ORDINE PROVINCIALE
DEI MEDICI CHIRURGHI E
DEGLI ODONTOIATRI
DI VENEZIA

INTELLIGENZA ARTIFICIALE IN SANITA'

PROSPETTIVE, OPPORTUNITA' E RISCHI DI UN PROGRESSO INEVITABILE

LE ATTESE DEGLI SPECIALISTI

| Domenico Mangino, Cardiochirurgo
Direttore U.O.C. Cardiochirurgia,
Ospedale dell'Angelo, AULSS 3 Serenissima

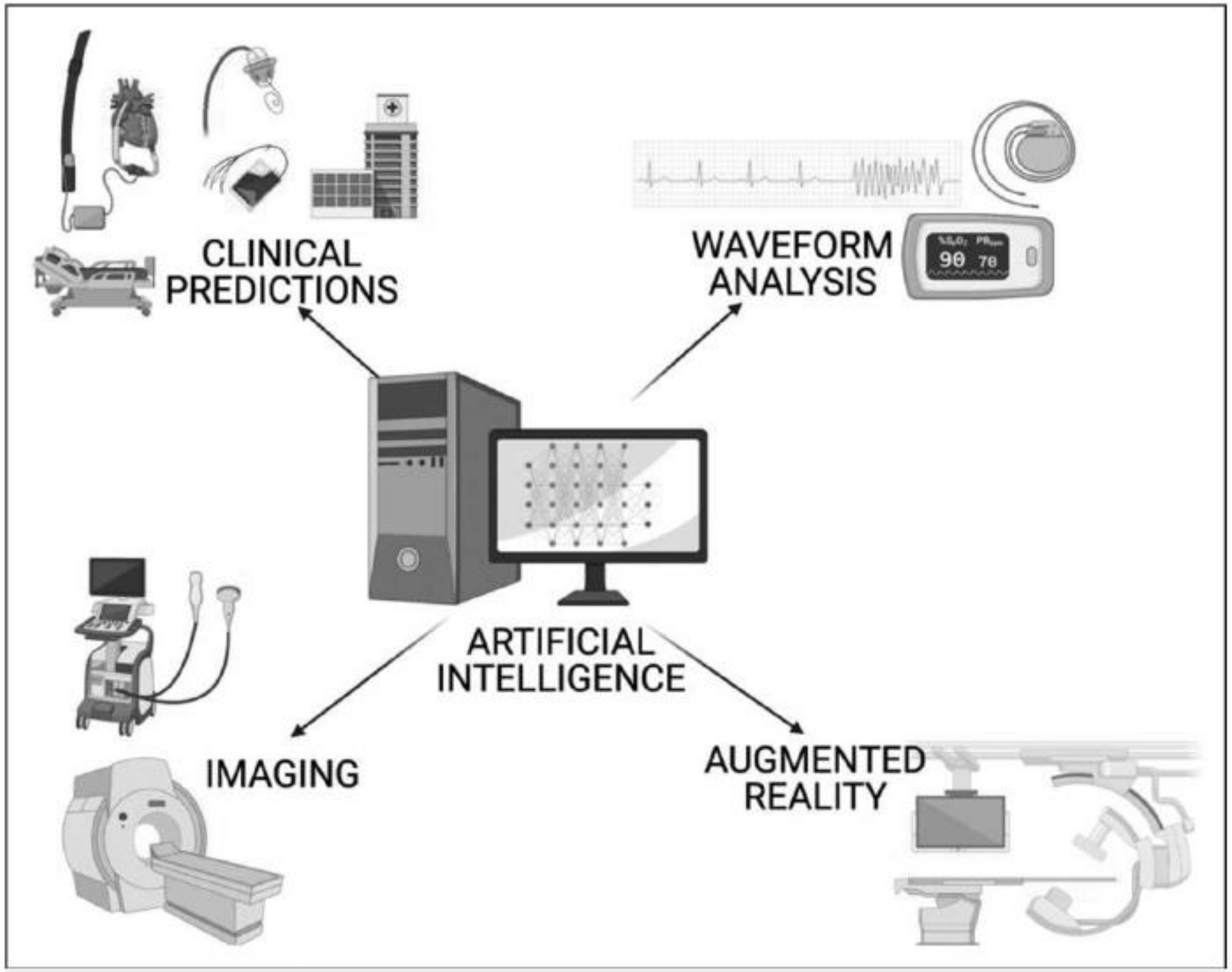
REGIONE DEL VENETO
ULSS3 SERENISSIMA

INTELLIGENZA ARTIFICIALE

L'intelligenza artificiale si riferisce alla **capacità di una macchina di svolgere compiti intelligenti**, come il riconoscimento di immagini e modelli, la pianificazione di azioni, la risoluzione di problemi, la comprensione del linguaggio e il riconoscimento di oggetti e suoni.

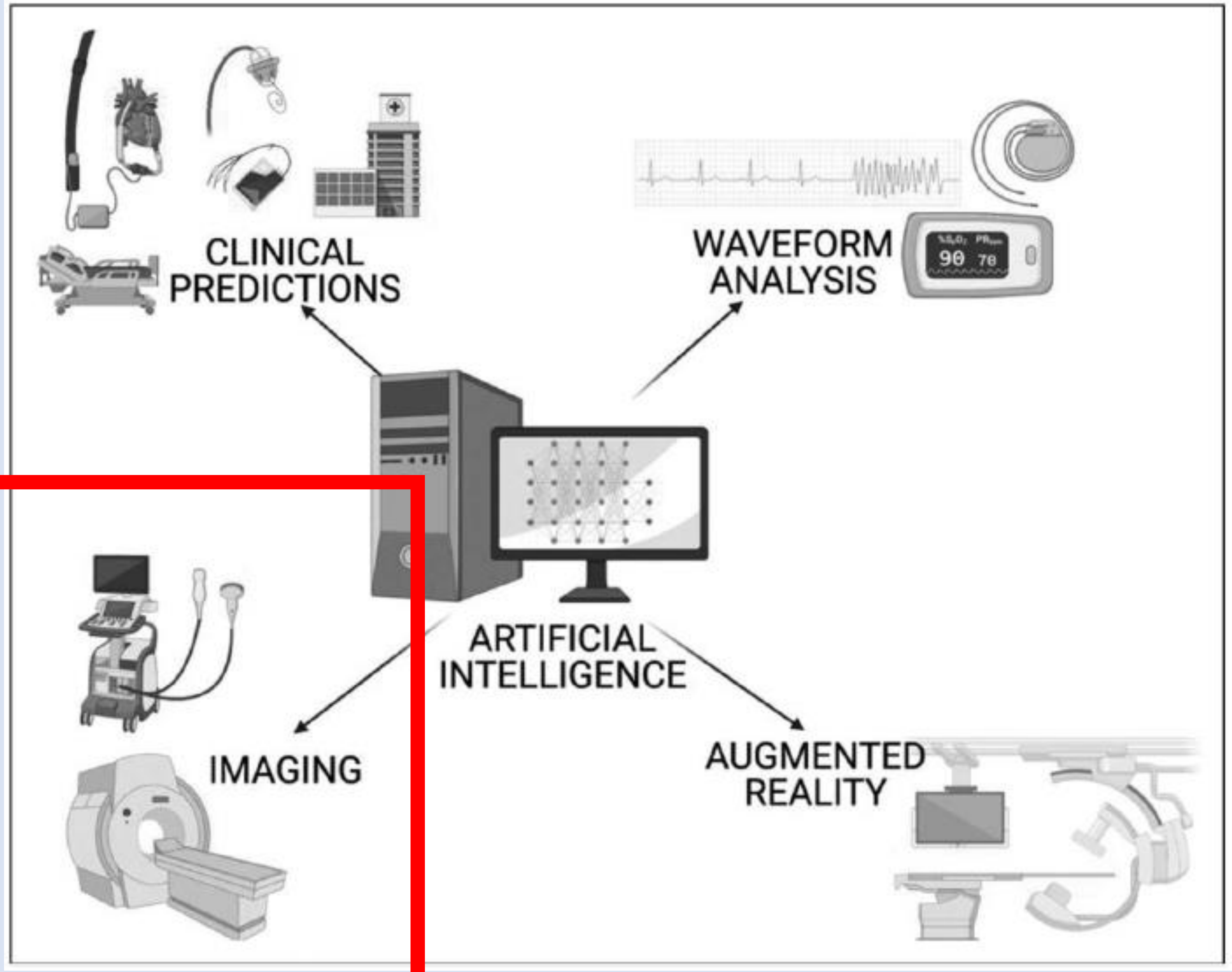
Più in generale, è **l'applicazione di metodi statistici a grandi quantità di dati per apprendere modelli e fare previsioni quando vengono presentati nuovi dati**.

INTELLIGENZA ARTIFICIALE IN AMBITO CARDIOVASCOLARE



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

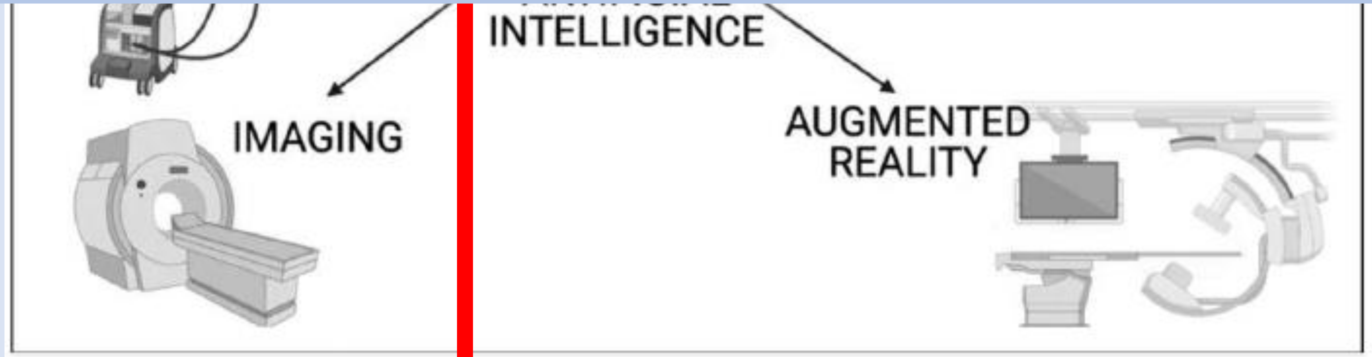
INTELLIGENZA ARTIFICIALE E IMAGING CARDIOVASCOLARE



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

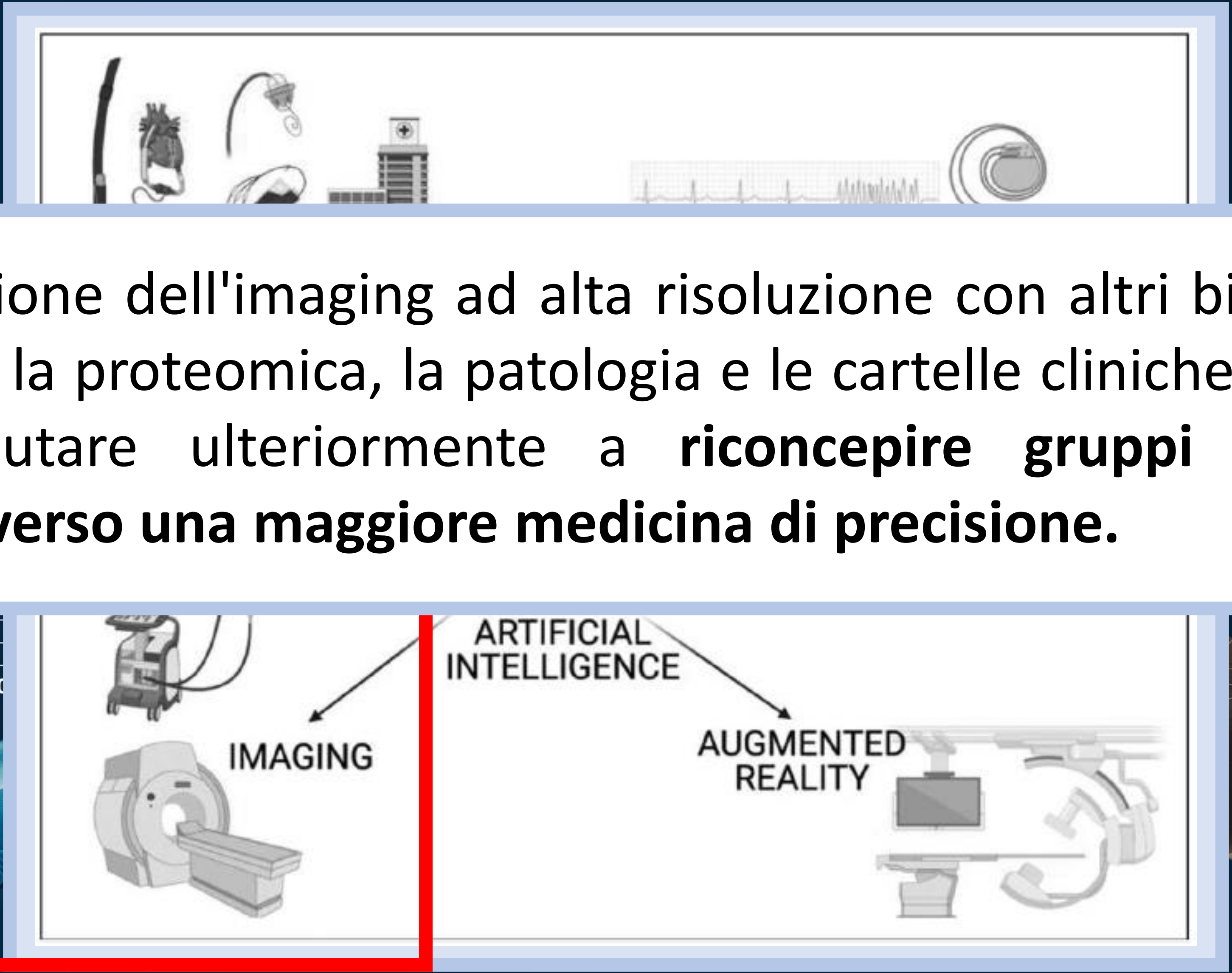
L’AI permette di **automatizzare tutte le fasi della catena di imaging** per contribuire a **migliorare il valore dell'acquisizione delle immagini, dell'interpretazione** e **del processo decisionale**.

