

Editor's Desk



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Artificial Intelligence (AI) in Hypertension (HTN)

Artificial Intelligence (AI) is an integration of computer science, data analytics, and pure mathematics, which enable computer systems to mimic human cognitive skills to simulate intelligent behavior and critical thinking comparable to a human being.

Why AI now? Availability of big data

- Database availability: MIDAS, NJ, USA: 17M records---4 M Patients with CVD
- Diagnostic tests such as Electrocardiograms and Imaging data is now online
- Wearable biosensors which have the potential to generate real time data
- Genomics, transcriptomics and proteomics, with many more variables than observations

Like specialties in medicine, there are different modalities in AI but the following two are widely used in hypertension

Machine Learning (ML)

ML uses mathematical algorithms to compile data and makes inferences based on pre-set criteria. It is used in managing medical data, helping in the diagnosis and early detection of diseases, personalized medicine, and analysis of errors in prescriptions, and analysis the data's of multiomics, and wearable devices.

Deep Learning (DL)

DL is a subfield of ML that requires less human supervision.

It is an upgraded version of ML that can solve the problem which is unsolvable by ML.

It is used in medical imaging, analysing a large amount of data, and predicting adverse outcomes

AI Applications:

Predicting development of Hypertension

- Predict the risk of developing HTN by using medical data, treadmill stress test, behavioural, environmental, socioeconomic factors, and genetics
- Identify new genes associated with HTN.



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Diagnosing Hypertension

- ***Accurately diagnosing HTN by using demographic data, vital signs, traditional CV risk factors, and routine labs in large patient cohorts***

Predicting Blood Pressure

- Predict BP from demographic data, lifestyle (alcohol, smoking, and exercise), and retinal fundus images.

Measuring Blood Pressure

- Estimate BP by analysing the PPG signal from pulse oximeter with ML algorithms and DL algorithms.
- Estimate BP from PPG signal recorded by a smartphone, and a smartwatch.

Predicting Cardiovascular Risk in Hypertension

- Predict CV outcomes in HTN patients, and stratify patients based on their risk.

Predicting and Identifying Barriers to Blood Pressure Control

- Predict the risk of developing uncontrolled BP.
- Identify factors contributing to treatment adherence and success.

Refining Blood Pressure Targets

- Uncover factors associated with CV outcomes and adverse events in major RCTs suggesting different BP targets.

AI programed IDx-DR software system which analyzes the retinal images taken with a fully automated digital fundal camera.

It helps to detect hypertension and diabetic retinopathy within minutes and leads to a reduction in ophthalmic complications

The Kardia app in smartphones or tablets is designed to monitor ECG and helps in the detection of arrhythmias

The Apple Watch Series 4 to Series 7 has an electrical heart rate sensors that detect atrial fibrillation

AI-enhanced HTN care will Promote patient awareness, Self-monitoring, Healthy behaviors,

Treatment adherence

Future research needs to focus on precision HTN medicine utilizing AI-based technologies with multi-omics data, socioeconomic, behavioural, and environmental factors will be able to



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prevent or delay the development of HTN, identify novel risk factors and phenotypes of patients, and improve the treatment outcomes, which can subsequently reduce the global burden of HTN.³

“Necessity is the mother of all innovations”

The European Union High-Level Expert Group on AI (2019) clearly states that

“AI is not an end in itself, but rather a promising means to increase human flourishing, thereby enhancing individual and societal well-being and the common good, as well as bringing progress and innovation.”

Today high-quality medical care requires strong clinical skills along with appropriate tests and technology like AI. At the beginning of a new era in medicine, the integration of digital medicine is an essential part of the growth and development of medicine, which was accepted as complementary to physicians.

AI is a Stethoscope of the 21st century that cannot replace physicians but rather helps physicians to create a paradigm shift toward precision diagnosis, risk prediction, prognosis, and management.

AI CANNOT REPLACE PHYSICIANS BUT PHYSICIANS WITH AI KNOWLEDGE WILL BE IN A BETTER POSITION THAN PHYSICIANS WITH OUT AI KNOWLEDGE

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