Artificial Intelligence and data driven decision making in anal dysplasia

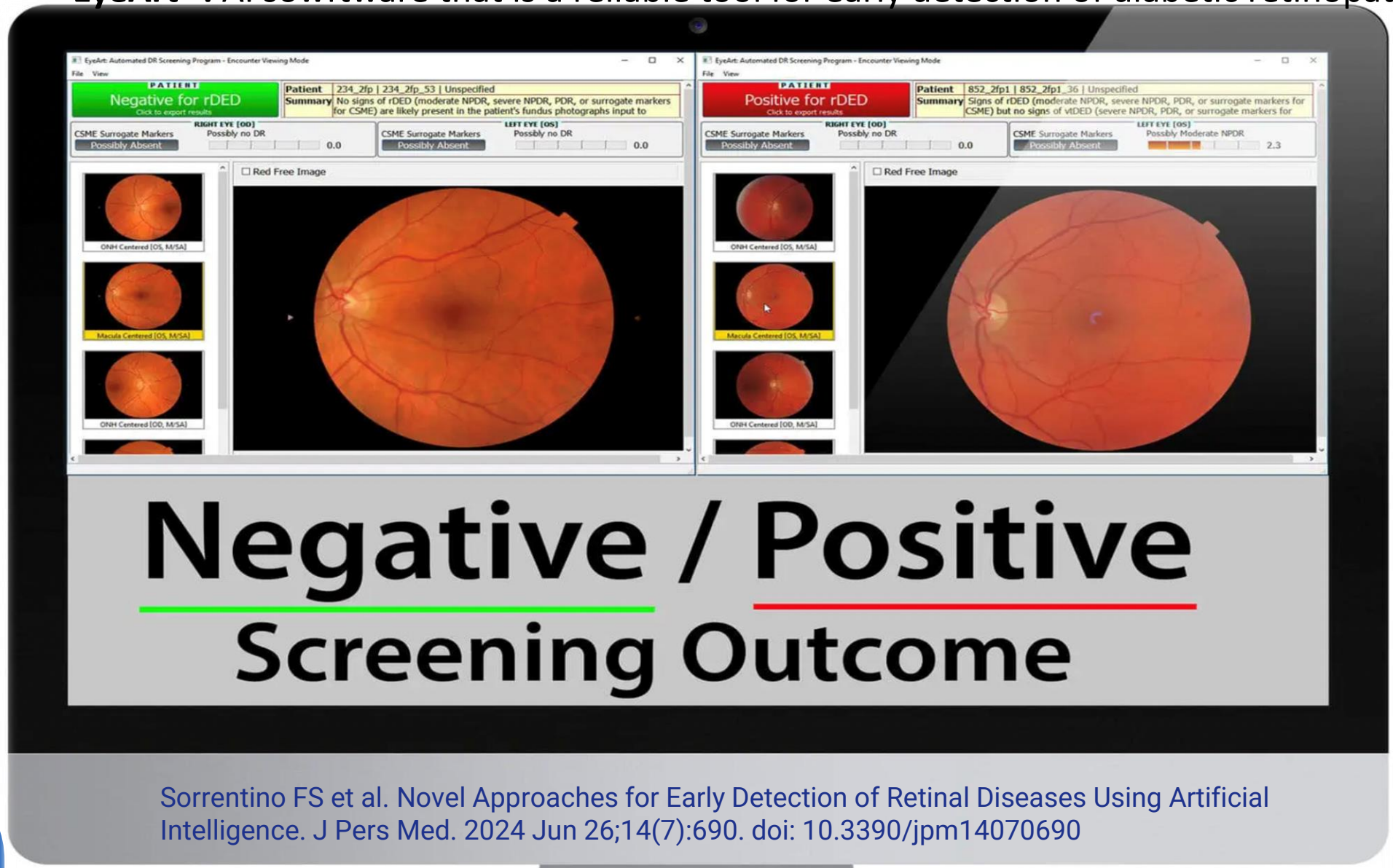
Dra. Anna Sala M.D, Ph.D
Head of Innovation in Vall d'Hebron Hospital

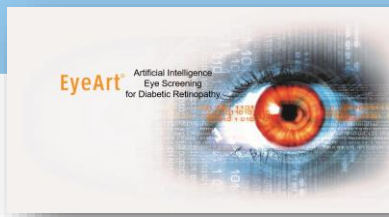
Vall d'Hebron

Vall d'Hebron

EyeArt [R] software has received FDA approval for clinical use and has undergone clinical validation

EyeArt [R]: AI sowftware that is a reliable tool for early detection of diabetic retinopathy





Sorrentino FS et al. Novel Approaches for Early Detection of Retinal Diseases Using Artificial Intelligence. J Pers Med. 2024 Jun 26;14(7):690. doi: 10.3390/jpm14070690