Consente di **semplificare il lavoro clinico automatizzando compiti semplici** e noiosi, consentendo di reindirizzare l'attenzione dell'uomo verso casi più complessi e rari.



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E IMAGING CARDIOVASCOLARE



La combinazione dell'imaging ad alta risoluzione con altri big data come la genomica, la proteomica, la patologia e le cartelle cliniche elettroniche potrebbe aiutare ulteriormente a **riconcepire gruppi di malattie eterogenee verso una maggiore medicina di precisione.**

Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E IMAGING CARDIOVASCOLARE

Table 1. Artificial intelligence applications in imaging

Imaging modality	Applications of AI
Echocardiography	Quality assessment with an associated confidence value [12] Cardiac Strain Measurement [13] Operative training for echosonographers [14] AutoEF to automatically calculate ejection fraction without any endocardial contouring [15] Automated mitral valve annulus measurement for transcatheter mitral valve intervention [16] Automated left heart chamber volume quantification [17] Automated left ventricular mass assessment [18]
Cardiac CT	TAVI planning automated by identification of various aortic root landmarks with vale size suggestion [19,20] Ascending and thoracic aorta size predicted from non-ECG gated noncontrast CT reducing the need for contrast and can assess size in incidental findings of aneurysm [21] Coronary disease quantification with full end-to-end pipeline to determine fractional flow reserve that correlated well to invasive fractional flow measurement and assessment of LV myocardium in intermediate coronary lesions [22]
CMR	Automated 3D aortic volume measurements [23] Automated assessment of left and right atrial size post atrial septal device to more accurately estimate size in the setting of imaging artifact [24] Automated myocardial native TI mapping to detect myocardial fibrosis [25] Automated stress myocardial blood flow and myocardial perfusion reserve measurement to quantify the hemodynamic impact of coronary stenosis [26]
Radiomics	Fat radiomics used to quantify the coronary inflammation induced changes to the water and fat content in the perivascular adipose tissue to predict adverse cardiac event including myocardial infarction [27]

Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

RADIOMICA

analisi delle immagini mediche volta a **ottenere**, tramite opportuni metodi matematici e l'uso dei computer, **informazioni di tipo quantitativo** da queste non rilevabili tramite la loro semplice osservazione visiva da parte dell'operatore.

	Coronary disease quantification with full end-to-end pipeline to determine fractional flow reserve that correlated well to invasive fractional flow measurement and assessment of LV myocardium in intermediate coronary lesions [22]
CMR	Automated 3D aortic volume measurements [23] Automated assessment of left and right atrial size post atrial septal device to more accurately estimate size in the setting of imaging artifact [24] Automated myocardial native T1 mapping to detect myocardial fibrosis [25] Automated stress myocardial blood flow and myocardial perfusion reserve measurement to quantify the hemodynamic impact of coronary stenosis [26]
Radiomics	Fat radiomics used to quantify the coronary inflammation induced changes to the water and fat content in the perivascular adipose tissue to predict adverse cardiac event including myocardial infarction [27]

Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

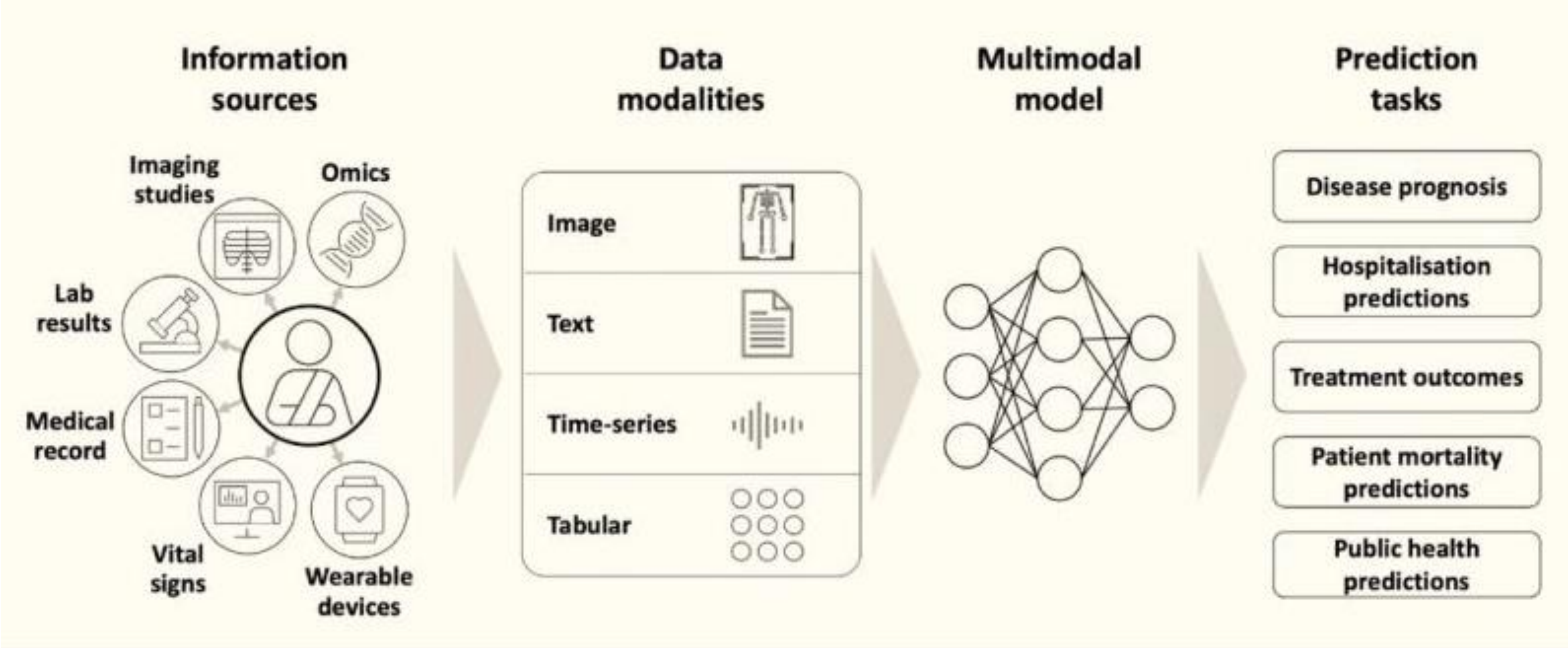
RADIOMICA

La **radiomica** nasce per **sviluppare strumenti di supporto decisionale** e implica la **combinazione di dati ricavati dall' imaging medicale con altre caratteristiche del paziente**, quando disponibili, **per aumentare la potenza dei modelli di supporto decisionale**. I **dati quantitativi** estratti dalle immagini possono venir **integrati in modelli predittivi multidisciplinari** per la gestione del paziente, anche mediante l'utilizzo di metodiche di machine learning e di intelligenza artificiale.

	hemodynamic impact of coronary stenosis [26]
Radiomics	Fat radiomics used to quantify the coronary inflammation induced changes to the water and fat content in the perivascular adipose tissue to predict adverse cardiac event including myocardial infarction [27]

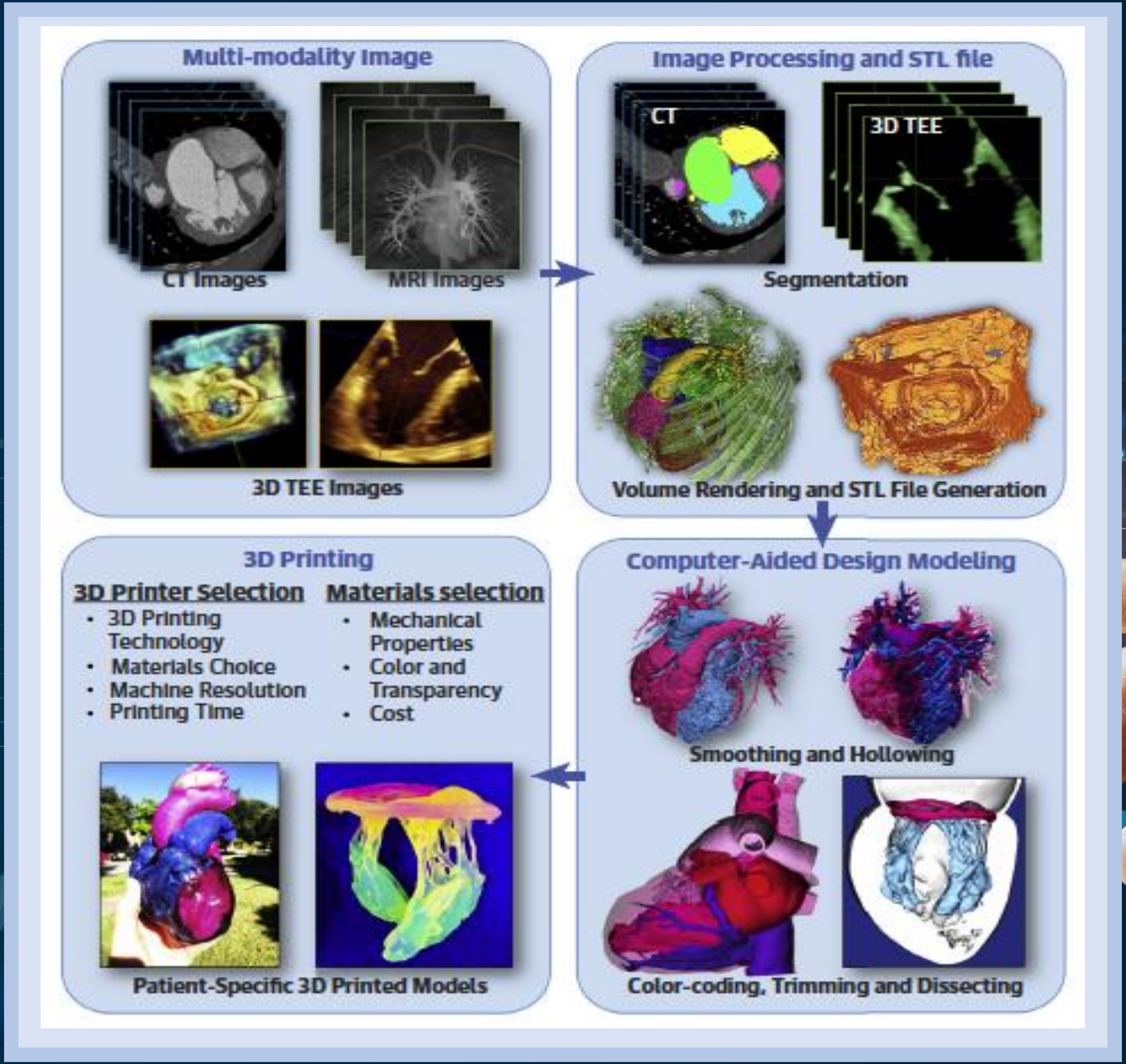
Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E IMAGING CARDIOVASCOLARE



