CURSO DE AVANCES EN GASTROENTEROLOGÍA
PERSPECTIVAS FUTURAS EN GASTROENTEROLOGÍA
17 - 19 Julio 2024 - Hotel InterContinental, Stgo.
SChGE

Artificial Intelligence in Hepatology: How to apply it in our daily work?

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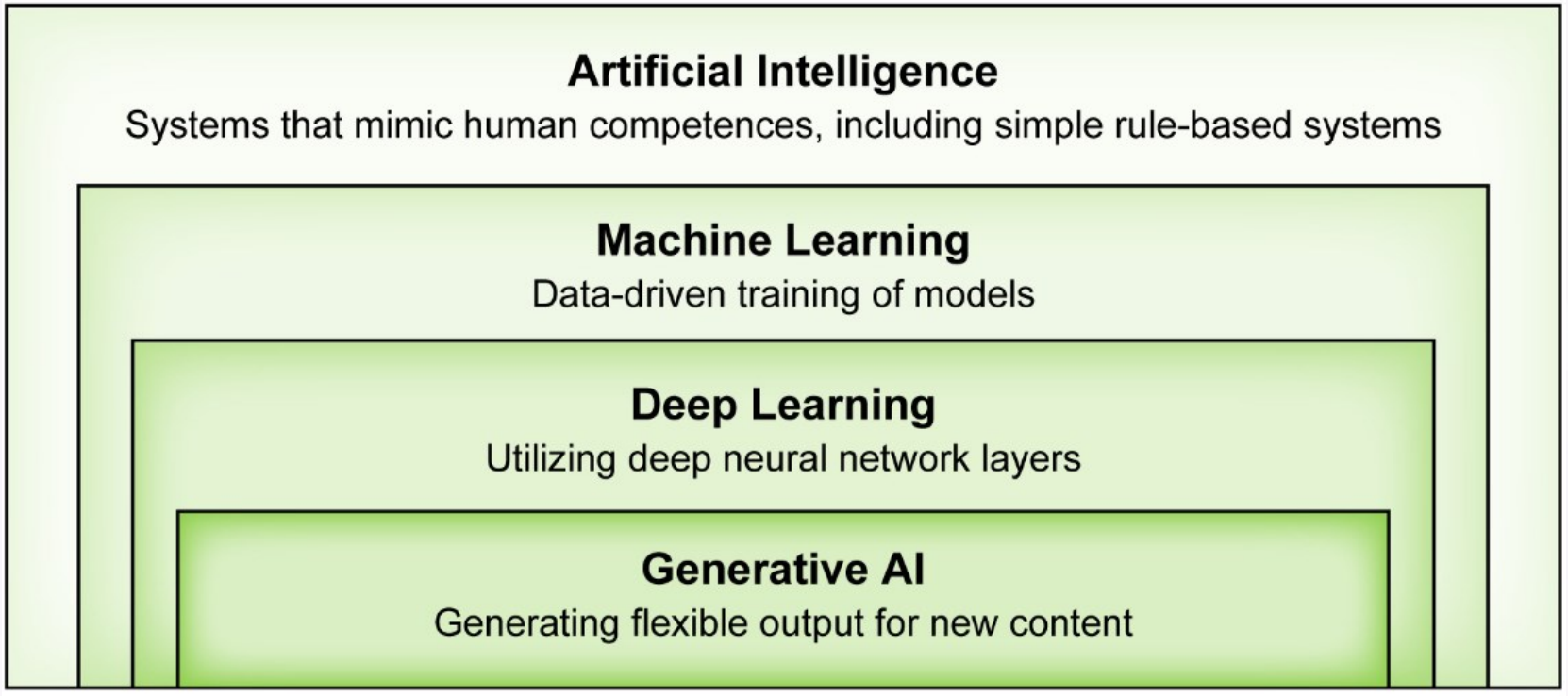
Subtypes of Artificial Intelligence



