Committee on Science & Technology

JANUARY 2026 ISSUE

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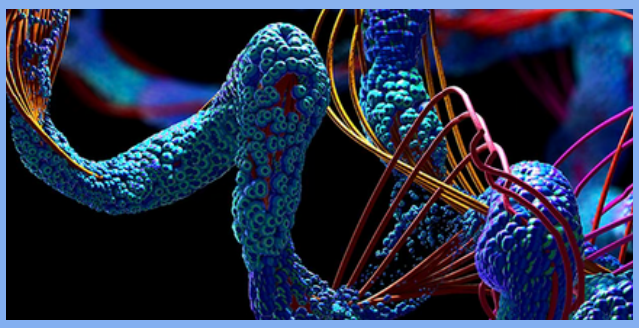
THE COMMITTEE OF SCIENCE AND TECHNOLOGY PRESENTS:

THE UPDATE

MEDICINE 3.0: NAVIGATING THE AI FRONTIER

AI IN DRUG DISCOVERY: HOW ALPHAFOLD IS REDEFINING THE PACE OF MEDICINE

Written by: Huma Tu Zahra 22901021



Artificial intelligence (AI)–driven drug discovery represents a transformative shift in biomedical research by addressing one of its most persistent challenges: the time and cost required to develop new therapeutics. Central to this transformation is AlphaFold, a deep learning–based system developed by DeepMind that predicts three-dimensional protein structures from amino acid sequences with near-experimental accuracy. Protein structure determination has traditionally relied on labor-intensive techniques such as X-ray crystallography and cryo-electron microscopy, significantly slowing target identification and drug design. By overcoming this bottleneck, AlphaFold enables rapid identification of disease-relevant protein targets and facilitates structure-based drug discovery at an unprecedented scale. This has proven particularly impactful in the search for new antibiotics, where AI-guided modeling allows researchers to identify essential bacterial proteins and design novel compounds capable of inhibiting them—often within days rather than years. The integration of AI into molecular biology not only accelerates drug discovery pipelines but also introduces structurally novel therapeutics that may combat antimicrobial resistance more effectively. This paradigm shift underscores the growing role of AI as a foundational tool in modern medicine, redefining how future physicians and researchers approach disease treatment and pharmaceutical innovation.

AI OUTPERFORMS CLINICIANS IN RADIOGRAPHIC CARIES DETECTION

Written by: Farah E. Ali 22901046

A recent study in BMC Oral Health introduces AI-Dentify, a deep-learning pipeline designed to automate proximal caries detection on bitewing radiographs. Using nearly 14,000 images from the HUNT4 Oral Health Study, researchers benchmarked three AI models (YOLOv5, RetinaNet, and EfficientDet) against the diagnostic accuracy of six veteran clinicians.

The results highlight a significant performance gap. The YOLOv5 model emerged as the superior tool, achieving a Mean Average Precision (mAP) of 0.647, which is more than double the human average of 0.299. Perhaps more importantly for clinical practice, the AI demonstrated a lower "miss" rate. Its false negative rate was 0.149, while the clinicians averaged 0.164.

These findings suggest that deep-learning tools are becoming a reliable safety net in dental diagnostics. By integrating systems like AI-Dentify into routine screenings, practitioners can better catch subtle enamel and dentine lesions that might otherwise be overlooked. This ensures earlier intervention and improved patient outcomes. This shift toward AI-assisted workflows marks a major step in minimizing human error and standardizing care in digital dentistry.

Designed & Edited by: Farah E. Ali 22901046

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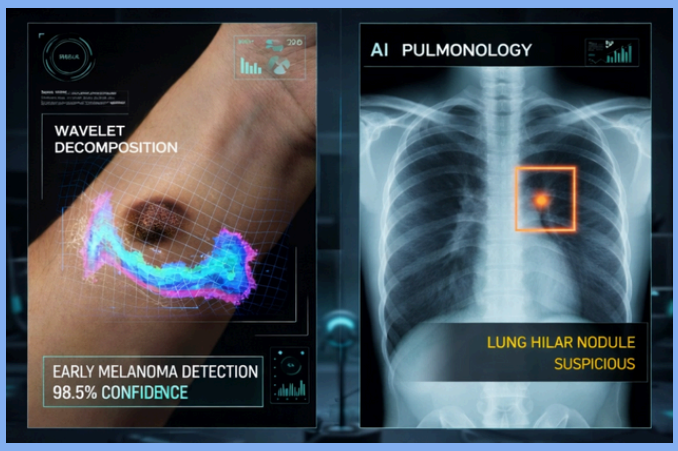
AI IN DIAGNOSTICS - A HELPING HAND WITH BETTER RESULTS