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E 3D PRINTING



Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

TECNOLOGIA DELLE STAMPANTI 3D

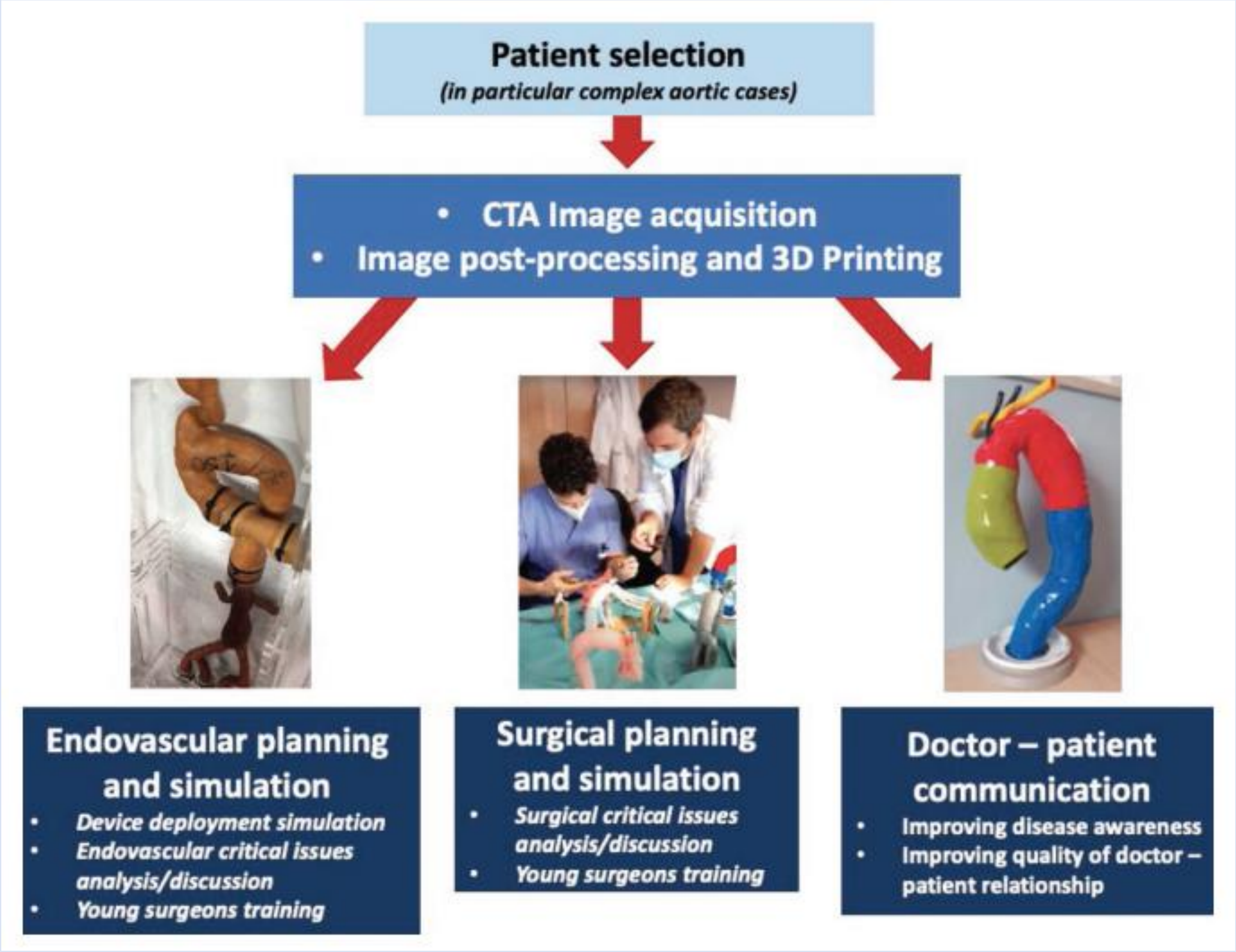
TABLE 1 3D Printing Technologies

Technology	Printing Material	Printing Technique	Pros and Cons	Applications
Stereolithography (SLA)	Photosensitive liquid resin	Ultraviolet laser curing	Pros: capable of printing large, highly accurate, and transparent models with a variety of elasticity. Cons: single material printing; need to print support structure; expensive.	Large and compliant models for illustration, education, and flow testing purposes
Selective laser sintering (SLS)	Thermosensitive particles	High-power infrared laser sintering	Pros: smooth finish and durable model; no need to print support structure. Cons: more expensive and less accessible; single material printing.	Industrial-level applications
Fused deposition modeling (FDM)	Thermoplastic filament or metal wire	Fused deposition	Pros: low-cost; suitable for desktop use; strong model. Cons: rough/stepped surface finish; single material printing.	Rigid and strong models for illustration
Inkjet	Powder material, such as starch and gypsum, and liquid binder	Inkjet and liquid binding	Pros: cost-effective; relatively fast; colorful models. Cons: rough surface finish; needs lengthy post-processing for model reinforcement; single material printing.	Complex colorful models for illustration
Polyjet	Ultraviolet (UV)-curable photopolymers	UV flood lamp curing	Pros: multimaterial printing; digital materials (variant colors and material properties); smooth surface finish. Cons: expensive; must use support material that needs to be removed in post processing.	Complex model with variant elasticity and color; tissue-mimicking models

3D = 3 dimensional.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

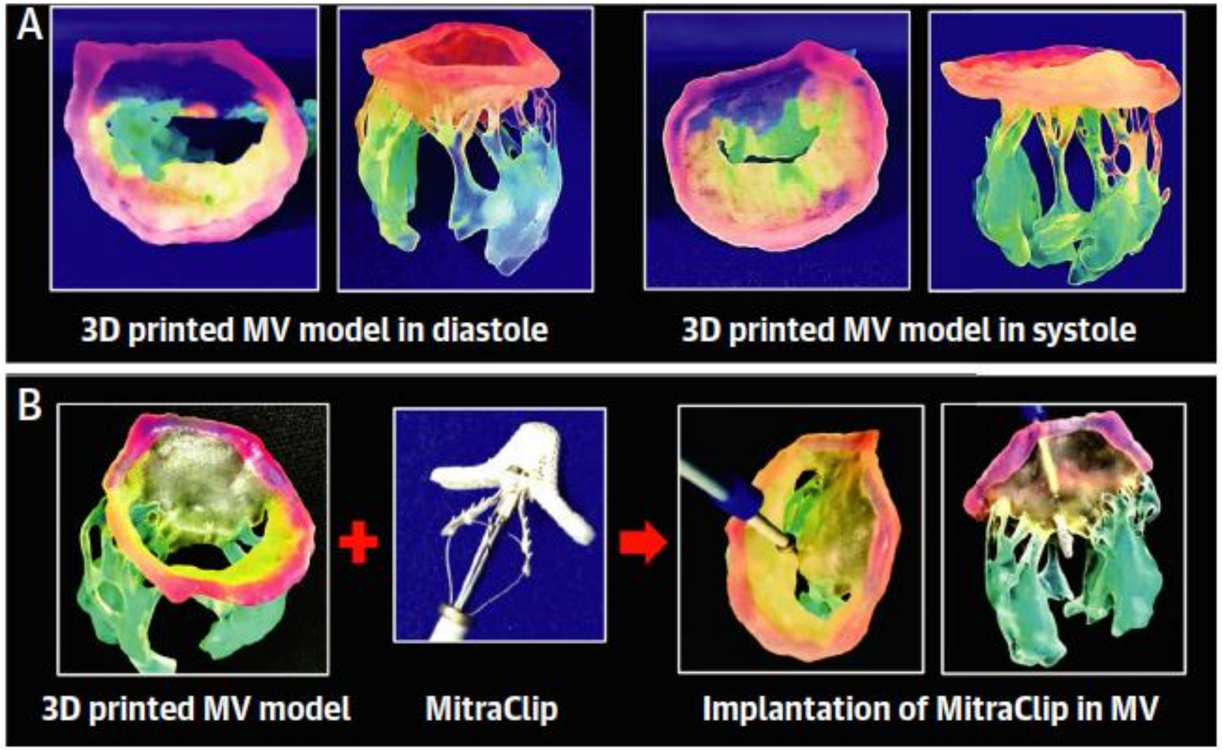
3D PRINTING IN CHIRURGIA AORTICA



Magagna P, Xodo A, Menegolo M et al. **Applications of Three-Dimensional Printing in the Management of Complex Aortic Diseases.** *Aorta (Stamford).* 2022 Oct;10(5):242-248.

PATIENT-SPECIFIC 3D PRINTING

FIGURE 3 **Patient-specific, Multimaterial 3D-Printed MV Apparatus**

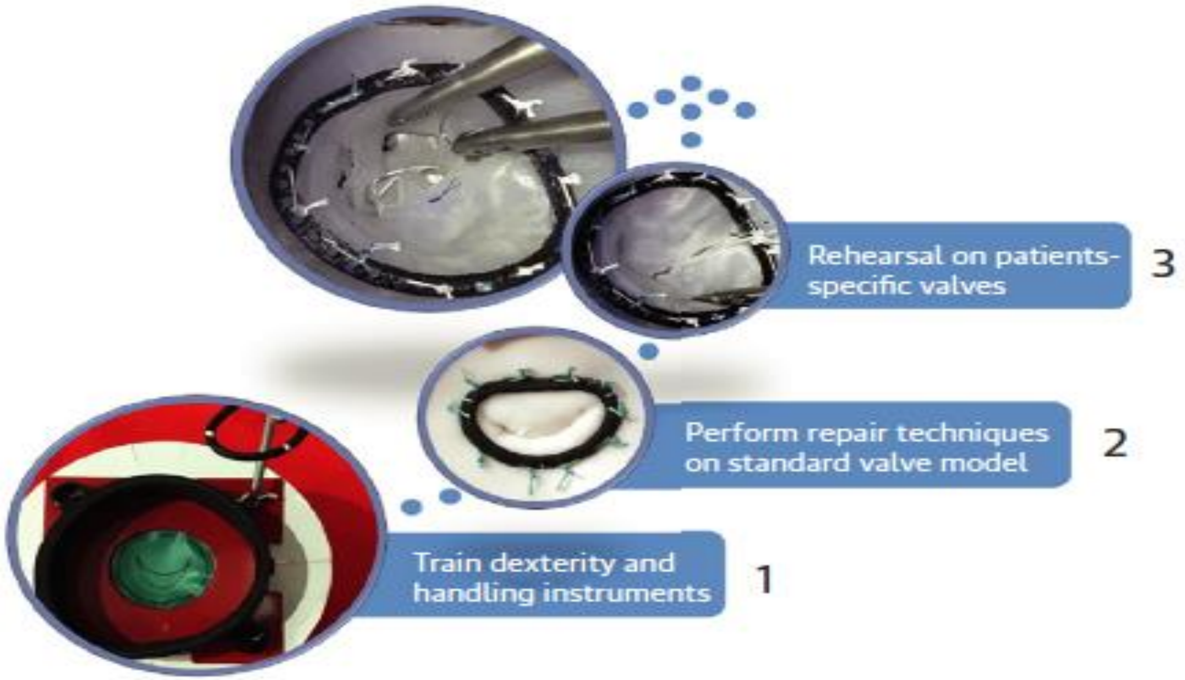


(A) A comprehensive mitral valve (MV) apparatus is extracted from contrast-enhanced computed tomography images. Patient-specific 3D printed models as shown in the diastolic and systolic phases of the cardiac cycle can be printed in different materials and colors to differentiate key cardiac anatomic structures; mitral annulus (pink), leaflets (transparent), chordae (yellow, transparent) and papillary muscles (green). **(B)** This allows for benchtop simulation of MitraClip implantation to facilitate early-operator learning curves.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

3D PRINTING E TRAINING CHIRURGICO

FIGURE 4 **3D Print-guided Simulation for Obtaining Levels of Surgical Training**

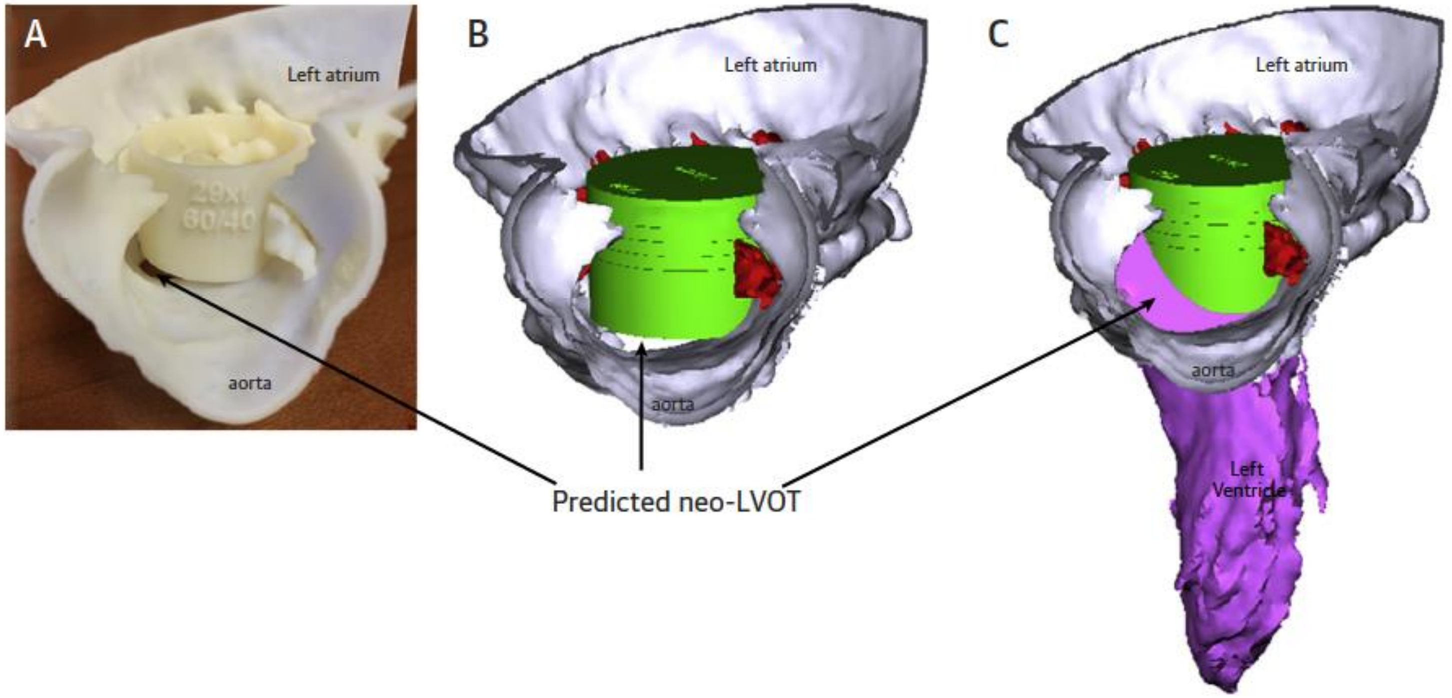


Three-dimensional printing enables high-end simulation of patient-specific valves extracted from medical imaging data suitable for mitral valve repair or cardiac interventions.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