Vall d'Hebron

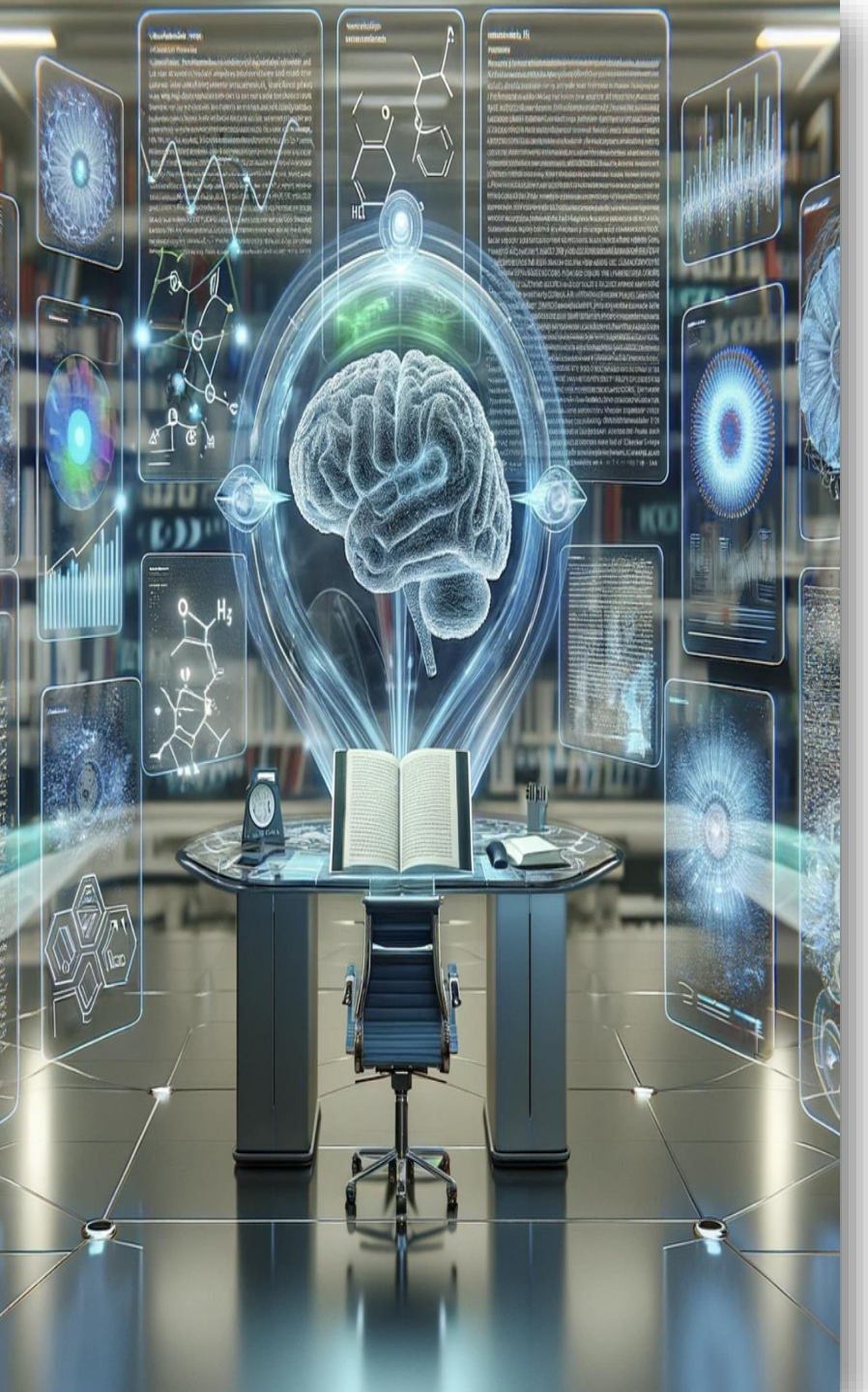
What algorithms can we use?

Can we do the same in anal dysplasia?

What would it be useful for?

What data do we need?