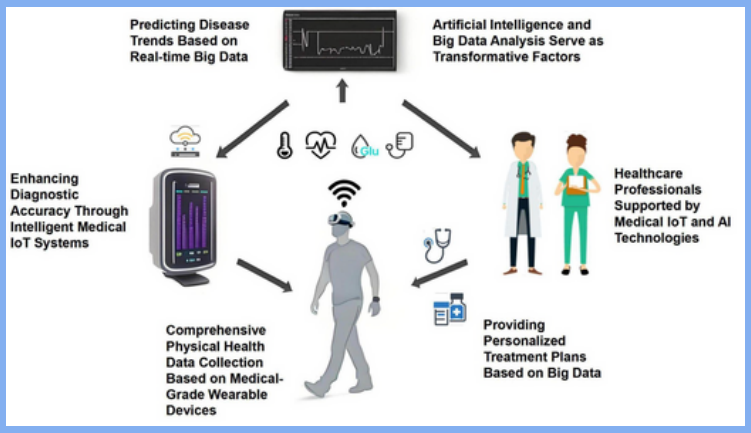
Written by: Feronia Melissa De Mello 22901015



Artificial intelligence has changed the way we look at medicine. Evidence highlighted in a Stanford meta-analysis by Krakowski et al. shows measurable gains in diagnostic accuracy for skin cancer when clinicians work alongside AI instead of against it. This highlights the value of integrative decision-making frameworks rather than replacement models (Krakowski et al., 2024).

In radiology, computer-aided detection and triage systems further enhance workflow efficiency by automatically prioritizing studies with suspected critical findings such as osseous fractures, pneumothorax, and pleural effusion. Tools such as AZtrauma and AZchest, part of the Rayvolve® suite, employ advanced algorithms to identify fractures, dislocations, joint effusions, and key thoracic abnormalities, ensuring that urgent cases are escalated promptly for clinical review. Similarly, AZboneage extends these benefits to pediatric imaging byautomating bone age assessment on hand X-rays using the Greulich and Pyle method, enabling earlier diagnosis and timely therapeutic intervention (AZmed, 2025).

FDA-cleared systems such as Qure.ai's qXR, which is endorsed by the World Health Organization, support chest X-ray interpretation for tuberculosis and other pulmonary abnormalities, particularly in high-volume and resource-limited settings (Zavaleta-Monestel, 2024). In dermatology, where lesion morphology is highly variable, recent methodological advances integrating wavelet transforms with visual state space models have shown promise in capturing multi-scale texture features critical for early lesion differentiation. As demonstrated in the work of Shuwan Feng and colleagues, these developments further underscore the expanding role of AI in enhancing diagnostic precision across medical specialties (Feng, 2024).



SMART MONITORING & VIRTUAL CARE

Written by: Aameena Nada Nazeer Ahamed 22901098

In the evolving digital health landscape, nursing practice is being transformed by AI-driven smart monitoring and virtual care technologies that empower nurses to deliver safer, more proactive patient care. Innovations like AI-assisted virtual nursing platforms use ambient sensors and predictive analytics to continuously monitor vital signs and detect early warning signs of deterioration. This enables timely interventions before crises occur and reduces the workload on bedside staff.

Remote and virtual nursing solutions further extend care beyond hospital walls, allowing nurses to assess, educate, and support patients through telehealth technologies while freeing up valuable time for direct clinical engagement. Wearable devices and IoT sensors enhance this digital shift, providing continuous real-time health data that integrates seamlessly into clinical workflows.

These tools help nurses anticipate complications and tailor care plans with unprecedented precision. As healthcare embraces these technologies, nursing professionals are at the forefront of combining human empathy with digital innovation to improve outcomes and patient experiences across care settings.

Created by: Feronia Melissa De Mello 22901015

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Designed & Edited by: Farah E. Ali 22901046

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