AI, IMAGING, 3D PRINTING E PLANNING CHIRURGICO

FIGURE 5 Benchtop 3D Printing to Virtual 3D Print Simulation

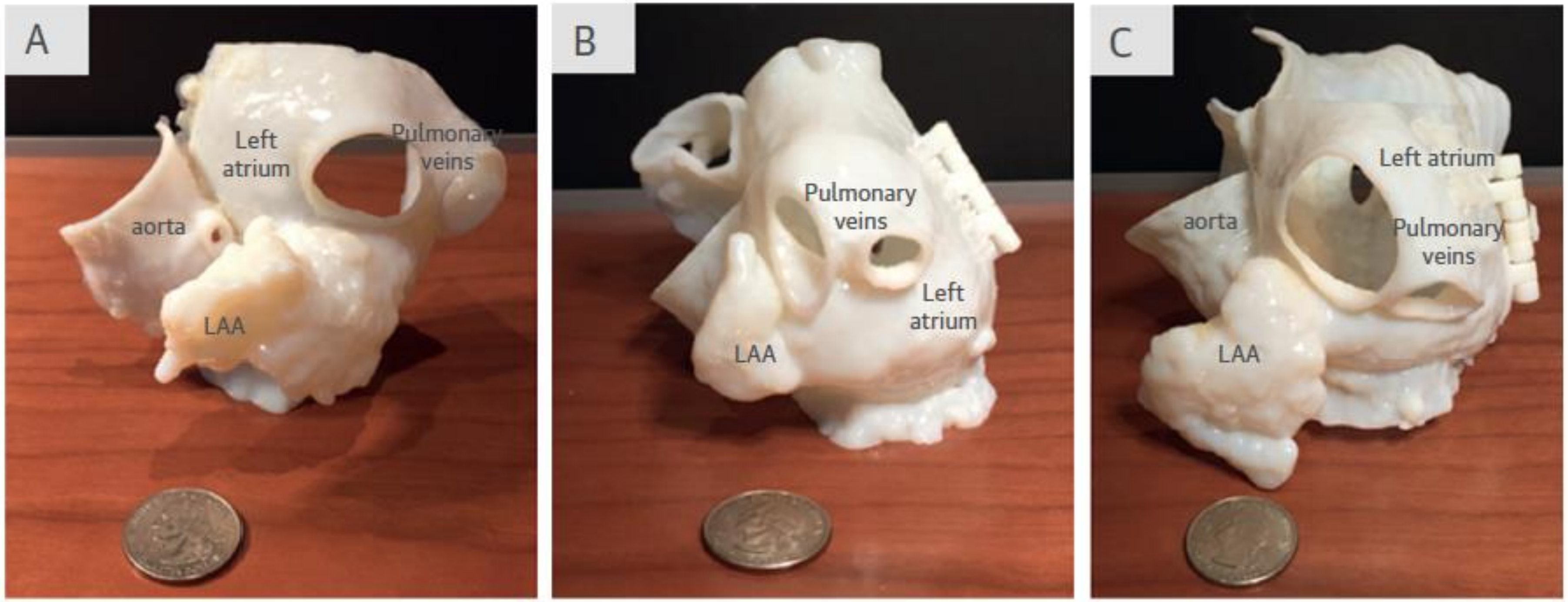


(A) Early experience with transcatheter mitral valve replacement (TMVR) involved physically 3-dimensionally (3D) printing the prosthesis of interest at a predetermined depth of implantation with visual estimation of the neo-LVOT (left ventricular outflow tract). **(B, C)** With understanding of the anatomic landmarks in the mitral landing zone, progression of TMVR planning expanded into virtual valve implant simulation in the mitral landing zone and beyond that of stationary 3D printing.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

AI, IMAGING, 3D PRINTING E PLANNING CHIRURGICO

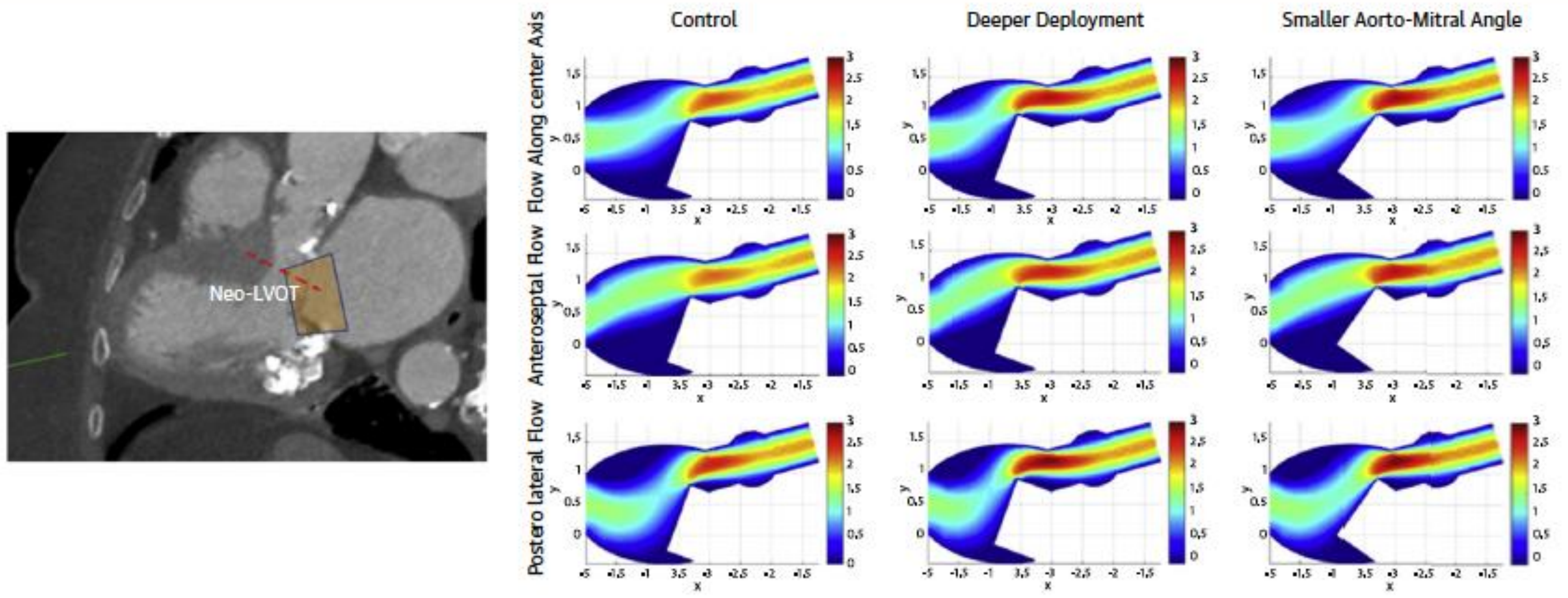
FIGURE 6 **3D Printing LAA Anatomy**



Early-operator learning curves were significantly reduced with pre-procedural 3-dimensional (3D) printing of the pertinent left atrial appendage (LAA) anatomy. This allowed implanters a thorough understanding of the unique sizing, angulations, landing zone, and geometry of the LAA and its surrounding structures. **(A–C)** Three different LAA 3D prints. Note each LAA has a unique take-off point from the left atrium, and unique angulation away from the left atrium and pulmonary veins.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

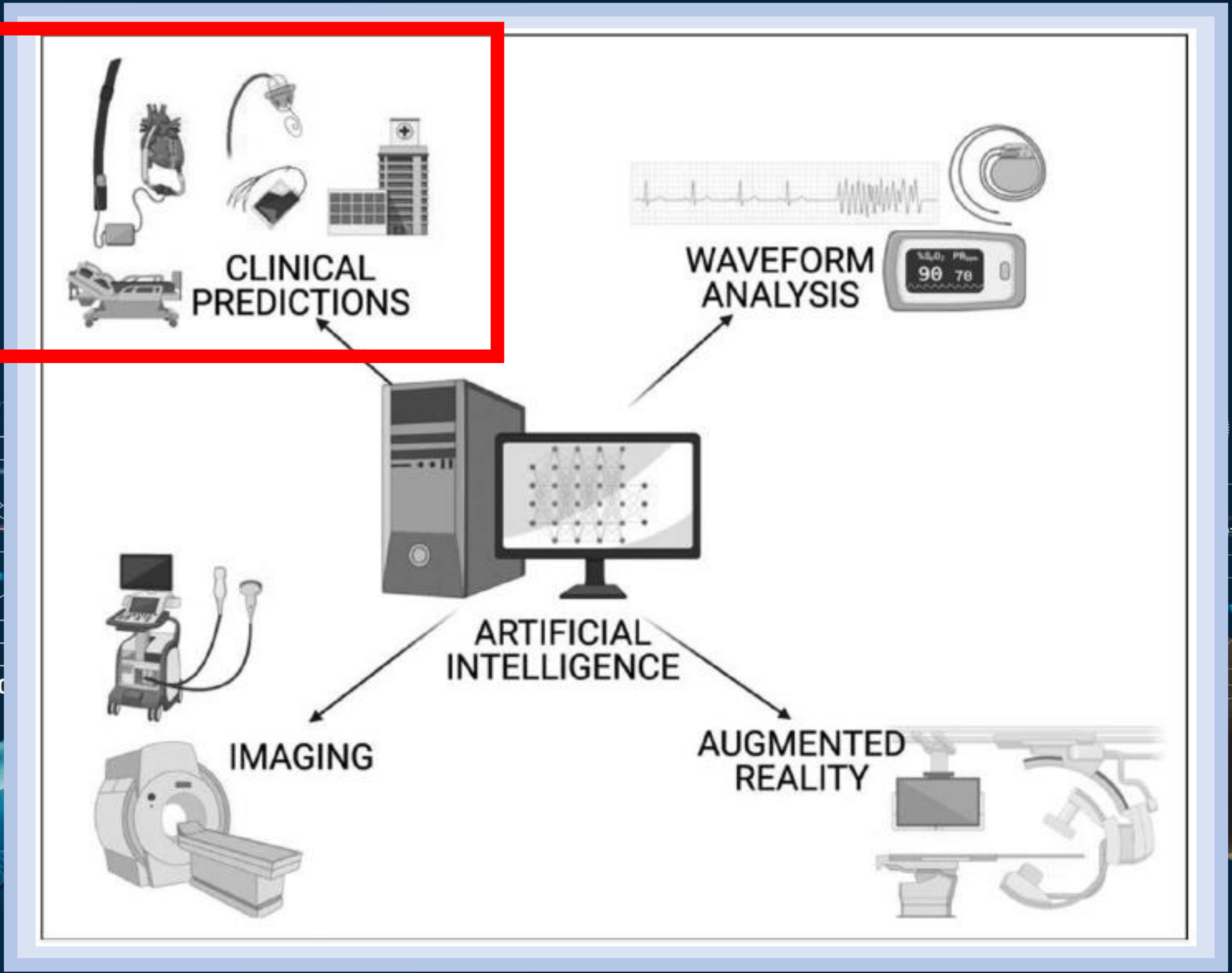
FIGURE 13 LVOT Obstruction Post-TMVR Visualized Using CFD



Computational flow dynamics (CFD) simulation has revealed that the occurrence of left ventricular outflow tract (LVOT) obstruction post transcatheter mitral valve replacement (TMVR) is multifactorial, affected by the valve deployment depth, the valve deployment angle, and the intraventricular flow direction.

Wang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial Intelligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

INTELLIGENZA ARTIFICIALE IN AMBITO CARDIOVASCOLARE



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

Meta-Analysis > J Thorac Cardiovasc Surg. 2022 Jun;163(6):2075-2087.e9.
doi: 10.1016/j.jtcvs.2020.07.105. Epub 2020 Aug 10.

Machine learning improves mortality risk prediction after cardiac surgery: Systematic review and meta-analysis

Umberto Benedetto [1], Arnaldo Dimagli [2], Shubhra Sinha [2], Lucia Cocomello [2], Ben Gibbison [2], Massimo Caputo [2], Tom Gaunt [3], Matt Lyon [3], Chris Holmes [4], Gianni D Angelini [2]