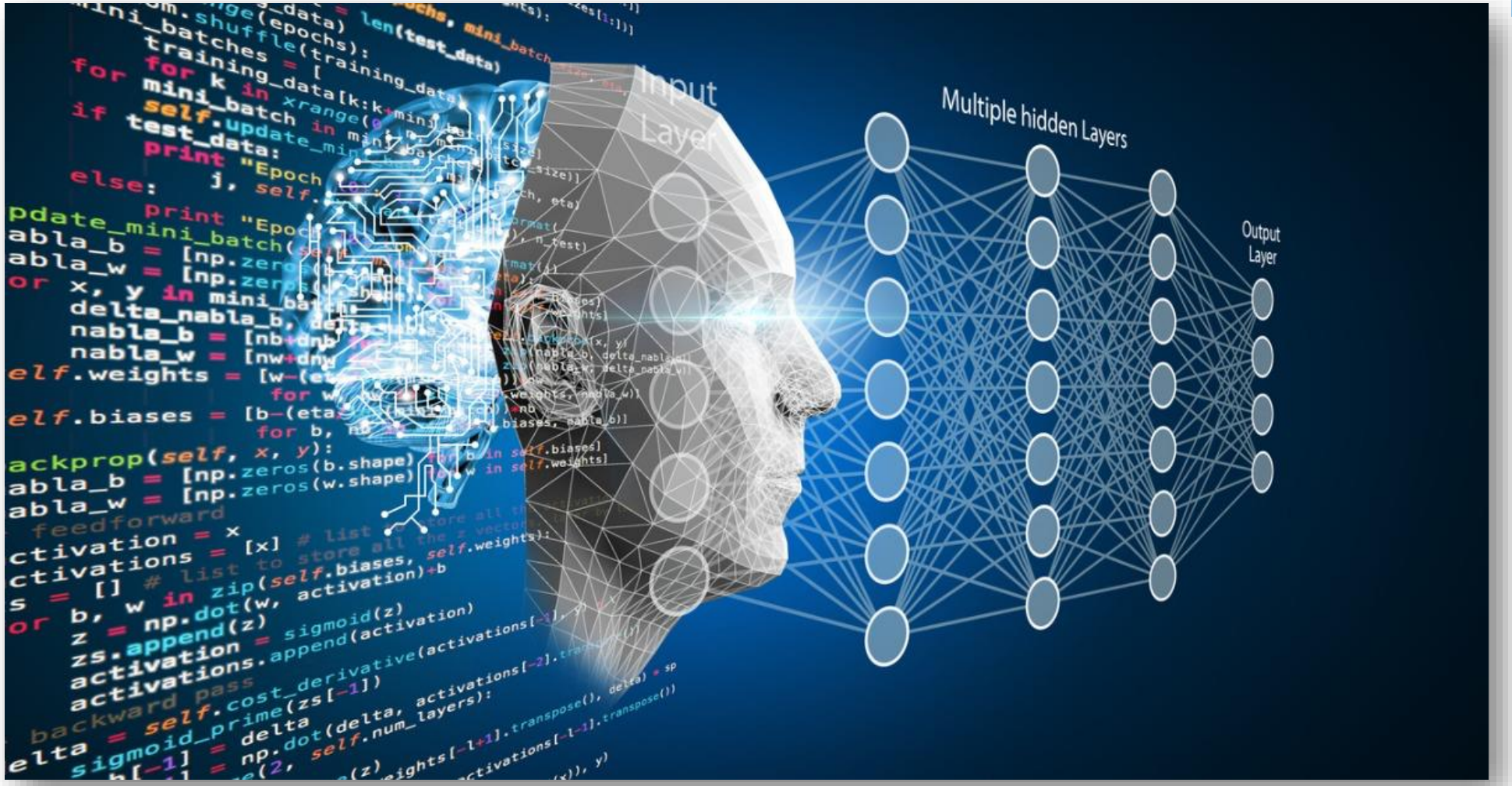
Vall d'Hebron



- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

Vall d'Hebron

DATASET

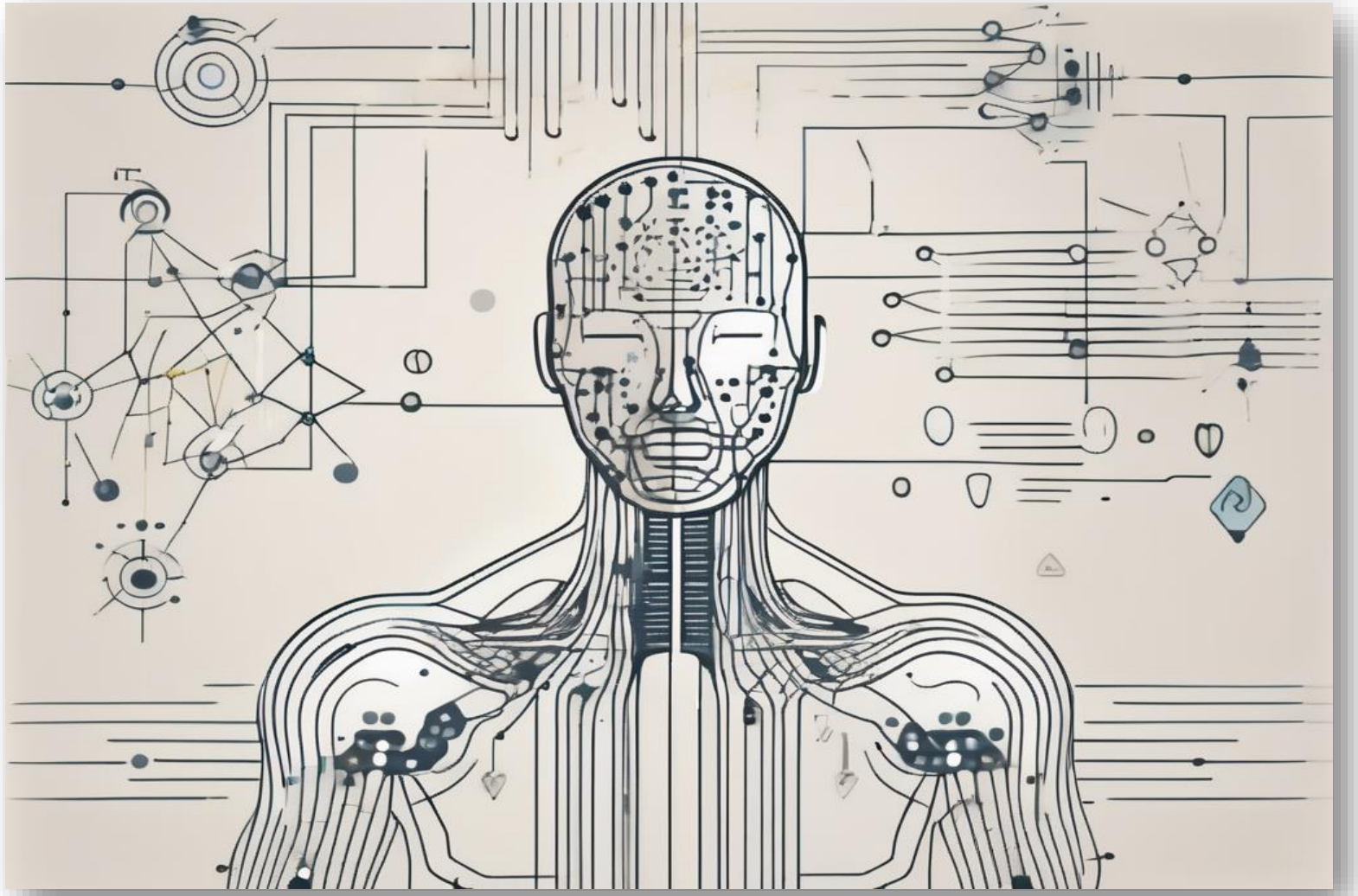


SHIT IN → SHIT OUT

Vall d'Hebron

DATASET

It is the bedrock upon which AI systems are built and trained.



Structured data

Name
Age
Gender

Unestructured Data

Text (Train NLP)

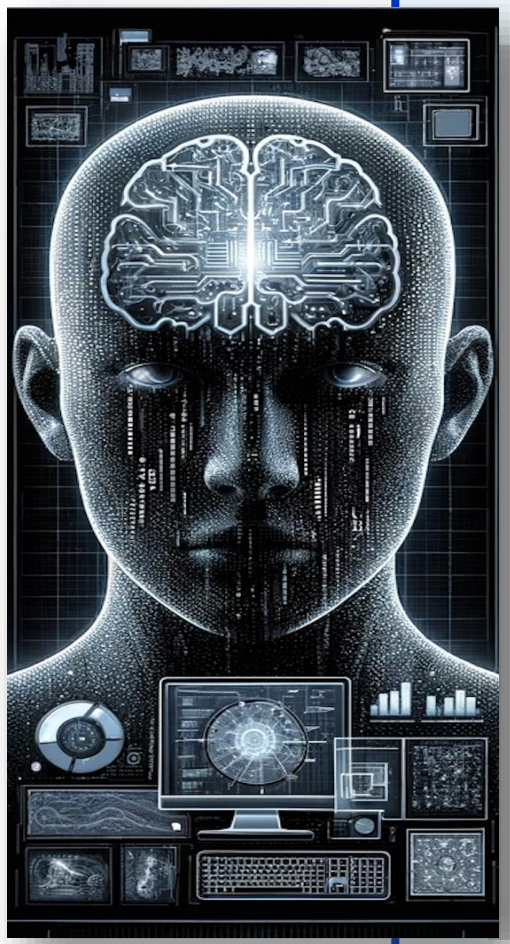
Audio

Image (Train convolutional neural networks)

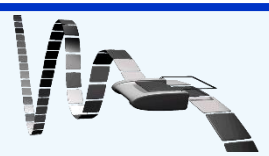
A high-quality dataset is one that is accurate, complete, and representative of the problem space.

Vall d'Hebron

¿WHAT IS ARTIFICIAL INTELLIGENCE?



COMPUTER SCIENCE



COMBINATIONS OF ALGORITHMS AIMING TO IMITATE HUMAN INTELLIGENCE (LINGUISTIC-VERBAL, LOGICAL-MATHEMATICAL, ...)

ARTIFICIAL INTELLIGENCE

MACHINE LEARNING

A SET OF ALGORITHMS THAT LEARN FROM DATA AND IMPROVE WITH EXPERIENCE WITHOUT BEING EXPLICITLY PROGRAMMED.