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Article

Health system-scale language models are all-purpose prediction engines

https://doi.org/10.1038/s41586-023-06160-y

Received: 14 October 2022

Accepted: 2 May 2023

Published online: 7 June 2023

Open access

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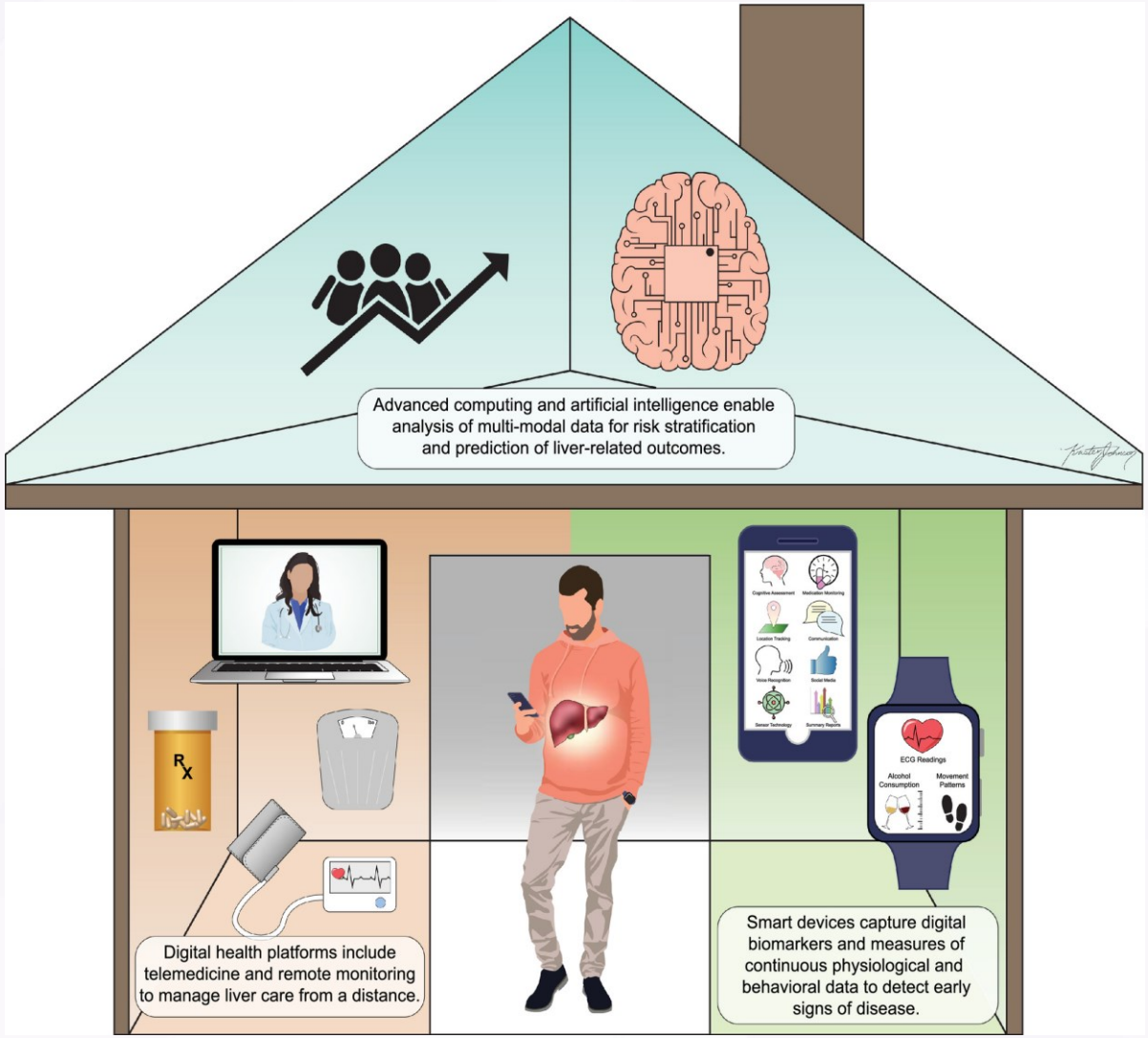
The Case for Digital Transformation of Hepatology:



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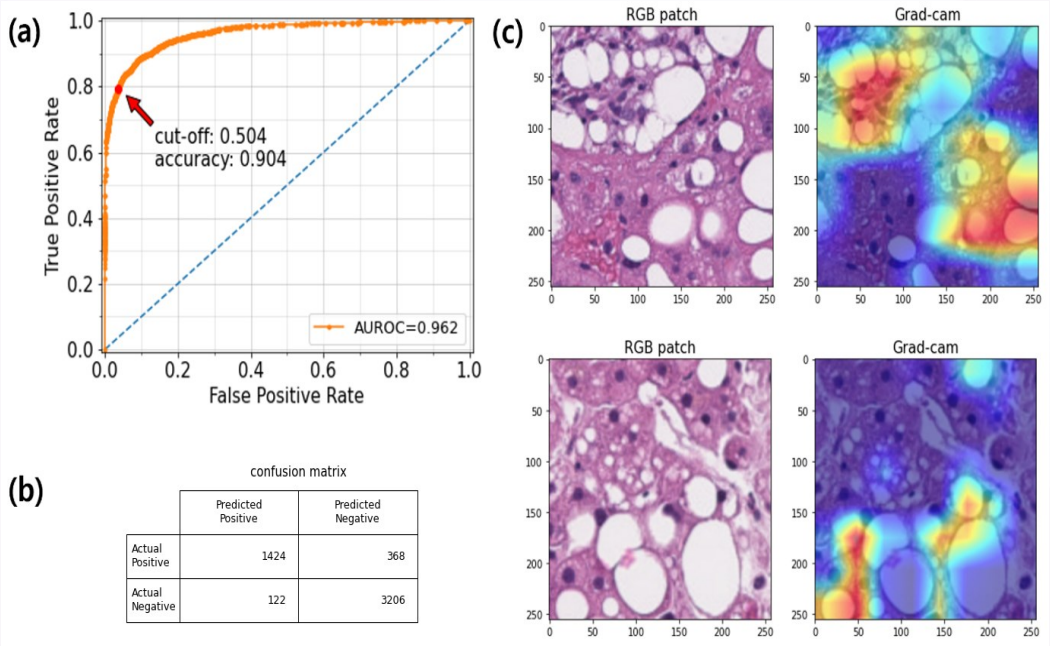
Digital Pathology: Differentiating NASH from ASH