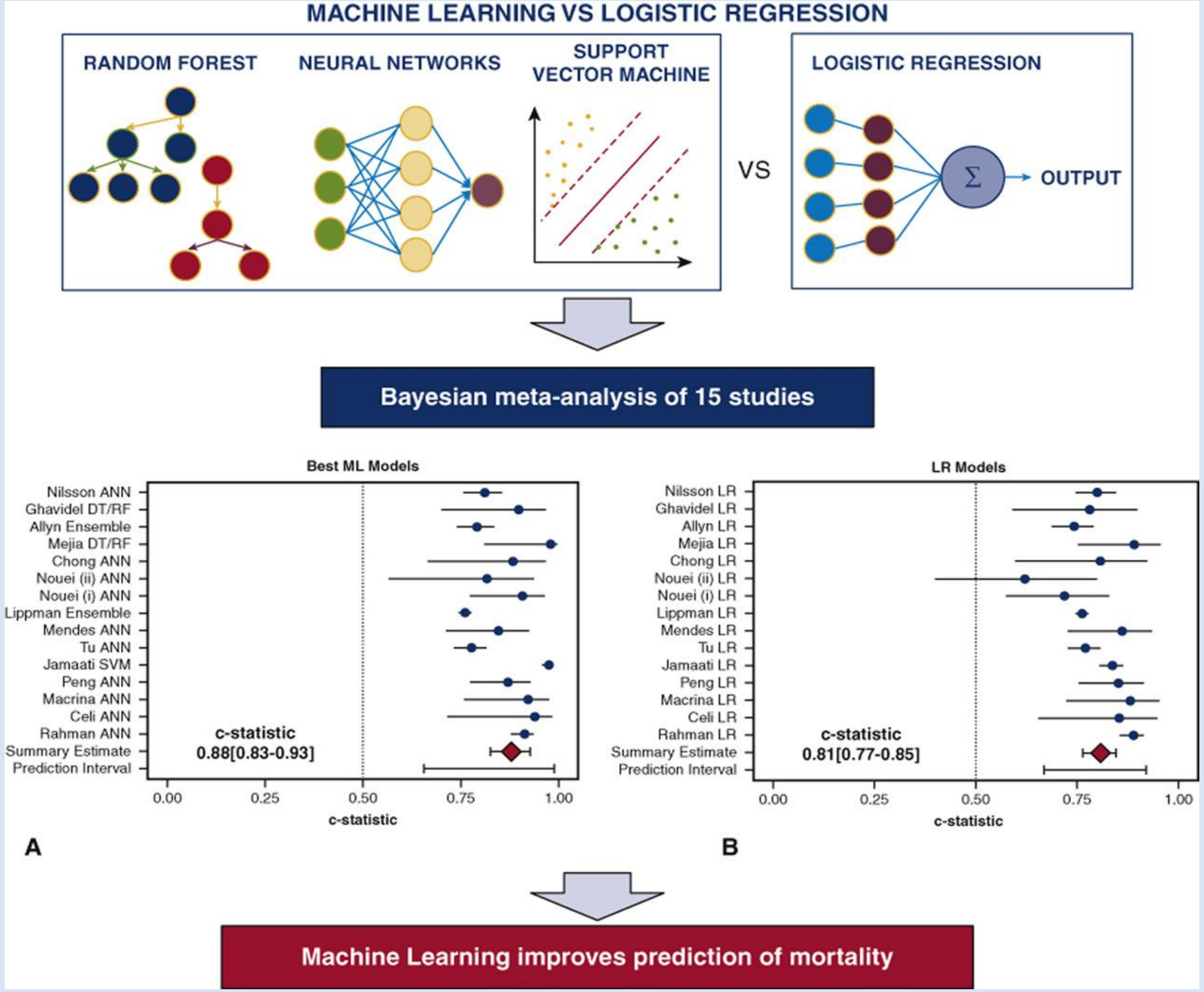
INTELLIGENZA ARTIFICIALE E RISK ASSESMENT

Meta-Analysis

doi: 10.1016/j.jtc

Machine ... ediction
after car ... meta-
analysis

Umberto Bened ... en Gibbison [2],
Massimo Caput ... [2]



INTELLIGENZA ARTIFICIALE E RISK ASSESMENT

> JACC Cardiovasc Interv. 2019 Jul 22;12(14):1328-1338. doi: 10.1016/j.jcin.2019.06.013.

Machine Learning Prediction Models for In-Hospital Mortality After Transcatheter Aortic Valve Replacement

Dagmar F Hernandez-Suarez [1], Yeunjung Kim [2], Pedro Villablanca [3], Tanush Gupta [4], Jose Wiley [4], Brenda G Nieves-Rodriguez [5], Jovaniel Rodriguez-Maldonado [5], Roberto Feliu Maldonado [5], Istoni da Luz Sant'Ana [5], Cristina Sanina [4], Pedro Cox-Alomar [6], Harish Ramakrishna [7], Angel Lopez-Candales [8], William W O'Neill [3], Duane S Pinto [9], Azeem Latib [4], Abiel Roche-Lima [5]

> PLoS One. 2020 Sep 4;15(9):e0238199. doi: 10.1371/journal.pone.0238199. eCollection 2020.

Improving preoperative risk-of-death prediction in surgery congenital heart defects using artificial intelligence model: A pilot study

João Chang Junior [1 2 3], Fábio Binuesa [1], Luiz Fernando Caneo [1], Aida Luiza Ribeiro Turquetto [1 4], Elisandra Cristina Trevisan Calvo Arita [1], Aline Cristina Barbosa [1], Alfredo Manoel da Silva Fernandes [1], Evelinda Marramon Trindade [1 4 5], Fábio Biscegli Jatene [1], Paul-Eric Dossou [6], Marcelo Biscegli Jatene [1]

> J Cardiothorac Vasc Anesth. 2021 Mar;35(3):857-865. doi: 10.1053/j.jvca.2020.07.029. Epub 2020 Jul 12.

Machine Learning Models with Preoperative Risk Factors and Intraoperative Hypotension Parameters Predict Mortality After Cardiac Surgery

Marta Priscila Bento Fernandes [1], Miguel Armengol de la Hoz [2], Valluvan Rangasamy [3], Balachundhar Subramaniam [4]

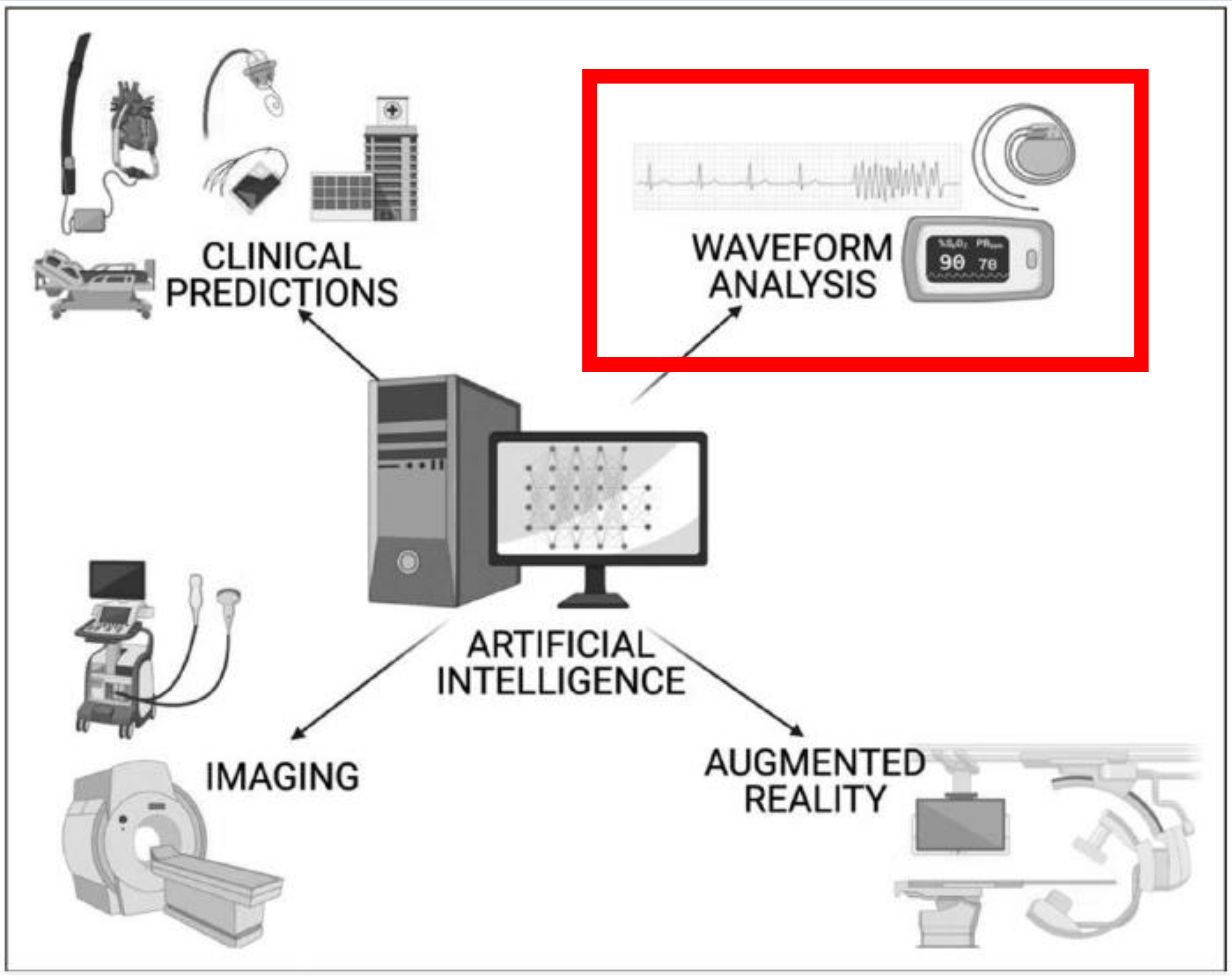
INTELLIGENZA ARTIFICIALE E RISK ASSESMENT

Table 2. Artificial intelligence applications in clinical prediction analytics

Outcome studied	Application
Clinical outcomes	Graft failure post heart transplant [39] Adverse events post LVAD implantation [40] Adverse cardiac events in those with hypertrophic cardiomyopathy [41]
Procedural outcomes	Postoperative length of stay post CABG [42] Operative outcomes post surgical aortic valve replacement [43] Postoperative delirium [44] Bleeding post percutaneous coronary intervention [45]

Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E WAVEFORM ANALYSIS



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E WAVEFORM ANALYSIS

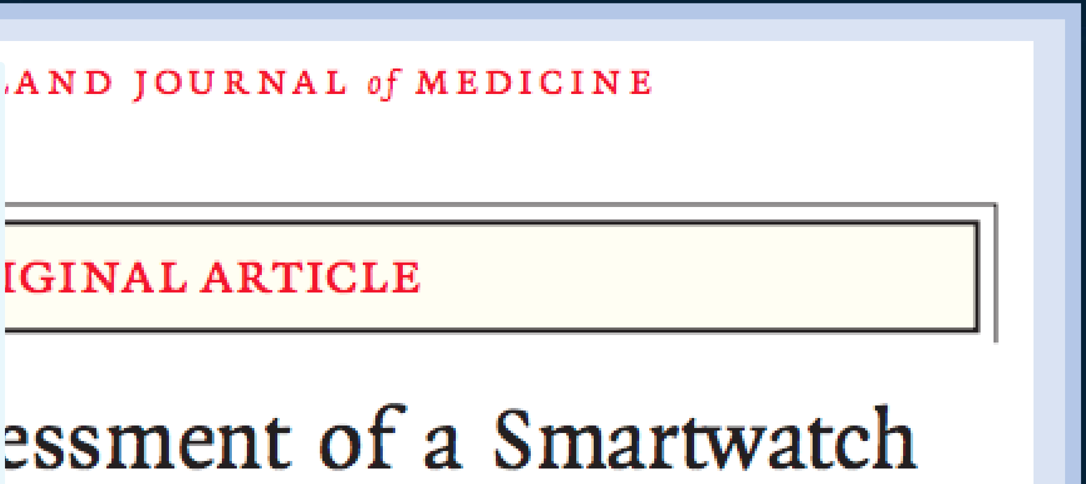
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Large-Scale Assessment of a Smartwatch to Identify Atrial Fibrillation

Marco V. Perez, M.D., Kenneth W. Mahaffey, M.D., Haley Hedlin, Ph.D., John S. Rumsfeld, M.D., Ph.D., Ariadna Garcia, M.S., Todd Ferris, M.D., Vidhya Balasubramanian, M.S., Andrea M. Russo, M.D., Amol Rajmane, M.D., Lauren Cheung, M.D., Grace Hung, M.S., Justin Lee, M.P.H., Peter Kowey, M.D., Nisha Talati, M.B.A., Divya Nag, Santosh E. Gummidipundi, M.S., Alexis Beatty, M.D., M.A.S., Mellanie True Hills, B.S., Sumbul Desai, M.D., Christopher B. Granger, M.D., Manisha Desai, Ph.D., and Mintu P. Turakhia, M.D., M.A.S., for the Apple Heart Study Investigators*

INTELLIGENZA ARTIFICIALE E WAVEFORM ANALYSIS


.AND JOURNAL of MEDICINE

IGINAL ARTICLE

essment of a Smartwatch

John S. Rumsfeld, M.D., Ph.D.
Vidhya Balasubramanian, M.S., A
Lauren Cheung, M.D., Grace Hung
Nisha Talati, M.B.A., Divya
Alexis Beatty, M.D., M.A.S., Me
Christopher B. Granger
Mintu P. Turakhia, M.D., M.A.S

nature medicine

Screening for cardiac contractile dysfunction using an artificial intelligence-enabled electrocardiogram

Zachi I. Attia[1], Suraj Kapa[1], Francisco Lopez-Jimenez[1], Paul M. McKie[1], Dorothy J. Ladewig[2], Gaurav Satam[2], Patricia A. Pellikka[1], Maurice Enriquez-Sarano[1], Peter A. Noseworthy[1], Thomas M. Munger[1], Samuel J. Asirvatham[1], Christopher G. Scott[3], Rickey E. Carter[4] and Paul A. Friedman[1*]