DEEP LEARNING

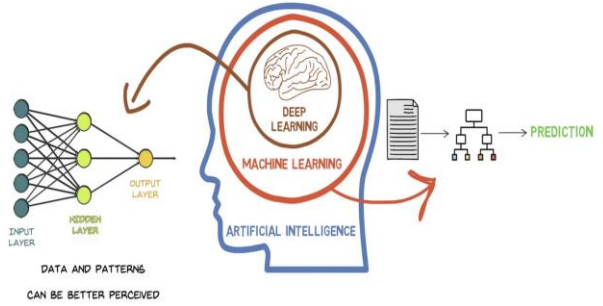
ARTIFICIAL NEURAL NETWORKS

Uses algorithms called artificial neural networks to model and solve complex problems

SUPERVISED LEARNING

UNSUPERVISED LEARNING

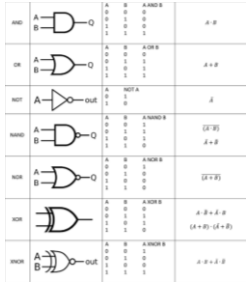
REINFORMCEMENT LEARNING

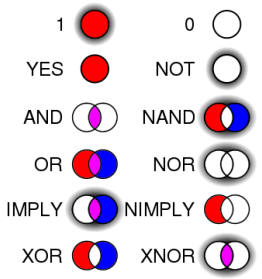


ALGORITHM: A sequence of finite, well-defined steps that solve a problem.
A set of systematic instructions used to perform a specific task.

Vall d'Hebron

What Algorithms are used in Machine Learning?





SUPERVISED

The training data includes labels

Regression

Classification

UNSUPERVISED

The training data is not labeled. Training does not specify the correct outcome.
Similar items are grouped together.

REINFORMCMENTE LEARNING

Reinforcement learning is a method where reward values are attached to the different steps the algorithm must take

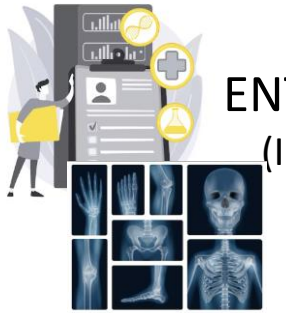
Vall d'Hebron

We don't know how the output is generated

BLACK BOX

We more or less understand what it does

Who is responsible for the output?



ENTRADA
(INPUT)