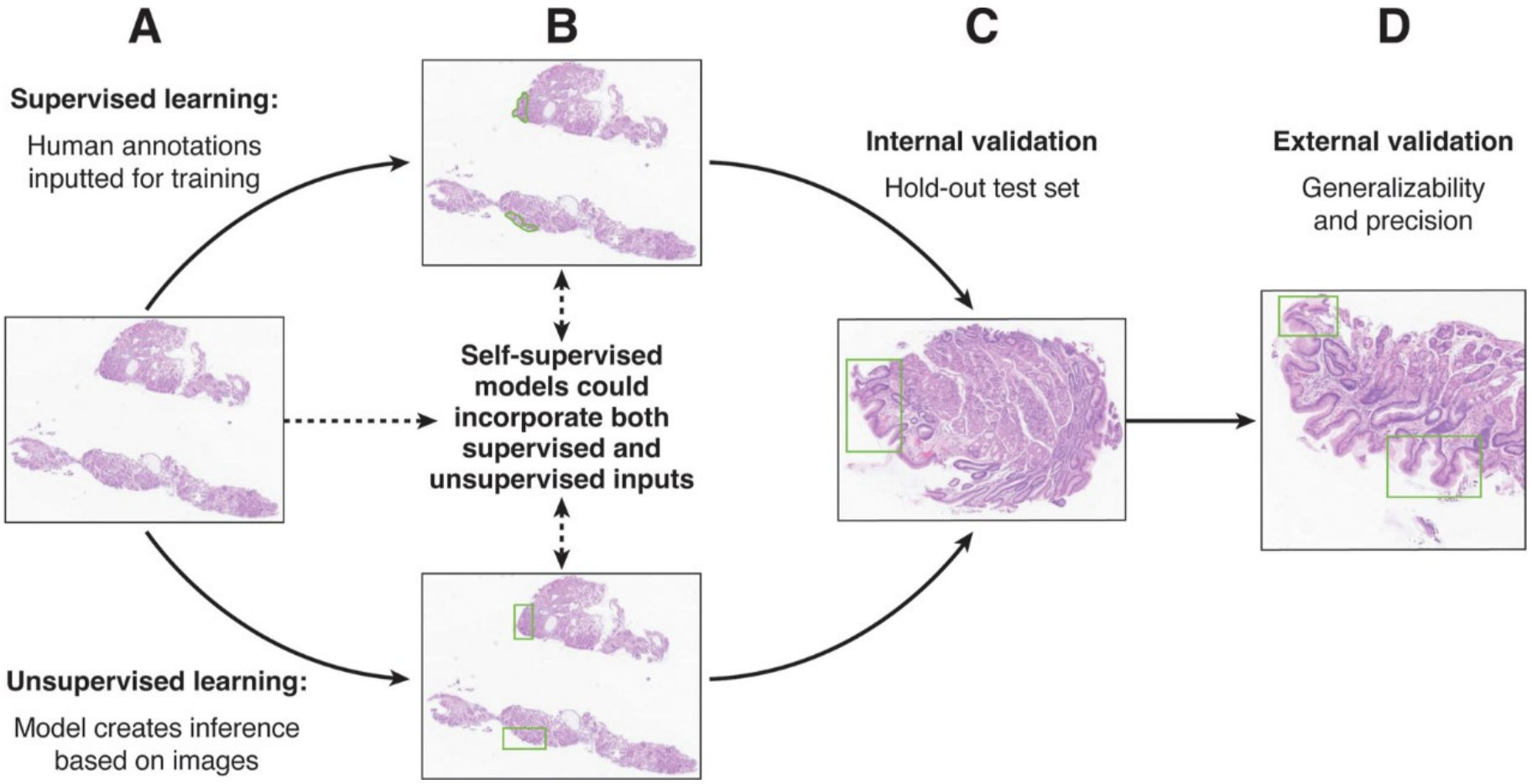
ASH

NASH

Ramkissoon 2022 EASL International Liver Congress

J Ahn PowerPoint

Schema for the development of an artificial intelligence model in digital histopathology



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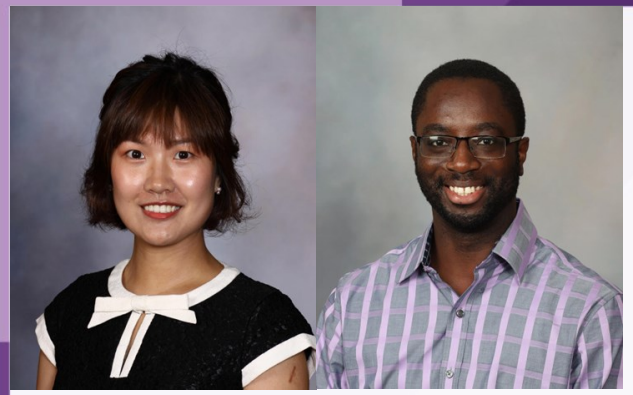
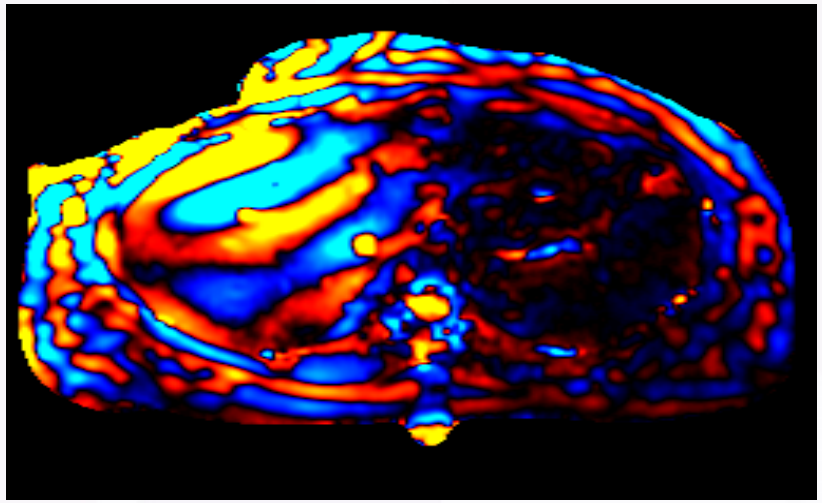


MRE and Radiomics



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1. MR-Biopsy:MR imaging+MR cytometry+MR elastography (MR-ICE).
2. Multiparametric MRI/MRE of the liver and spleen-PHTN.
3. Multiparametric MRI/MRE of the liver and kidneys-HRS.
4. Longitudinal MRI/MRE of disease evolution.