NATURE MEDICINE | VOL 25 | JANUARY 2019 | 70–74 | www.nature.com/naturemedicine

INTELLIGENZA ARTIFICIALE E WAVEFORM ANALYSIS

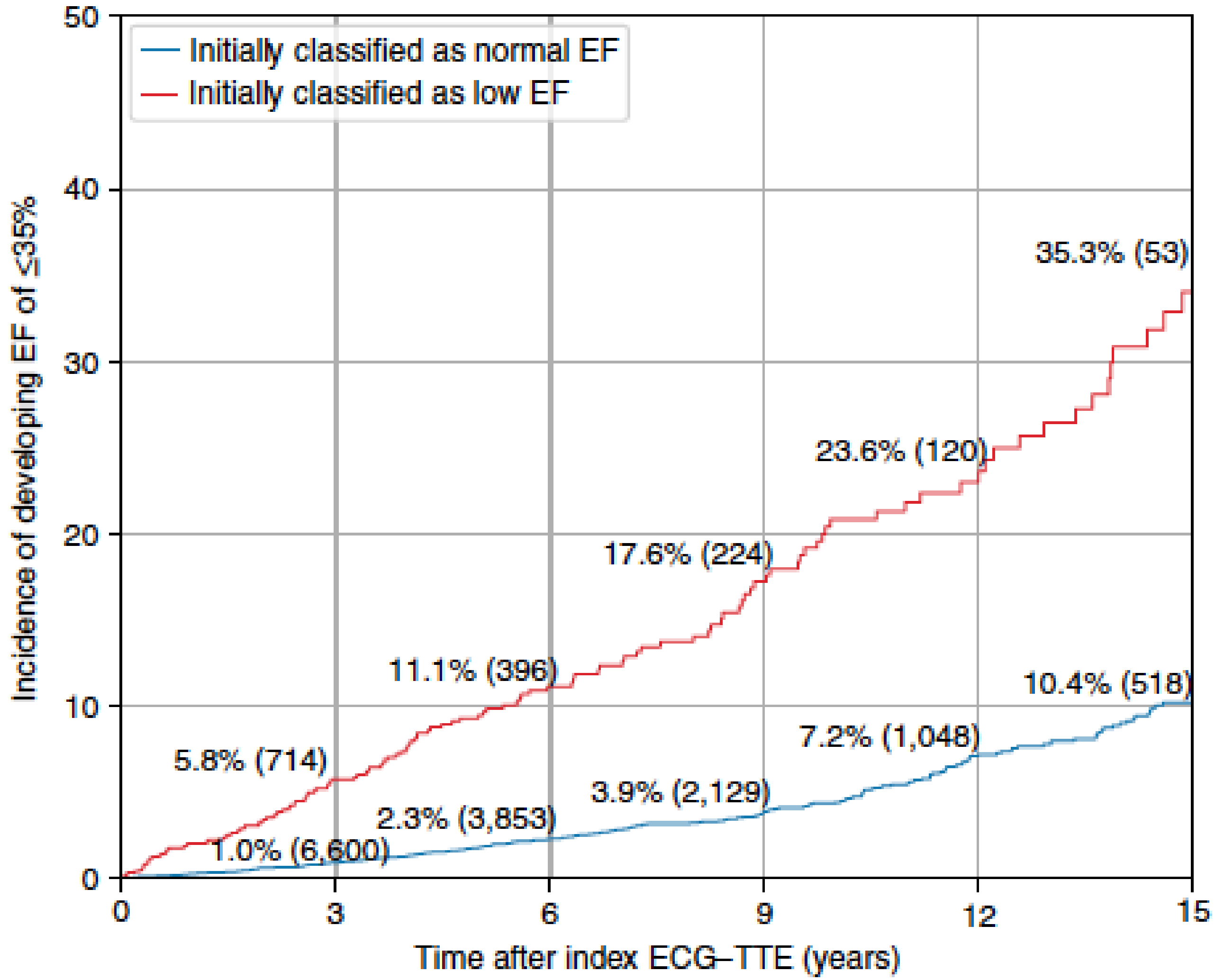
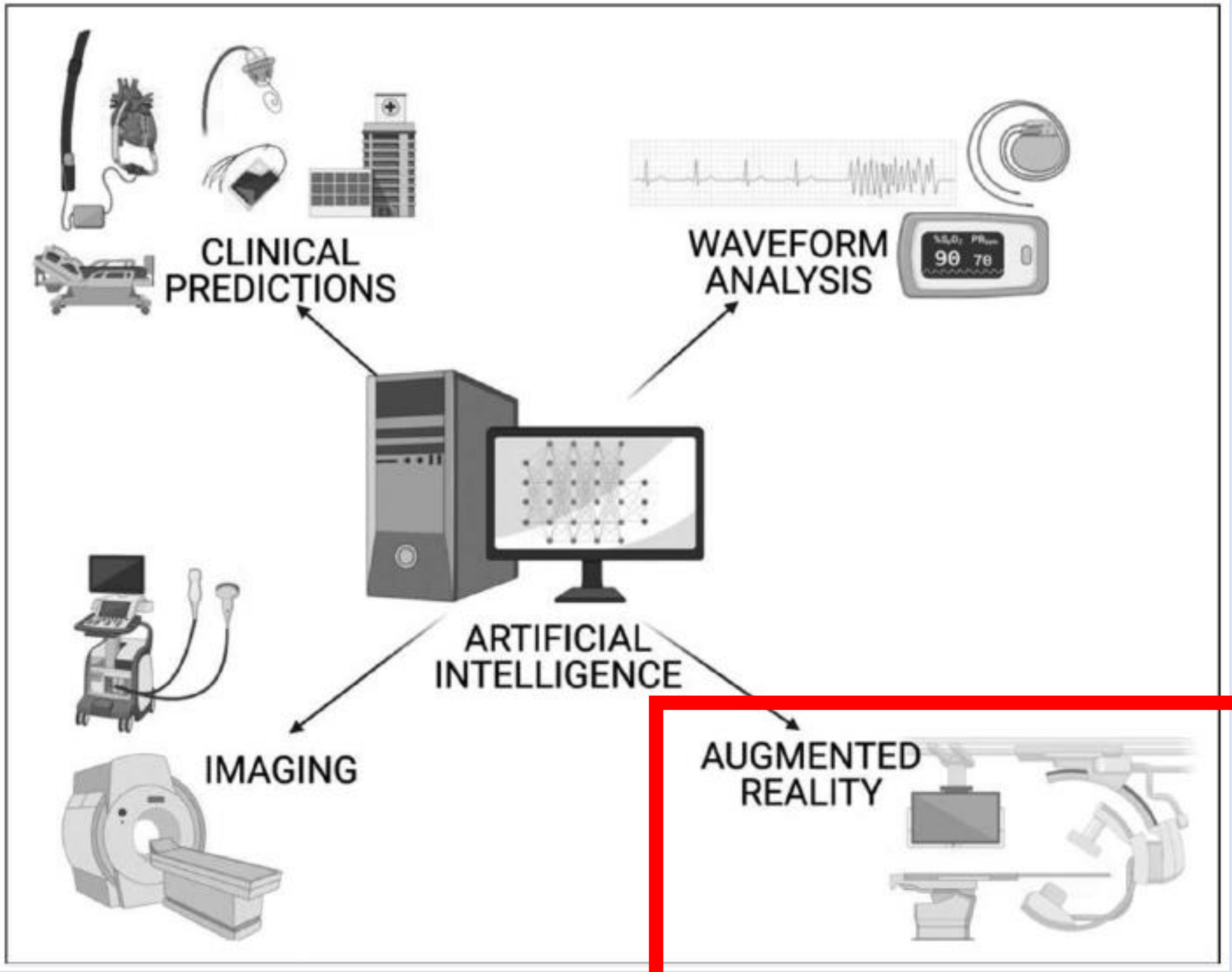


Fig. 3 | Long-term incidence of developing an EF of ≤35% in patients with an initially normal EF stratified by AI classification. Long-term outcome of patients with an echocardiographic EF of ≥50% at the time of initial classification, stratified by the initial network classification. The ordinate shows the cumulative incidence of developing a low EF (35%), and the abscissa indicates years from the time of index ECG-TTE evaluation. A fourfold risk of future low EF was present when the AI algorithm defined the ECG as abnormal (age- and sex-adjusted HR, 4.1 (95% CI, 3.3–5.0), *P* < 0.001), compared with patients with an echocardiographic normal EF who were classified as having a normal EF by the ECG network. The numbers reported along the cumulative incidence curves reflect the estimated cumulative incidence (and number at risk, in parentheses) for each group at the times indicated along the axis.

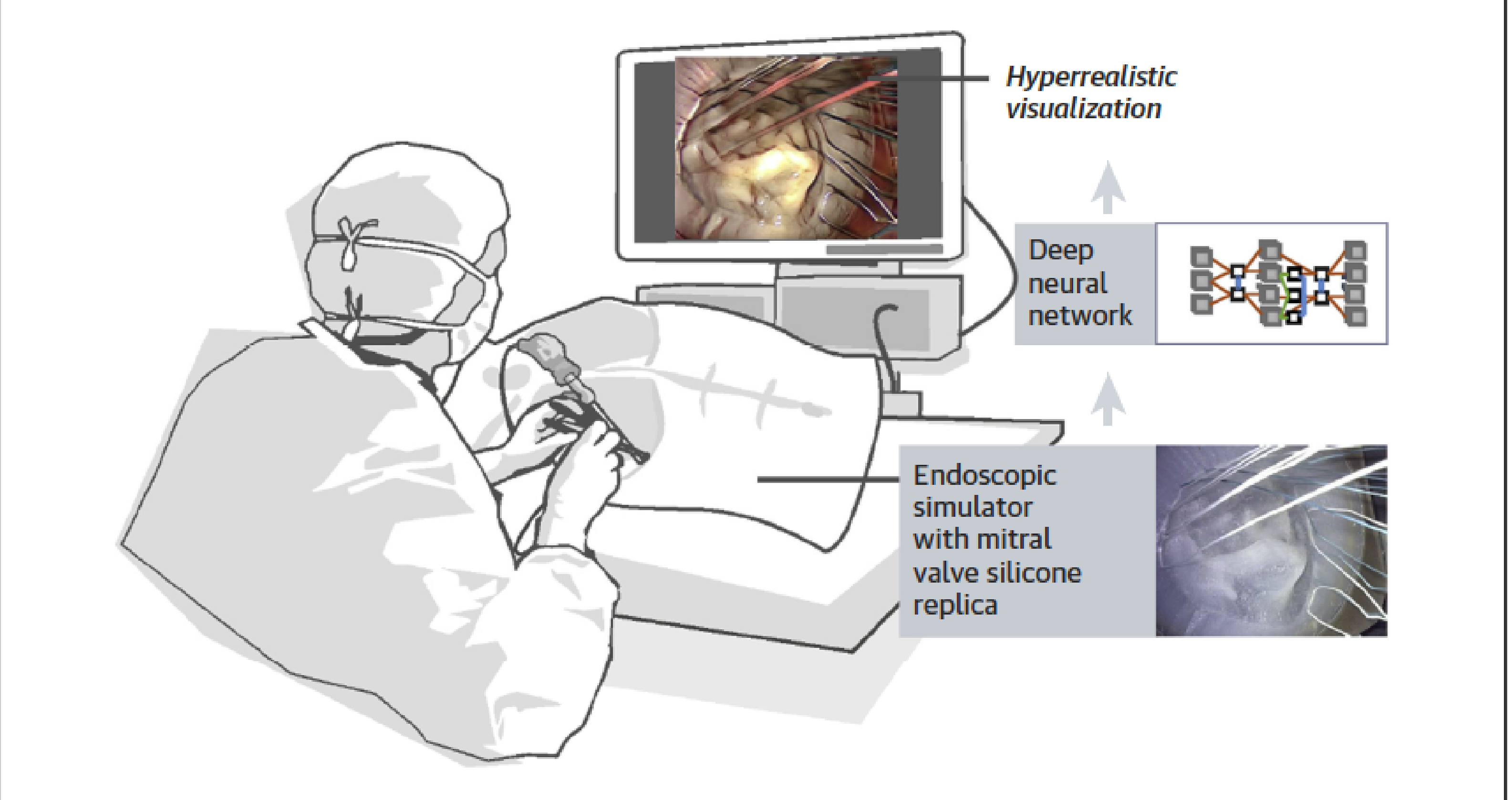
INTELLIGENZA ARTIFICIALE IN AMBITO CARDIOVASCOLARE



Nedadur R, Wang B, Yanagawa B. **The cardiac surgeon's guide to artificial intelligence.** *Curr Opin Cardiol.* 2021 Sep 1;36(5):637-643.