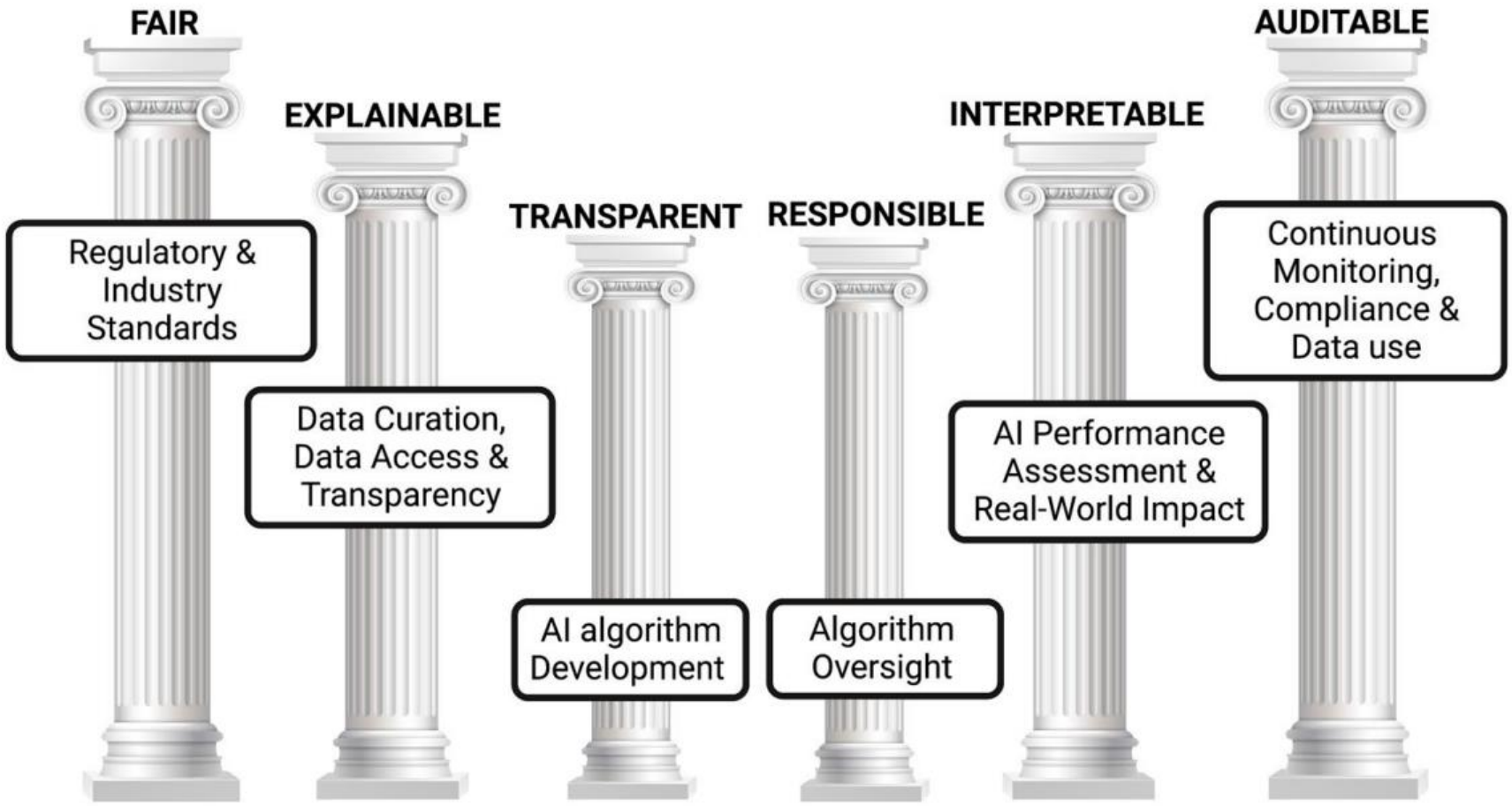
INTERPRETABLE

SALIDA
(OUTPUT-PREDICIÓN)

EXPLAINABLE

WE FULLY UNDERSTAND WHICH INPUT FACTORS CAUSE A CERTAIN OUTPUT

Vall d'Hebron



McMath et al. Current Allergy and Asthma Reports (2023) 23:351–362

Vall d'Hebron

nature medicine

Explore content · About the journal · Publish with us

nature > nature medicine > comment > article

Comment | Published: 26 August 2024

Not all AI health tools with regulatory authorization are clinically validated

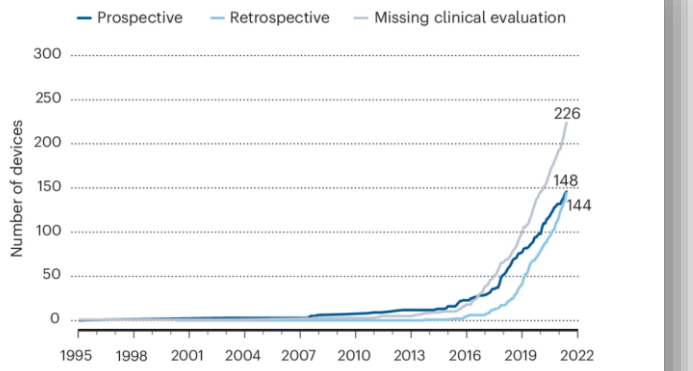
Sammy Chouffani El Fassi, Adonis Abdullah, Ying Fang, Sarabesh Natarajan, Awab Bin Masroor, Naya Kayali, Simran Prakash & Gail E. Henderson

Nature Medicine (2024) | Cite this article

1566 Accesses | **263** Altmetric | Metrics

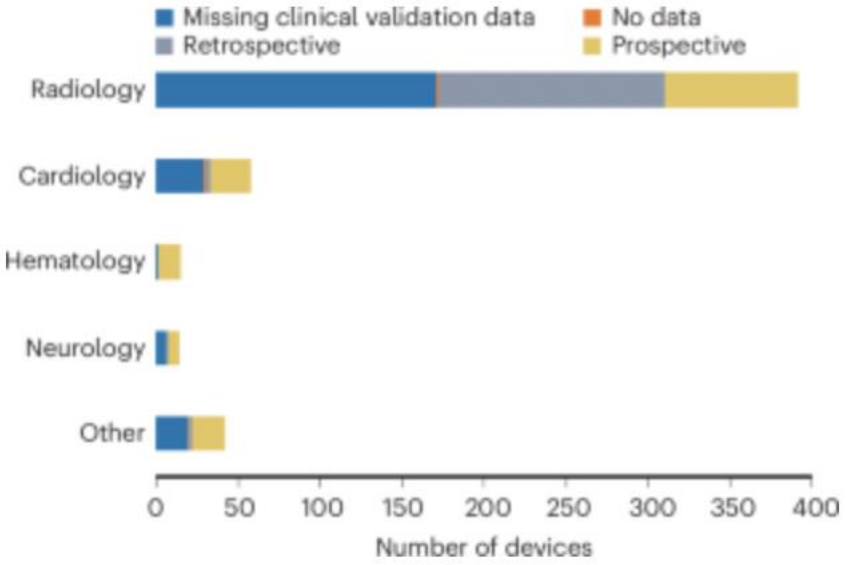
Fig. 2: Validation methods for FDA-authorized AI devices over time.

From: Not all AI health tools with regulatory authorization are clinically validated



The number of FDA authorizations for AI devices on the basis of prospective or retrospective clinical validation, together with the number of authorizations without clinical validation data, from 1995 to 2022.

