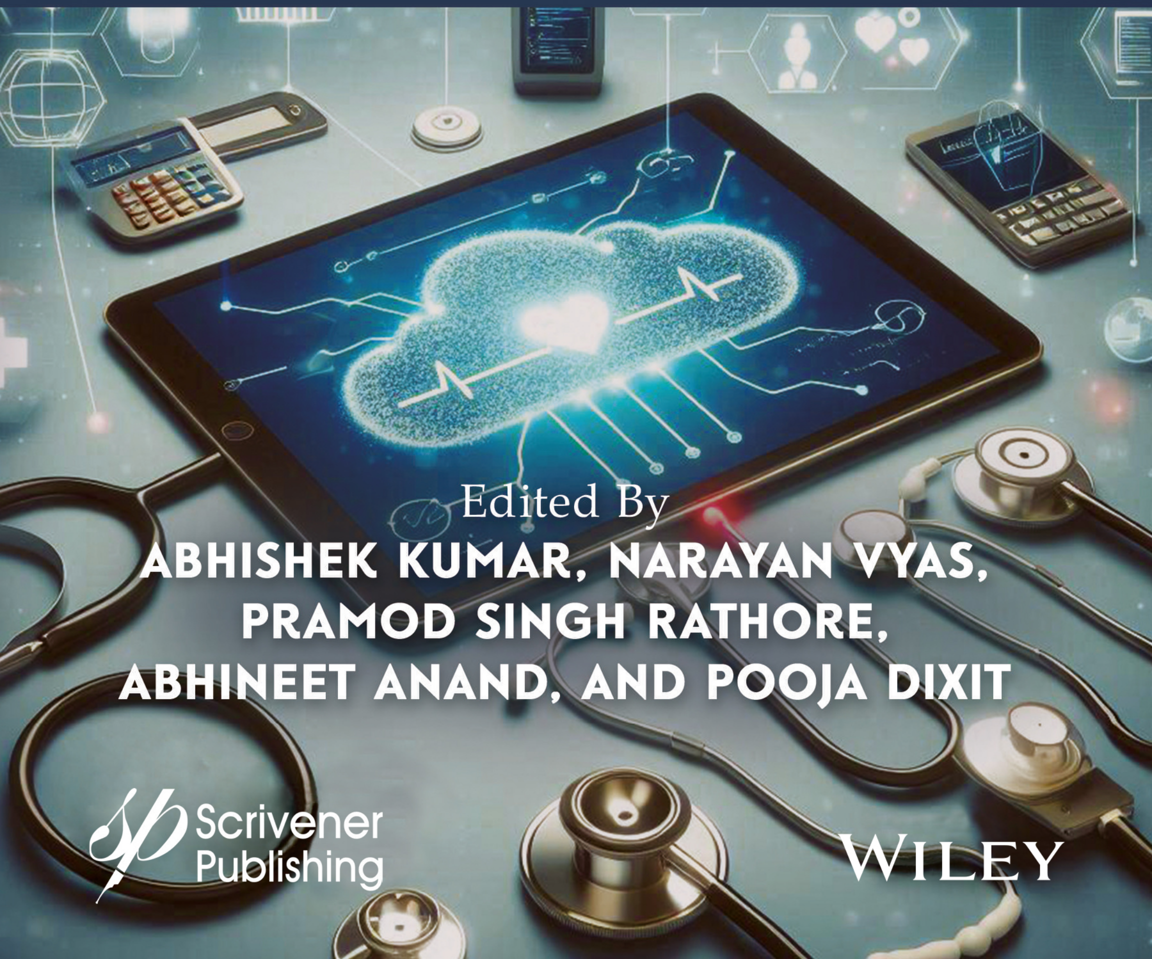
INTERNET OF MEDICINE FOR SMART HEALTHCARE



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Scrivener Publishing

WILEY

Internet of Medicine for Smart Healthcare

Scrivener Publishing
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Beverly, MA 01915-6106

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This edition first published 2025 by John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, USA and Scrivener Publishing LLC, 100 Cummings Center, Suite 541J, Beverly, MA 01915, USA

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Wiley Global Headquarters
111 River Street, Hoboken, NJ 07030, USA

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Library of Congress Cataloging-in-Publication Data

ISBN 978-1-394-27223-5

Front cover images supplied by Pixabay.com
Cover design by Russell Richardson

Set in size of 11pt and Minion Pro by Manila Typesetting Company, Makati, Philippines