Remote patient monitoring: The 24/7 clinic

The GI Practice of the Future

Post- Hospital Care

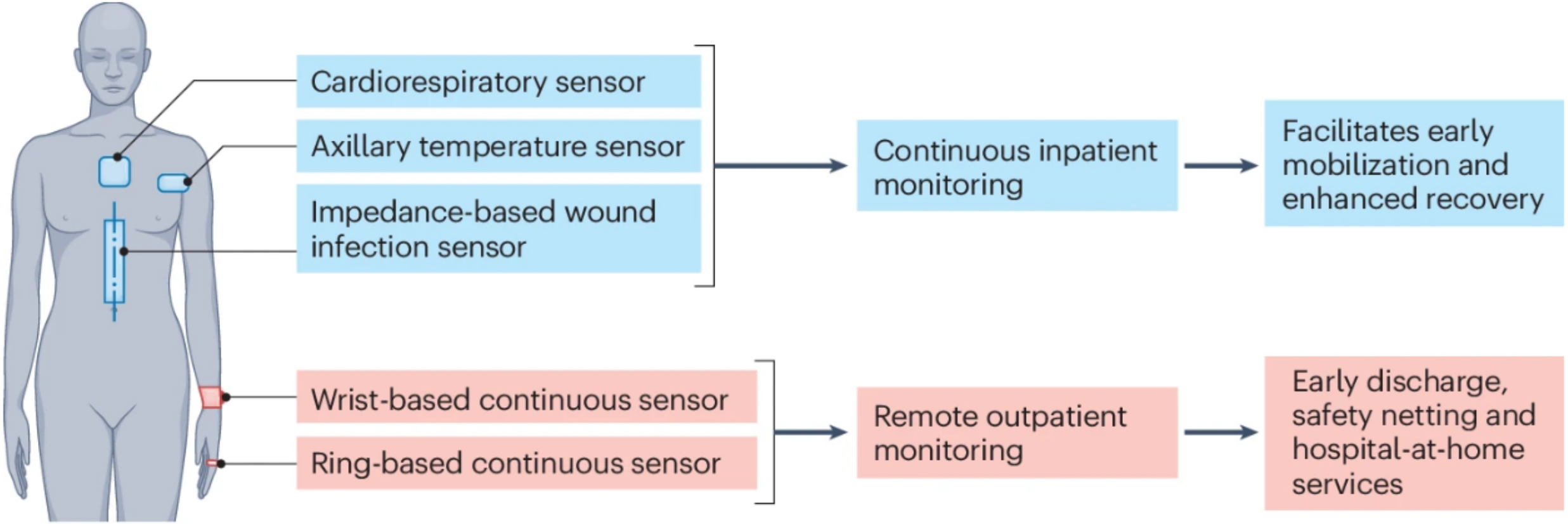
- Post-hospital dicharge vital sign monitoring
- Remote monitoring of labs, such as hemoglobin after endoscopy
- Monitor voice patterns for signs of hepatic encephalopathy

Virtual GI Clinic

- Virtual clinic visits
- Home based diagnostic testing (ascites measurements, virtual capsule endoscopy)
- Virtual Reality therapies for functional disorders

Penrice et al *GHA* 2022

Sensor inputs for peri- and postoperative continuous monitoring



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Remote patient monitoring: The 24/7 clinic

Goals:

- ↓ hospital readmission rates
- ↓ health care spending
- ↑ patient quality of life

Lessons Learned:

- Subject identification is time consuming
- Lack of process and data automation leads to cumbersome workflows

Preliminary Outcomes:

- 31 Graduates thus far
- 90-day readmission: **37.1%** (2019) vs **28.0%** (RPM)
- 90-day readmission: **43.9%** (2021 not enrolled) vs **28.0%** (RPM)
- 90-day ED visit: **44%** vs **24%**