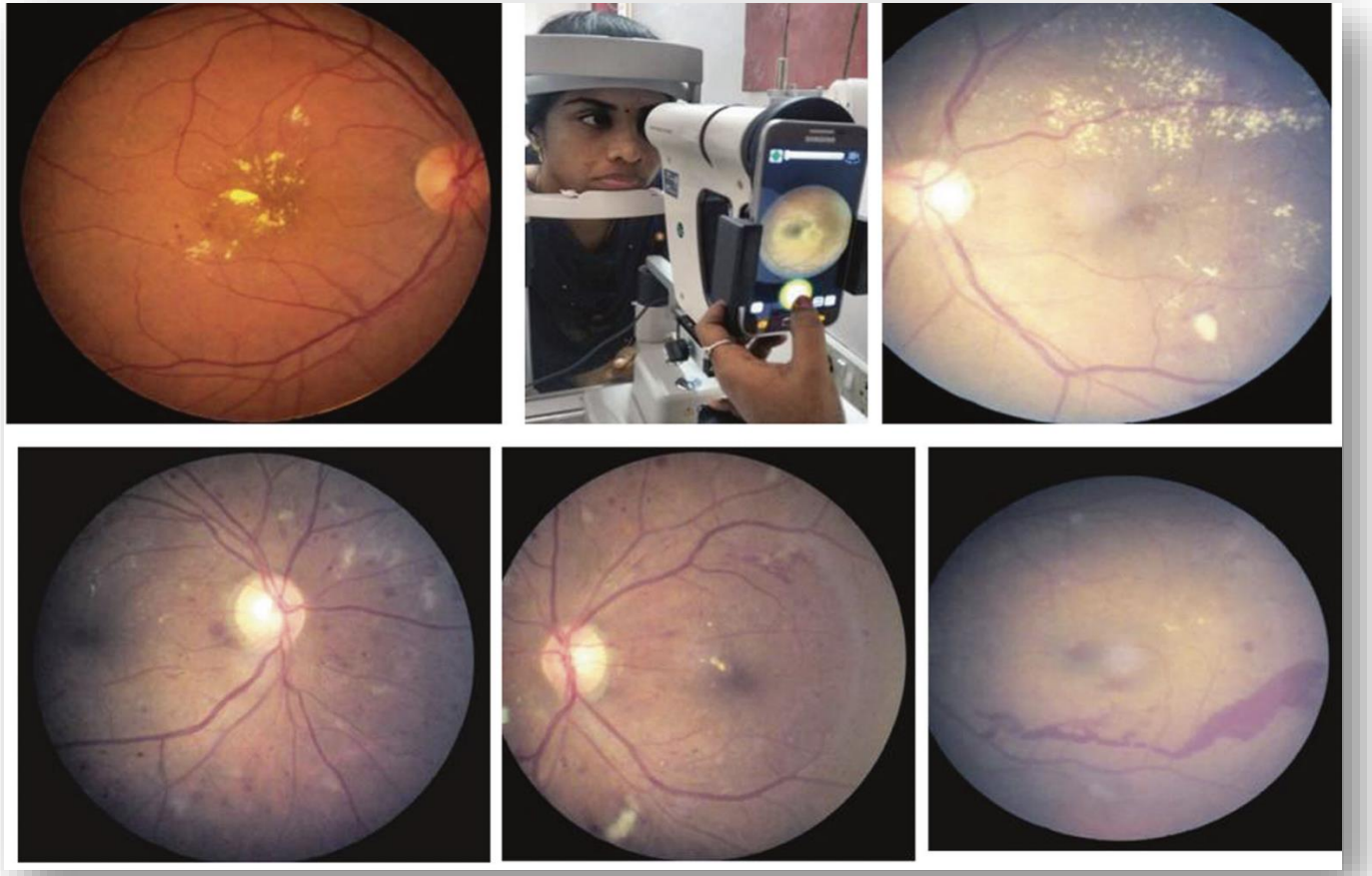
Fig. 1: Validation methods for FDA-authorized AI devices by specialty.



521 FDA-aproved
Only 22 have been clinical validated

Chouffani El Fassi, S., Abdullah, A., Fang, Y. *et al.* Not all AI health tools with regulatory authorization are clinically validated. *Nat Med* (2024)