Printed in the USA

10 9 8 7 6 5 4 3 2 1

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Preface

This book is organized into 22 chapters. In *Internet of Medicine (IOM) for Smart Healthcare*, we usher in a dialogue that melds the computational prowess of artificial intelligence (AI) with the nuanced realm of healthcare. Within 22 chapters, each is a beacon of innovation, exploring how AI is reshaping patient care, from diagnostics to treatment and beyond. As the editors, we have witnessed a tapestry of research that not only pushes the boundaries of technology but also tethers it closely to the human condition. From the micro-scale of genetic data to the macro-impact of wearable technology, the contributions herein address both the potential and the challenges of these converging worlds, underlining the importance of ethical considerations as we tread forward. This book stands as an invitation to embrace the future—a future where technology and healthcare converge to better human lives.

Delving into the intersection of omics data and AI, Chapter 1 illustrates how integrating vast biological datasets can refine neurodynamic exercises for PIVD patients, offering insights into personalized care strategies that yield both immediate and lasting therapeutic effects. Chapter 2, based on the exploration of graph-based methods in biological networks, reveals how AI can enhance the treatment of cervicogenic headache patients, optimizing reflex release techniques to reduce pain and disability more effectively than ever before. Focusing on the potent synergy of AI with primal reflex release techniques, Chapter 3 discusses the role of AI in quantifying the effects of such interventions on SI joint mobility, providing data-driven insights for clinicians. Next, Chapter 4 probes into the future of AI in bioinformatics, projecting its transformative impact on understanding and addressing neck pain and stiffness through innovative reflex release techniques. In Chapter 5, evolutionary computation underscores the value of bioinformatics in dissecting the effects of neurodynamic exercises, offering new avenues for treating pain and disability in carpal tunnel syndrome patients. In Chapter 6, AI and nanotechnology are presented as pivotal drivers for sustainable development in healthcare, with discussions centered on their imperative roles in ushering a new era of medical innovation. Chapter 7 basically synthesizes AI and yoga therapy as holistic approaches to sleep pattern enhancement, presenting a scientific approach that could redefine therapeutic strategies for better health. Next, Chapter 8 focused on ethical considerations in AI, and bioinformatics are dissected in the context of analyzing the rehabilitation effects of the SHAT device on stroke patients, underscoring the importance of ethical data handling. In Chapter 9, the AI's transformative impact on drug discovery and repurposing is discussed, with a focus on its potential to improve the long-term quality of life for patients with cervicogenic headaches. In Chapter 10, the antineoplastic potential of edible mushrooms is examined through the lens of AI, showcasing how advancements in AI can elucidate the polysaccharides' modes of action and their health benefits. Chapter 11 evaluates the role of AI in enhancing the bioremediation processes of dairy effluent using microalgae, highlighting the innovative use of resulting lipid byproducts. Chapter 12 focused on the smart collision recognition, and reporting system employing GPS and GSM technology is introduced, signifying how AI can leverage automation to enhance safety measures. In Chapter 13, the evolution and consequential impact of wearable devices in healthcare are chronicled, with particular attention to their anatomical integration and their expansive influence on medical science. In Chapter 14, the current overview of wearable healthcare technology delves into the physiological and biochemical intricacies of these devices, emphasizing their role in proactive health monitoring. In Chapter 15, techniques for real-time data acquisition and analysis are detailed, revealing their microbiological and immunological aspects and their revolutionary impact on health data collection. Chapter 16, based on real-time data applications in healthcare, discusses the groundbreaking implications for pharmacological interventions, heralding a new wave of data-informed treatment protocols. In Chapter 17, the strategies for the integration of wearable technology with healthcare systems are outlined, with a focus on the pathological considerations vital for successful device adoption. In Chapter 18, the challenges and solutions surrounding healthcare system integration are examined from a histological perspective, addressing the nuanced difficulties of incorporating wearable devices into medical routines. In Chapter 19, the wearable technology's role in mental health monitoring and management is dissected, providing psychiatric insights into the adoption and efficacy of these innovative tools. In Chapter 20, the ethical considerations in mental health data collection and analysis are scrutinized, discussing the delicate balance between technology's benefits and the privacy of the individuals. Next, Chapter 21 discusses the ethical challenges and guidelines necessary for the deployment of AI in healthcare, offering perspectives from urology and gastroenterology on how to navigate this complex landscape. Finally, Chapter 22 concludes the book, and a forward-looking perspective highlights the future directions and opportunities within AI-driven healthcare, inspiring family medicine and anaesthesiology to integrate AI in their practices.