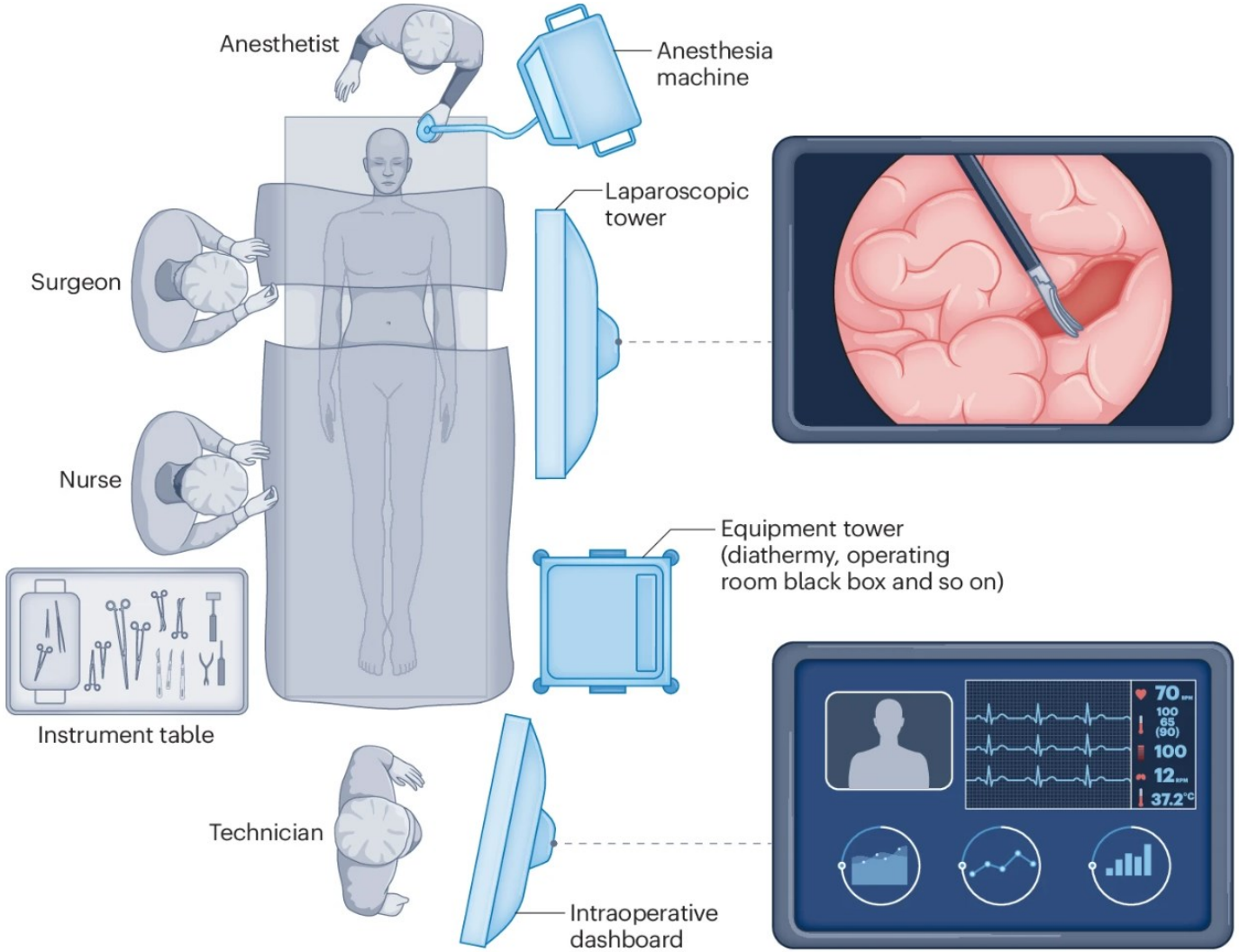
Next steps:

- Move to scale

  Cost comparison & QoL assessment
- Single lead ECG implementation
- Automation and smart processes

Penrice et al 2022

Integration of novel AI-powered digital interventions in the intraoperative setting



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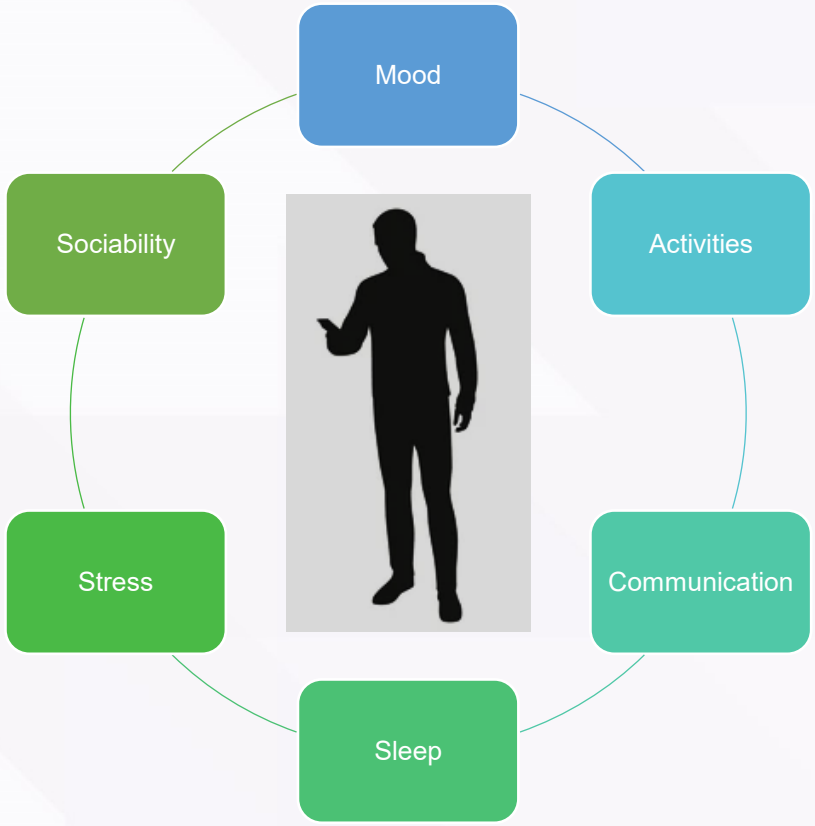
Digital biomarkers of alcohol use disorder

- Patients with alcohol-associated liver disease (ALD) have relapse rates >30% within 30 days of hospital discharge
- Risk factors predicting relapse are multifactorial & limited by standard assessments at set times and locations
- Digital technologies enable collection of dynamic behavioral data and may reveal novel biomarkers of addiction
- Current studies using smartphone sensor data may predict relapse in ALD



