid-20th century

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marked a significant shift, allowing for more precise and less invasive procedures. Innovations such as ultrasonic scalers, advanced dental chairs, and digital radiography transformed the practice of dentistry by enabling more accurate diagnoses and more comfortable patient experiences[2]. These changes not only improved clinical outcomes but also made dental procedures less intimidating and more accessible to a broader population.

In recent decades, the integration of digital technologies has further revolutionized the field. Tools such as CAD/CAM systems, which allow for the design and manufacture of dental restorations, 3D printing for creating custom dental appliances, and laser dentistry for minimally invasive procedures, represent the cutting edge of dental technology[3,4]. These advancements have significantly enhanced the precision, speed, and versatility of dental care, offering new possibilities for patient treatment and improving the overall quality of care[5].

However, with these advancements come new challenges. The adoption of modern dental equipment often requires significant financial investment and specialized training, and there is always the risk of technological obsolescence[6]. Despite these challenges, the continuous evolution of dental equipment is essential for the progress of dental care. Understanding the historical context and current trends in dental equipment helps dental professionals make informed decisions about integrating new technologies into their practices[7].

This review aims to provide a comprehensive overview of the evolution of dental equipment, tracing its development from traditional tools to the latest innovations. By examining the impact of these advancements on clinical practice, patient care, and the dental profession as a whole, this article seeks to offer valuable insights for practitioners looking to stay at the forefront of dental technology[8].

2. Result

For explanation of the content for each aspect typically covered in an article reviewing the evolution of dental equipment:

Historical Overview: Traditional Dental Equipment: Early dental tools were largely manual and rudimentary. Examples include handheld scalers for cleaning teeth, manual drills for cavity preparation, and basic extraction tools. These tools were less precise and required more physical effort from the dentist.

Technological Advances:

Innovations: Over time, technology introduced more sophisticated equipment. For instance, ultrasonic scalers became popular, using high-frequency vibrations to remove plaque more efficiently and comfortably. Digital X-rays and intraoral cameras provided clearer images with less radiation. CAD/CAM (Computer-Aided Design and Computer-Aided Manufacturing) technology allowed for more precise and quicker creation of dental restorations.

Current State of Technology: Modern Equipment: Today's dental practices use a range of advanced tools. Laser dentistry offers a minimally invasive option for various procedures, from soft tissue surgeries to cavity preparations. Digital imaging systems provide instant, high-resolution images, improving diagnostic accuracy. Automated systems streamline tasks like patient scheduling and record-keeping.

Future Trends: Emerging Technologies: The future of dental equipment includes developments such as AI-driven diagnostic tools, 3D printing for custom dental prosthetics, and even more advanced laser technologies. These innovations promise further enhancements in precision, patient comfort, and overall efficiency in dental care.

Table 1

Comparison Table Breakdown

Aspect	Traditional Dental Equipmen	Cutting-Edge Dental Equipment	*Key Differences*
Instruments	Handheld tools: Manual scalers, drills, extraction tools.	Powered instruments: Ultrasonic scalers, air abrasion tools.	Modern instruments are more efficient, precise, and comfortable for patients.
Diagnostic Tools	X-rays, visual examination: Conventional film X-rays, manual examination.	Digital X-rays, intraoral cameras: Electronic imaging with high-resolution.	Digital tools offer better image clarity, reduced radiation, and faster diagnostics.
Treatment Techniques	Conventional drills and fillings: Manual cavity preparation and standard filling methods.	Laser dentistry, CAD/CAM technology: Minimally invasive techniques and precise restorations.	Modern techniques reduce invasiveness, increase speed, and improve outcomes.
Sterilization	Autoclaves and chemical agents: Basic sterilization methods.	Advanced systems, UV light: Enhanced hygiene practices.	New systems offer higher levels of safety and efficiency in maintaining cleanliness.
Patient Interaction	Manual records, traditional scheduling: Paper records and manual appointment booking.	Electronic health records, digital appointment systems: Digital management and scheduling.	Digital systems improve organization, accessibility, and efficiency in patient care.
Cost	Generally lower initial investment: Traditional tools are less expensive upfront.	Higher initial cost: Modern equipment often requires a significant investment.	Higher initial costs are often balanced by long-term benefits and efficiency.

[a]Full-width-half-maximum of the cyclic voltammetric peak.

[b]This is the format for table footnotes.Very often you will already have prepared (parts of) your text. If you load that text as a separate document, you can easily insert it into a document based on this template by cutting and pasting between the two documents.

3. Discussion

The evolution of dental equipment can be divided into several key phases, each marked by significant technological advancements. Initially, dental tools were rudimentary, with instruments like hand mirrors, basic forceps, and manual drills dominating dental procedures[9]. These tools, while effective for their time, had limitations in terms of precision, patient comfort, and the scope of procedures that could be performed.

The mid-20th century saw the introduction of more sophisticated equipment, such as electric drills, ultrasonic scalers, and dental chairs with enhanced ergonomic designs[10]. These innovations not only improved the efficiency of dental procedures but also significantly reduced patient discomfort. The advent of digital radiography in the late 20th century revolutionized diagnostic capabilities, allowing for more accurate and timely identification of dental issues[11].

In the 21st century, the integration of digital technology into dental equipment has further transformed the field. CAD/CAM systems, 3D printers, and laser dentistry have expanded the possibilities for dental restorations, implants, and minimally invasive procedures[12]. These technologies offer unprecedented precision and customization, leading to better patient outcomes and more efficient workflows.

However, the adoption of these cutting-edge technologies is not without challenges. High costs, the need for specialized training, and the potential for technological obsolescence are significant concerns for dental practitioners [13]. Despite these challenges, the benefits of modern dental equipment—such as improved diagnostic accuracy, faster treatment times, and enhanced patient satisfaction—make a compelling case for their integration into contemporary dental practices.

Conclusion

The evolution of dental equipment from traditional tools to cutting-edge technologies has profoundly impacted the practice of dentistry. These advancements have not only improved the quality of care but also increased the efficiency and scope of dental procedures. As the field continues to evolve, it is essential for dental professionals to stay informed about the latest technological developments and their potential implications. While the adoption of new technologies presents certain challenges, the overall trajectory suggests that the future of dental equipment will continue to enhance patient care and advance the field of dentistry.

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Acknowledgments should be inserted at the end of the paper, before the references, not as a footnote to the title. Use an unnumbered section heading for the Acknowledgments, similar to the References heading.

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