To conclude, we extend heartfelt gratitude to all the authors who contributed their expertise to this volume. Their dedication to advancing our understanding and their commitment to ethical practice in Internet of Medicine and AI-driven healthcare sets the groundwork for the future of medicine. This book is dedicated to all those who stand at the forefront of technological innovation and healthcare, who seek to push the boundaries of what is possible for the benefit of patients worldwide.

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Omics Data Integration in AI System for Immediate and Carryover Effects of Neurodynamic Exercises on SLR Ranges Among Acute PIVD Patients

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Abstract

Prolapsed interverterbral disc (PIVD) is a disease that occurs when there is a rupture of annulus fibrosus, which further leads to an effusion of nucleus purposes. In order to obtain a more thorough knowledge of a biological system, data from several omics technologies—such as transcriptomics, proteomics, metabolomics, and genomics—are combined in a process known as "omics data integration." Thus, different medical data of each patient are collected, which makes easy for their treatment. The aim of this study is to analyze the immediate and carryover effects of neurodynamic exercises on straight leg raise test ranges among acute PIVD patients using omics data integration in artificial intelligence (AI) system. There is no evidence-based study on neurodynamic exercises including static opener and four levels of sliders and tensioners to decrease the mechanosensitivity and nerve root irritation among acute PIVD patients, to promote more tolerance to exercises with less pain experience, and to decrease more reliability over electrotherapy, using omics data integration in AI system. This study can be further carried by comparing the age and gender by giving two different interventions, and their effectiveness can be seen in longer period of time, which becomes easy due to AI.

Keywords**:** AI, data integration, SLR, neurodynamics, omics, PIVD

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Abhishek Kumar, Narayan Vyas, Pramod Singh Rathore, Abhineet Anand and Pooja Dixit (eds.) Internet of Medicine for Smart Healthcare, (1–22) © 2025 Scrivener Publishing LLC

1.1 Introduction

Prolapsed interverterbral disc (PIVD) is a disease that occurs when there is a rupture of annulus fibrosus, which further leads to an effusion of nucleus pulposus [1, 2]. Lumbar disc herniation is a frequent condition that affects 5% of individuals in adults [3]. In the world, the incidence of PIVD in males is from 1.9% to 7.6%, and, in females, it is between 2.2% and 5.0% [4]. It is one of the most common condition among low back ache (LBA) patients, which affects about 10% of the population [5, 6]. It consists of four stages that are nucleus degeneration, nucleus displacement, protusion, and extrusion [7, 8].

Studies have been conducted in usefulness of various physical examination results. They suggest that the straight leg raise (SLR) continues to remains the gold standard test for identifying the radicular symptoms [9]. Root irritation is typically thought to be present when the examiner elevates the affected limb and the pain reproduces or intensifies [10–15]. When the test reproduces pain in the gluteal or lower leg region as the examiner passively lifts the affected leg with the hip in flexion and knee in extension, it is said to be positive. The relevance given to the angle of elevation at which the pain is produced varies greatly. Brieg and Troups and others suggested that less than 70° is clinically relevant [16–19].

PIVD propulsion of disc leads to compression due to which there is compromised distal sliding of neural structures, which, in turn, possess challenges to physiotherapist in treatment of acute PIVD patients. There is no evidence-based study on neurodynamic exercises including static opener and four levels of sliders and tensioners to decrease the mechanosensitivity and nerve root irritation among acute PIVD patients. The purpose of this study was to analyze that neurodynamic exercise including static opener and four levels of sliders and tensioners can significantly alter neural mobility, SLR ranges, visual analog scale (VAS), and pain side code score [20–26].

The primary focus in gaining practical understanding of cellular processes is now on the examination of multi-omics data in conjunction with clinical informations. A methodical and thorough comprehension of complex biology seems to be possible through the integrations of multi-omics data relevant to biomolecule at several levels. They aid in evaluating the information transfer between omics levels and, hence, aid in closing the gap between genotype and phenotype. Integrative techniques can eventually contribute to better prevention and management because they can