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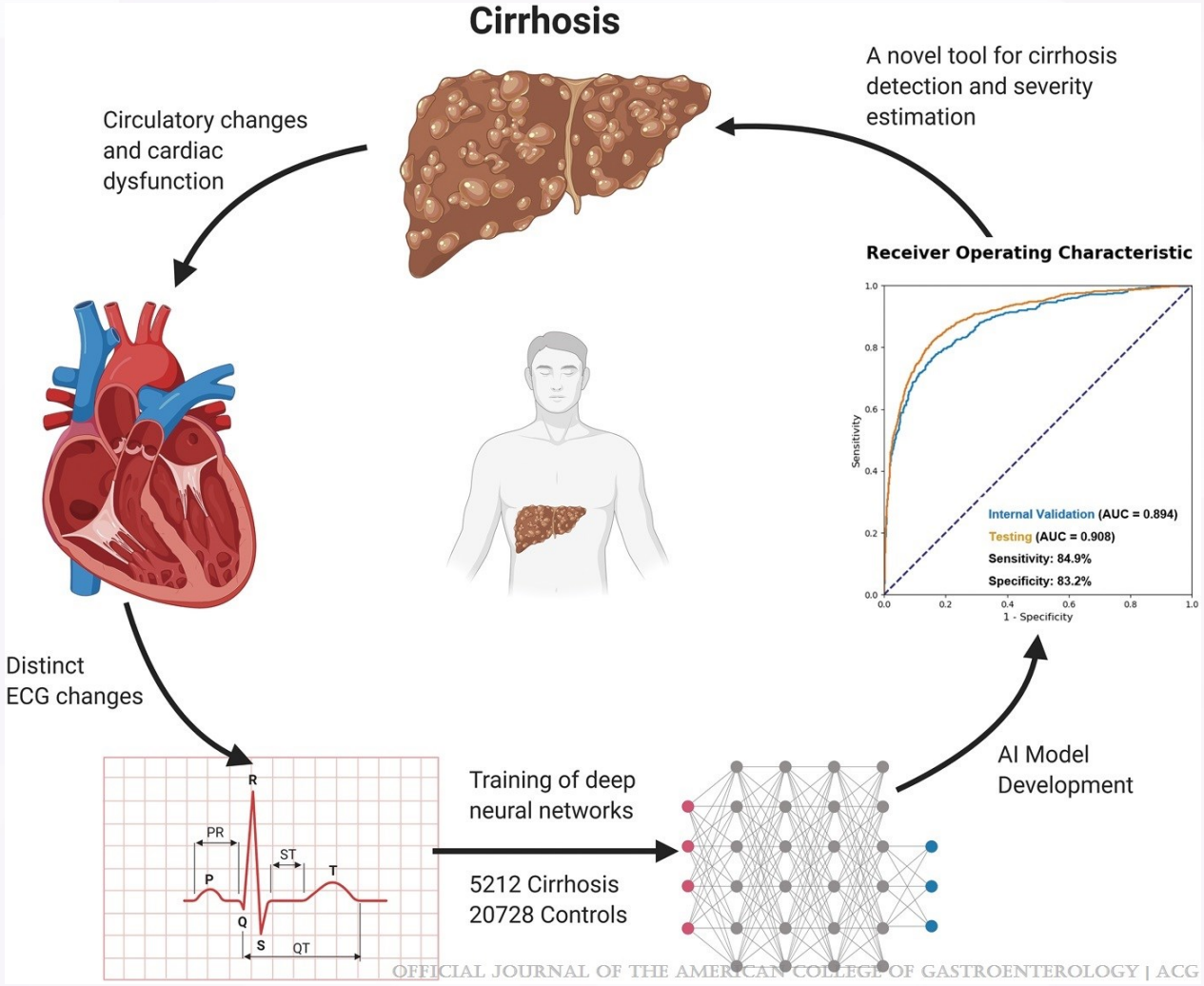
Using AI to predict and prognosticate cirrhosis from ECG (ACE SCORE)



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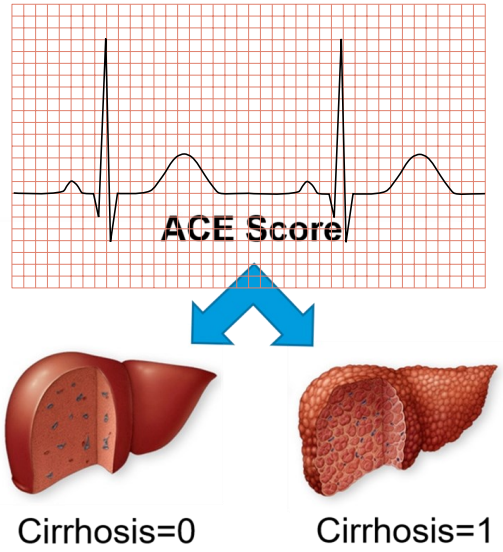
ACE Model Overview

AI Model Development

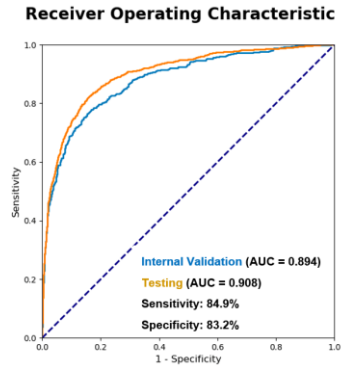
- Convolutional neural network architecture
- 5,212 patients with cirrhosis
- 20,728 age & sex-matched controls



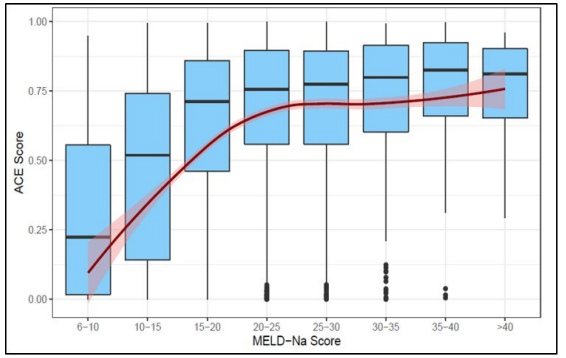
Main Findings

Excellent performance for classifying ECGs from patients with cirrhosis vs. controls.