INTELLIGENZA ARTIFICIALE E IPERREALISMO

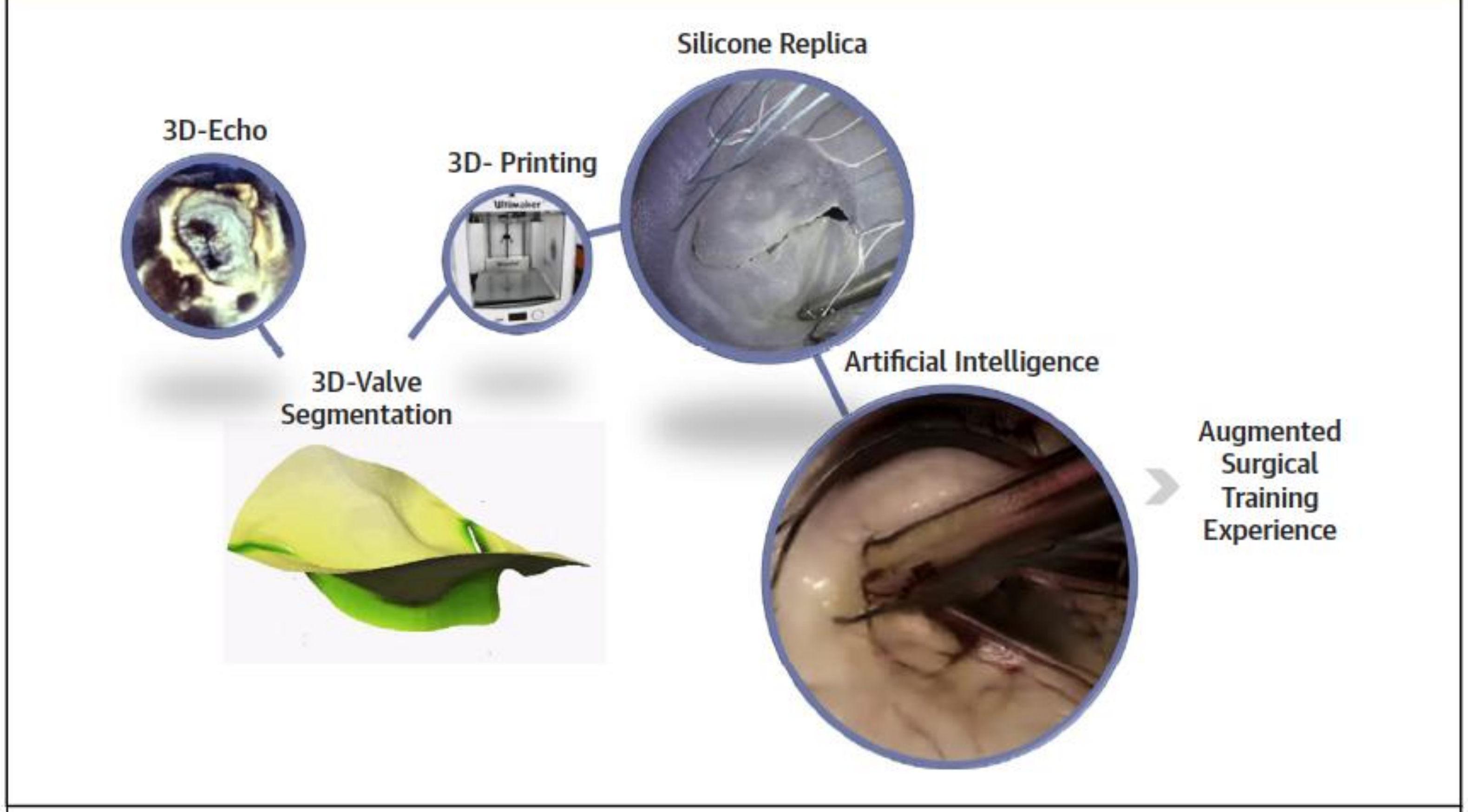
FIGURE 14 **Concept of Hyperrealism**



Hyperrealism, a novel subform of augmented reality where real, but artificially looking objects (in this case the silicone valve phantoms) are changed to appear realistically, for example, by including heterogeneous texture and blood. Objects that already look realistic ideally stay the same (in this case the instruments, sutures).

g DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial ligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

INTELLIGENZA ARTIFICIALE E IPERREALISMO

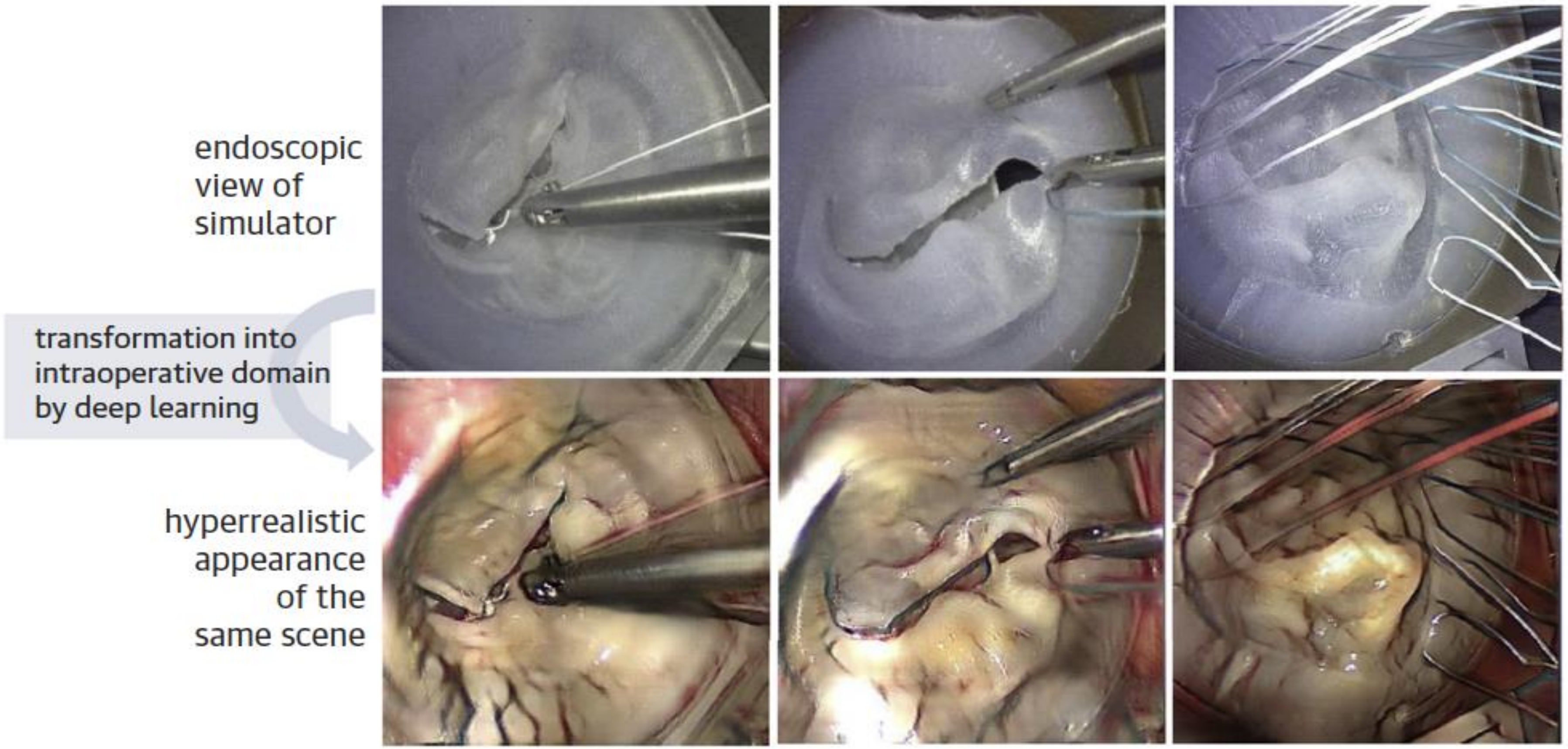


Application of 3-dimensional (3D) image acquisition to virtual image segmentation, to making of a physical 3D print, followed by silicone replica production with incorporation of artificial intelligence in generating an augmented surgical training experience.

'ang DD, Qian Z, Vukicevic M et al. **3D Printing, Computational Modeling, and Artificial telligence for Structural Heart Disease.** *JACC Cardiovasc Imaging.* 2021 Jan;14(1):41-60.

INTELLIGENZA ARTIFICIALE E IPERREALISMO

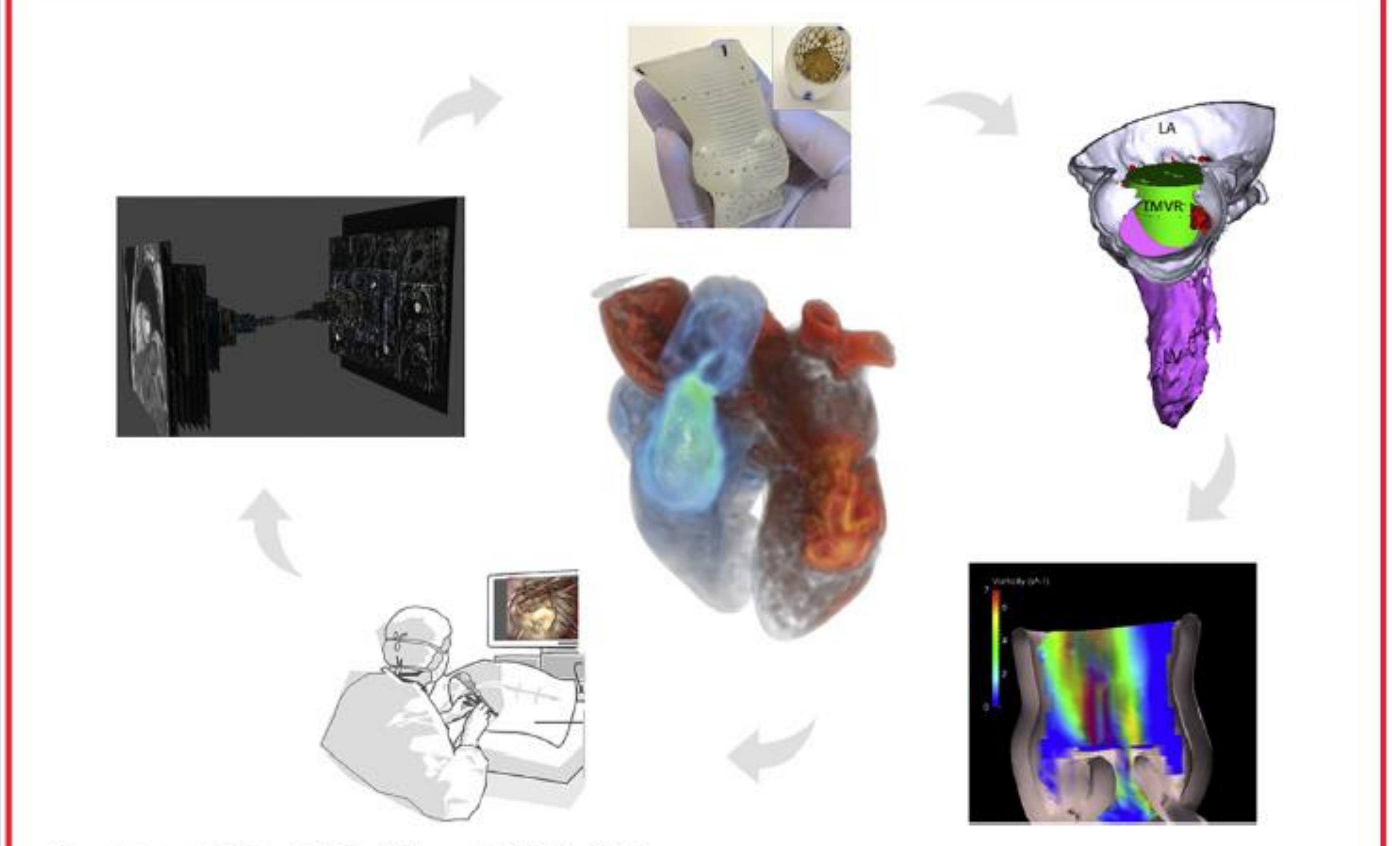
FIGURE 16 GANs



Generative adversarial networks (GANs) transform the appearance of a physical phantom into a more intraoperative-like appearance.

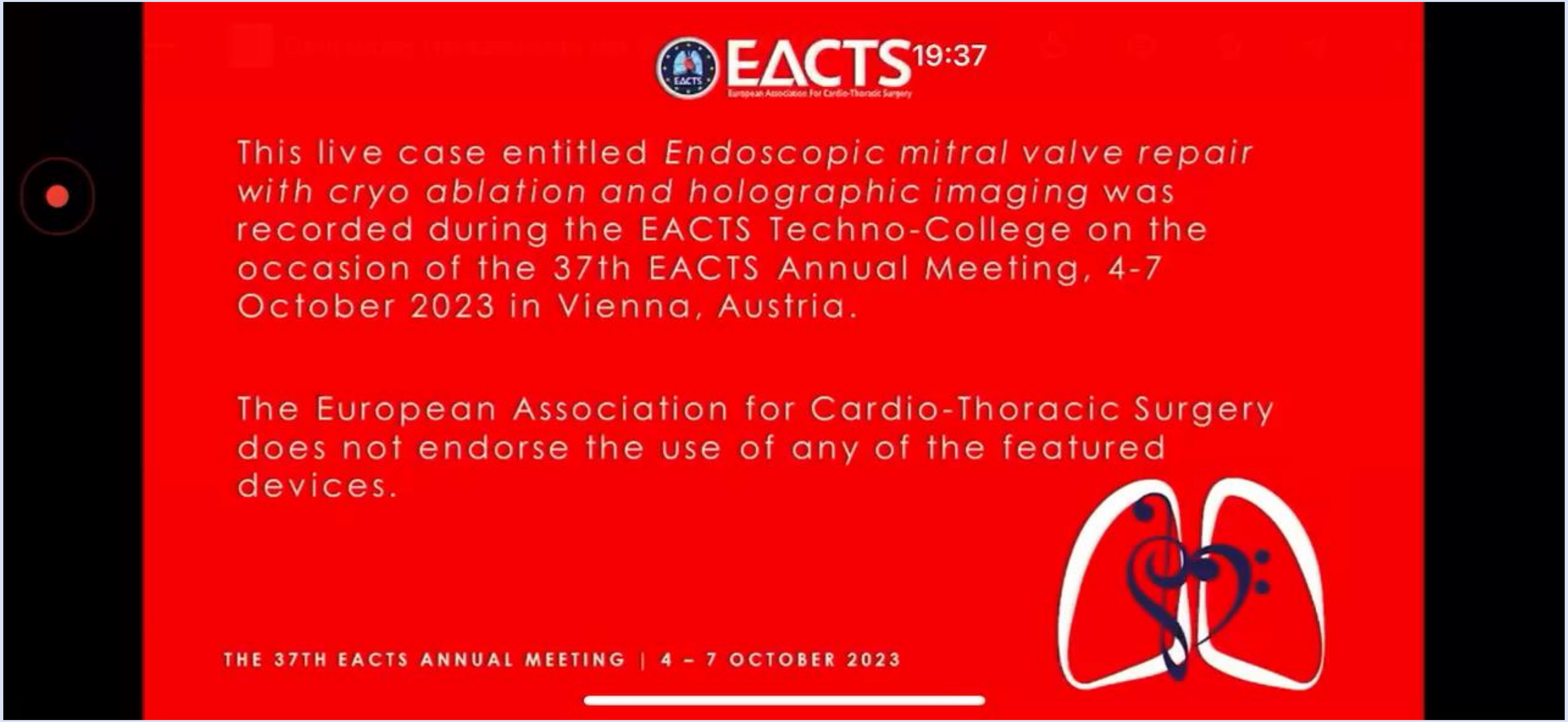
…Printing, Computational Modeling, and Artificial …
…JACC Cardiovasc Imaging. 2021 Jan;14(1):41-60.