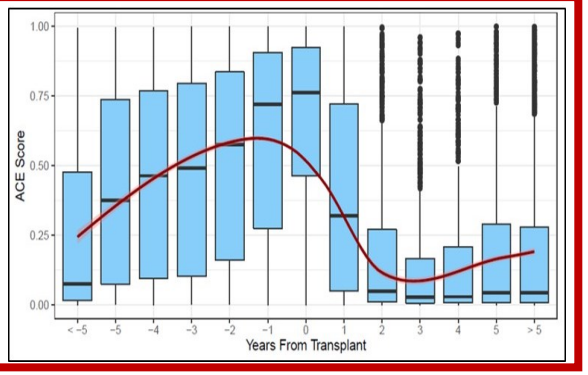
- AUC: 0.908
- Sensitivity: 84.9%
- Specificity: 83.2%



Positive association with markers of liver disease severity including MELD-Na.



Trends in the ACE score mirrored the progression and resolution of liver disease before and after liver transplantation.



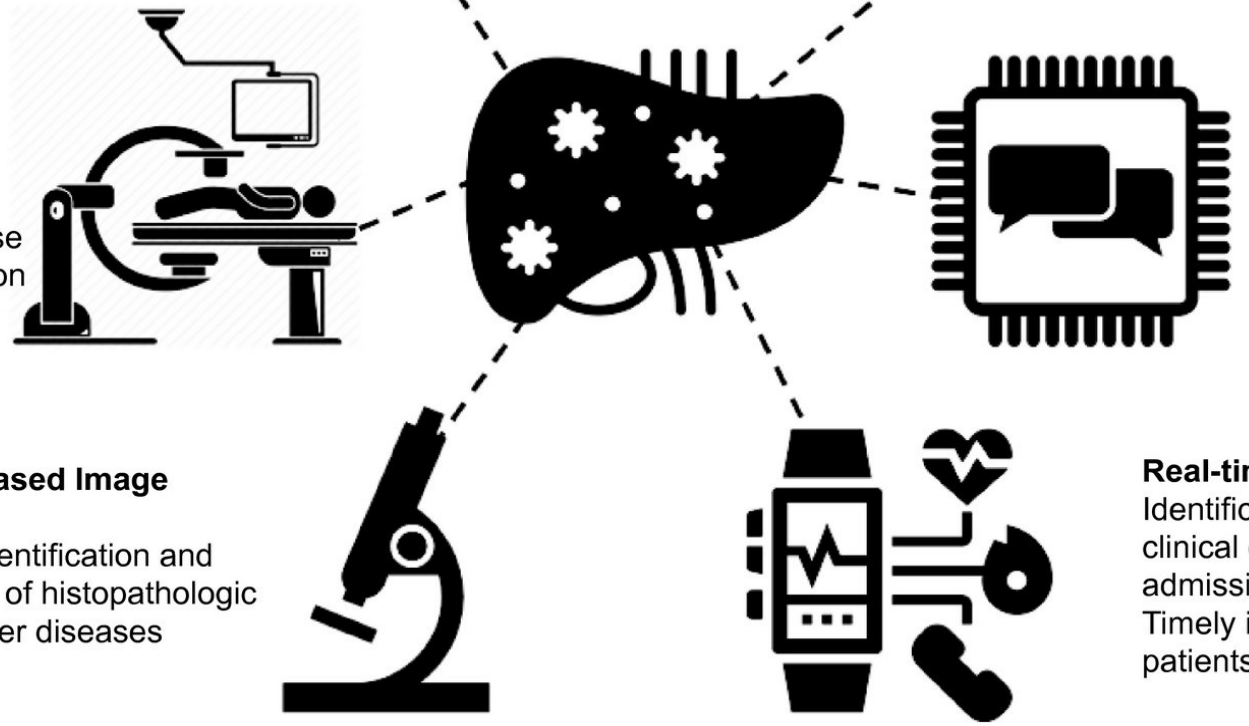
Ahn JC et al *AJG* 2021

Application of Artificial Intelligence for the Diagnosis and Treatment of Liver Diseases

Routine Clinical/Laboratory Data
Prediction of fibrosis
Prediction of cirrhosis complications
Prediction of mortality
Transplant outcomes

Multi-Omics
Identification of high-risk genetic and epigenetic features
Lipidomic, glycomic, hormonal analysis
Prediction of hepatotoxicity in drug development

Radiology-based Image Recognition
Prediction of fibrosis
Prediction of steatosis
Classification of liver masses
Prediction of treatment response
Estimation of portal hypertension



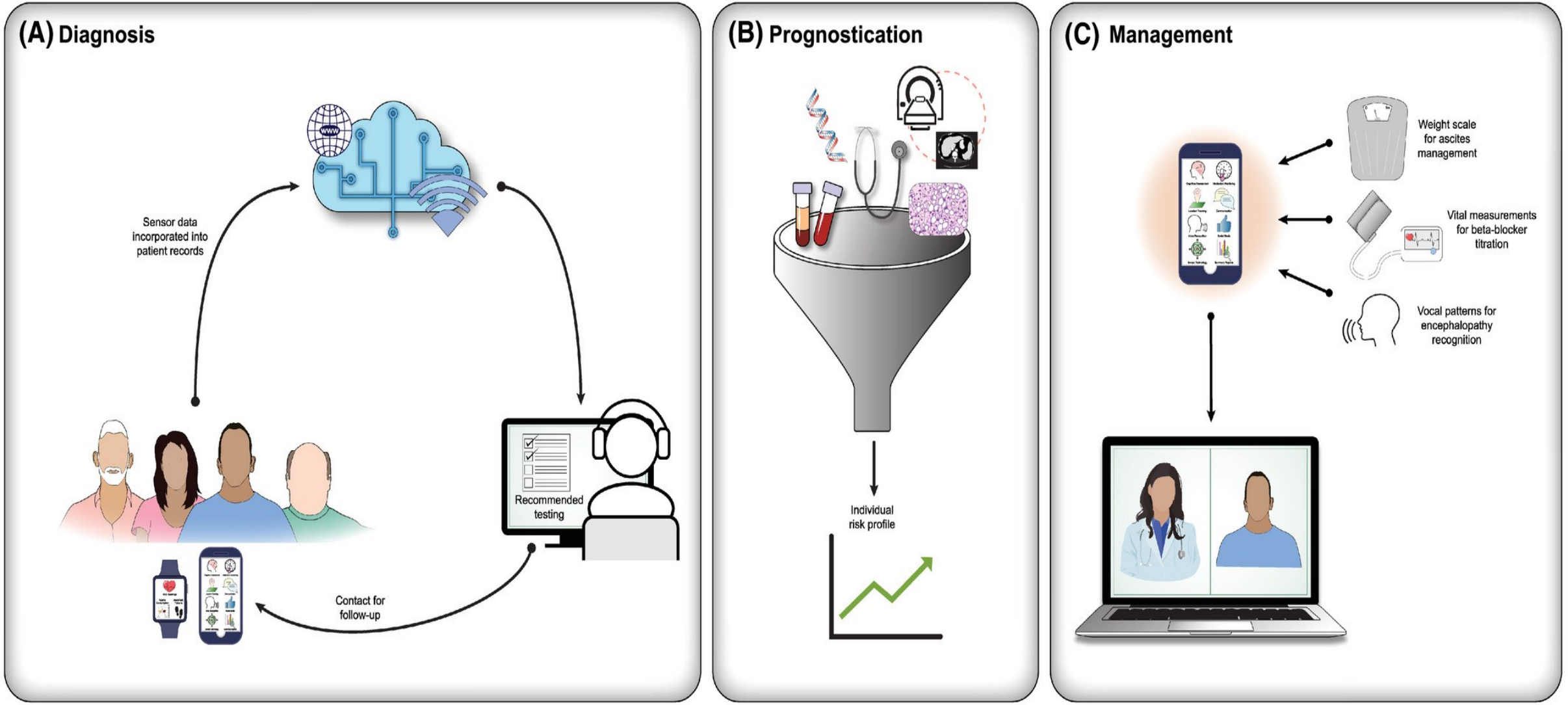
Natural language processing
Identification of specific diagnosis from electronic health records
Automated interpretation and analysis of clinical reports
Detection of hepatic encephalopathy

Pathology-based Image Recognition
Automated identification and quantification of histopathologic features of liver diseases

Real-time Biomonitoring
Identification of patients at risk of clinical decompensation and hospital admission
Timely intervention for high risk patients

J Ahn et al *Hepatology* 2021

Artificial intelligence for diagnosis, prognostication, and management of liver disease



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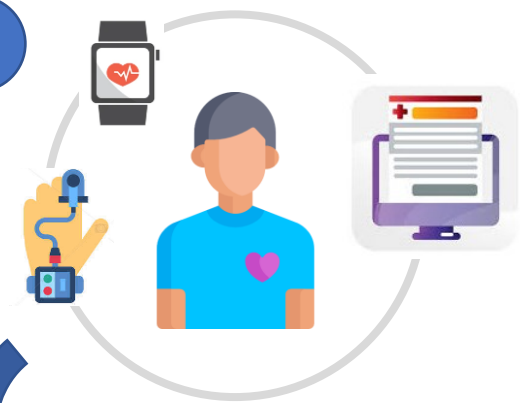
The Digital Twin

Raw Data Extraction

1



Patient + IOT

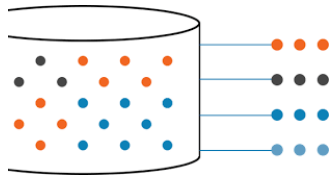
2

Data Aggregation, Cleaning, Normalization

3

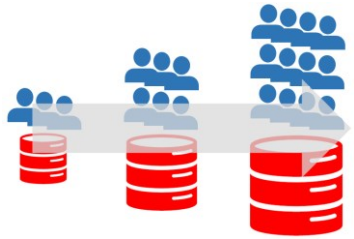
Model creation and physician validation

4



Data Insights: correction, refinement, analytics

5a



Population insights: Extrapolation and scaling

5b

Care insights: augmented reality