INTELLIGENZA ARTIFICIALE E IPERREALISMO



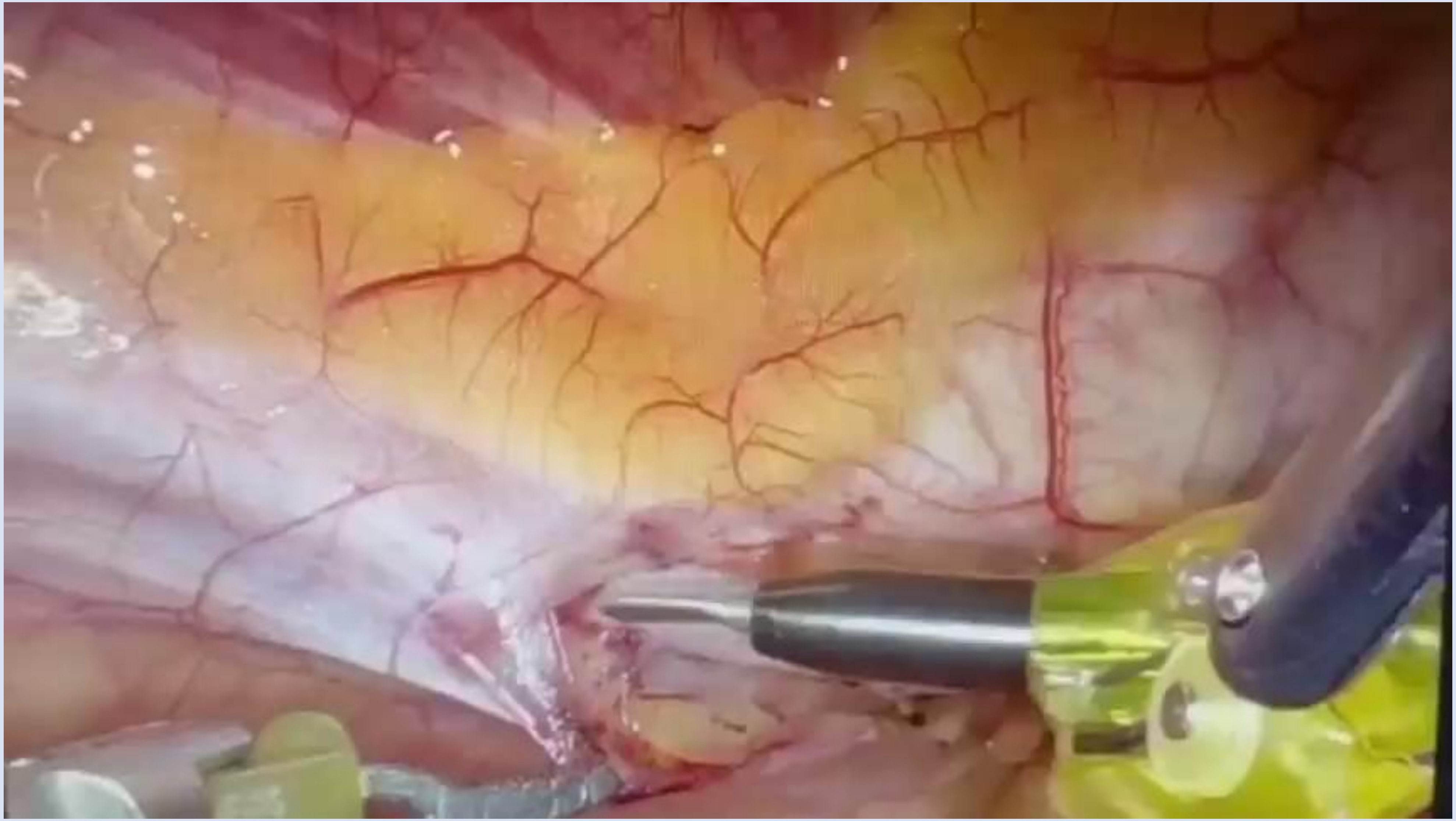
Integration of physical and virtual 3D printing, including procedural simulation, fluid modeling, and artificial intelligence into transcatheter interventions is the next wave of clinical education, device development, and optimization of patient-centric care.

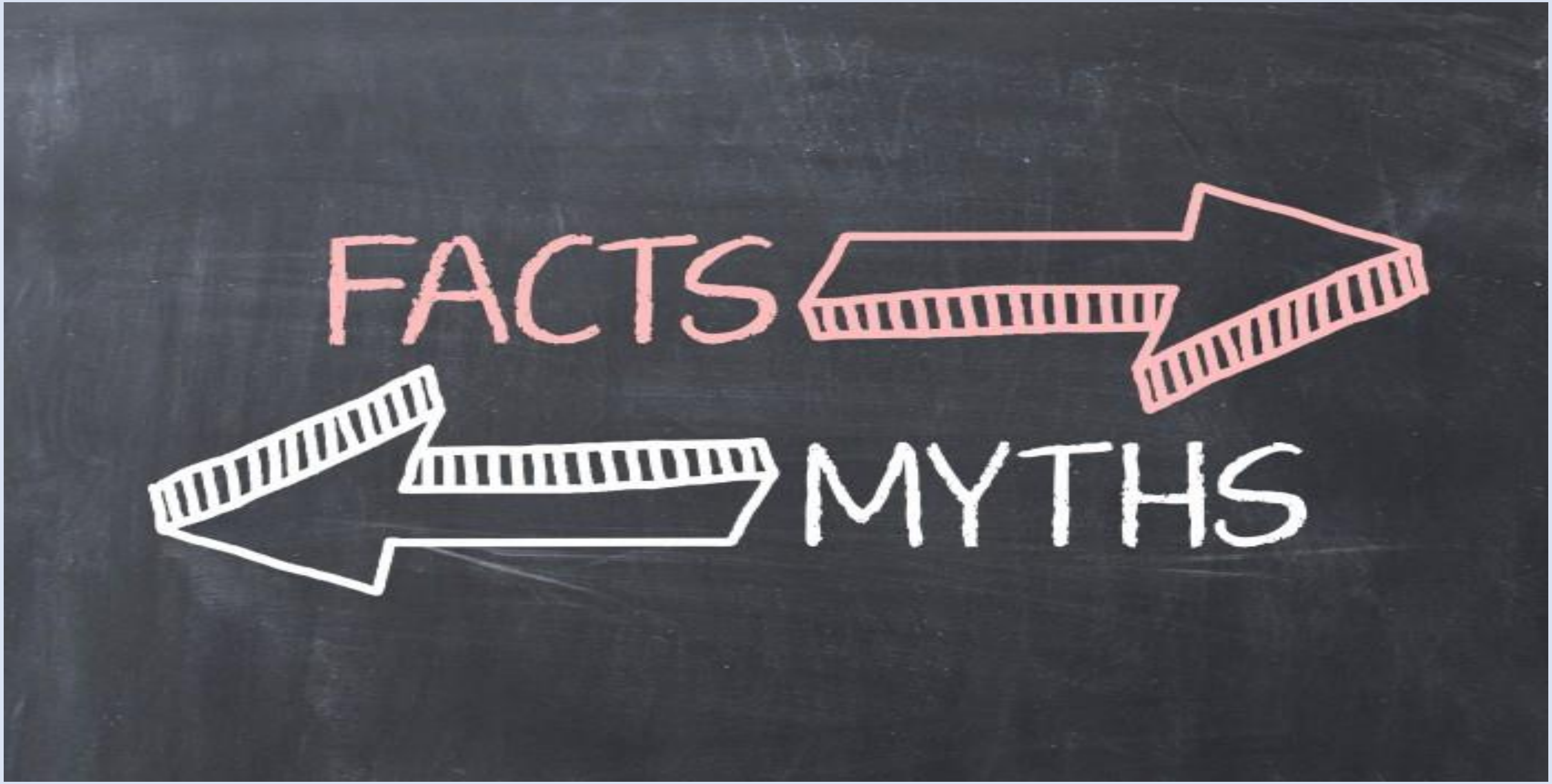
REALTA’ VIRTUALE E PLANNING CHIRURGICO



REALTA' VIRTUALE E PLANNING CHIRURGICO

INTELLIGENZA ARTIFICIALE E ROBOTICA




FACTS
MYTHS

L'intelligenza artificiale diventerà l'unico fornitore di assistenza sanitaria

INTELLIGENZA ARTIFICIALE

L'IA migliora l'assistenza sanitaria analizzando rapidamente i dati per aiutare la diagnosi e il trattamento, ma non sostituisce i professionisti umani. **Supporta, piuttosto che sostituire, il loro lavoro**, consentendo loro di concentrarsi sul **processo decisionale critico**, garantendo che il tocco umano rimanga al centro dell'assistenza sanitaria.

INTELLIGENZA ARTIFICIALE

L'integrazione dell'intelligenza artificiale nelle pratiche chirurgiche sta **rivoluzionando l'assistenza personalizzata ai pazienti**, dalle procedure assistite da robot all'analisi predittiva, **rendendo necessarie soluzioni normative innovative.**

SFIDE FUTURE

- **Quadri normativi obsoleti: l**e normative attuali spesso non tengono conto delle sfumature dell'IA nella chirurgia.
- **Complessità delle applicazioni: l**e diverse applicazioni chirurgiche dell'IA sfidano le normative tradizionali.
- **Privacy e sicurezza dei dati: l**'uso dell'IA richiede linee guida rigorose per la protezione dei dati.
- **Integrazione interdisciplinare: l**'integrazione dell'IA richiede un approccio normativo che copra sia la tecnologia che la medicina.
- **Divergenza normativa internazionale: l**e incoerenze normative a livello globale possono ostacolare l'adozione chirurgica dell'IA.

POSSIBILI SOLUZIONI

- **Modelli normativi dinamici:** regolamenti che si evolvono con i progressi dell'IA.
- **Uso etico dell'IA in chirurgia:** linee guida che danno priorità alla sicurezza e al consenso del paziente.
- **Standard globali:** collaborazione internazionale per standard unificati di IA nell'assistenza sanitaria.
- **Coinvolgimento delle parti interessate:** coinvolgere tutte le parti nello sviluppo normativo dell'IA.
- **Monitoraggio continuo:** garantire la sicurezza e l'efficacia delle tecnologie di IA.
- **Implicazioni etiche e consenso del paziente:** il consenso informato e la trasparenza sono fondamentali per un'applicazione chirurgica etica dell'IA.

TAKE HOME MESSAGES

Il futuro consiste in **modelli ibridi**:

- una componente ***guidata da esperti e basata su regole***, fornita dai **chirurghi** che vincoleranno gli algoritmi a percezioni meccanicistiche note e a limiti alla pratica clinica.
- una componente ***guidata dai dati*** che apprenderà ulteriormente i pesi dai dati stessi per rafforzare le associazioni tra caratteristiche ed esiti.

Questo tipo di architettura consente l'interpretabilità del modello, l'uso efficiente dei dati e una maggiore generalizzabilità.

TAKE HOME MESSAGES

Il futuro consiste in **modelli ibridi**:

- una componente ***guidata da esperti e basata su regole***, fornita dai **chirurghi** che vincoleranno gli algoritmi a percezioni meccanicistiche note e a limiti alla pratica clinica.
- una componente ***guidata dai dati*** che apprenderà ulteriormente i pesi dai dati stessi per rafforzare le associazioni tra caratteristiche ed esiti.

Questo tipo di architettura consente l'interpretabilità del modello, l'uso efficiente dei dati e una maggiore generalizzabilità.

TAKE HOME MESSAGES

L'intelligenza artificiale non è destinata a sostituire il medico, ma a creare **efficienze nel flusso di lavoro** del medico, in modo da **favorire il rapporto medico-paziente**. Attualmente non è in grado di tenere conto degli elementi intangibili di una buona assistenza olistica e guidata dal paziente.

Pertanto, le decisioni mediche sono al massimo assistite dall'intelligenza artificiale e **il chirurgo e il paziente devono rimanere al centro del processo decisionale**.

TAKE HOME MESSAGES

È necessario il **corretto bilanciamento tra il nostro giudizio e l'affidamento all'automazione**. Dobbiamo **valutare criticamente i risultati dei modelli** di intelligenza artificiale, tenendo conto delle loro distorsioni e dei loro limiti, e capire quali tipi di problemi sono più adatti alle soluzioni di intelligenza artificiale.

Con la formazione e l'esperienza, i medici possono garantirne un utilizzo appropriato per migliorare la pratica cliniche e dare priorità ai pazienti.

TAKE HOME MESSAGES

Intelligenza artificiale in sanita' prospettive, opportunita' e rischi di un progresso inevitabile

Dott. Domenico Mangino - Direttore U.O.C. Cardiochirurgia
ULSS3 Ospedale dell'Angelo, Mestre Venezia, IT

ORDINE PROVINCIALE
DEI MEDICI CHIRURGHI E
DEGLI ODONTOIATRI
DI VENEZIA