Vall d'Hebron



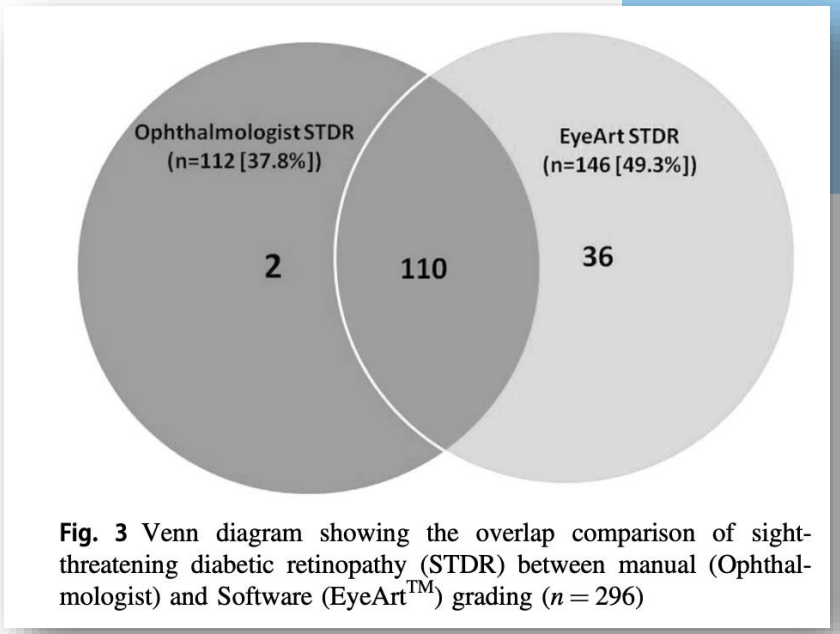
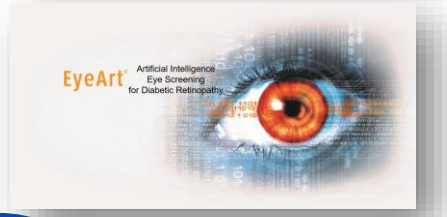


Fig. 3 Venn diagram showing the overlap comparison of sight-threatening diabetic retinopathy (STDR) between manual (Ophthalmologist) and Software (EyeArt^{TM}) grading ($n = 296$)

AI algorithms need to be clinically validated in one's own population

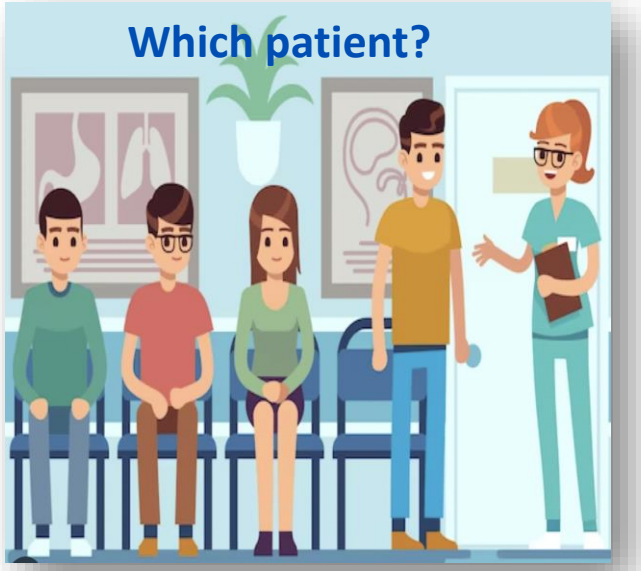


Rajalakshmi, R., Subashini, R., Anjana, R.M. *et al.* Automated diabetic retinopathy detection in smartphone-based fundus photography using artificial intelligence. *Eye* 32, 1138–1144 (2018).

Vall d'Hebron

Where would AI be useful in Anal Dysplasia?

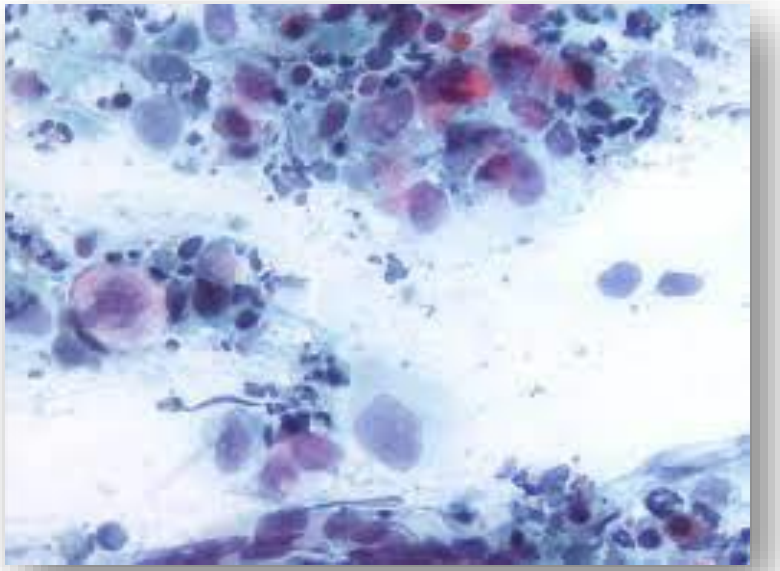
Screening



Structured data

Unstructured data (Text)

Cytology & histopathology

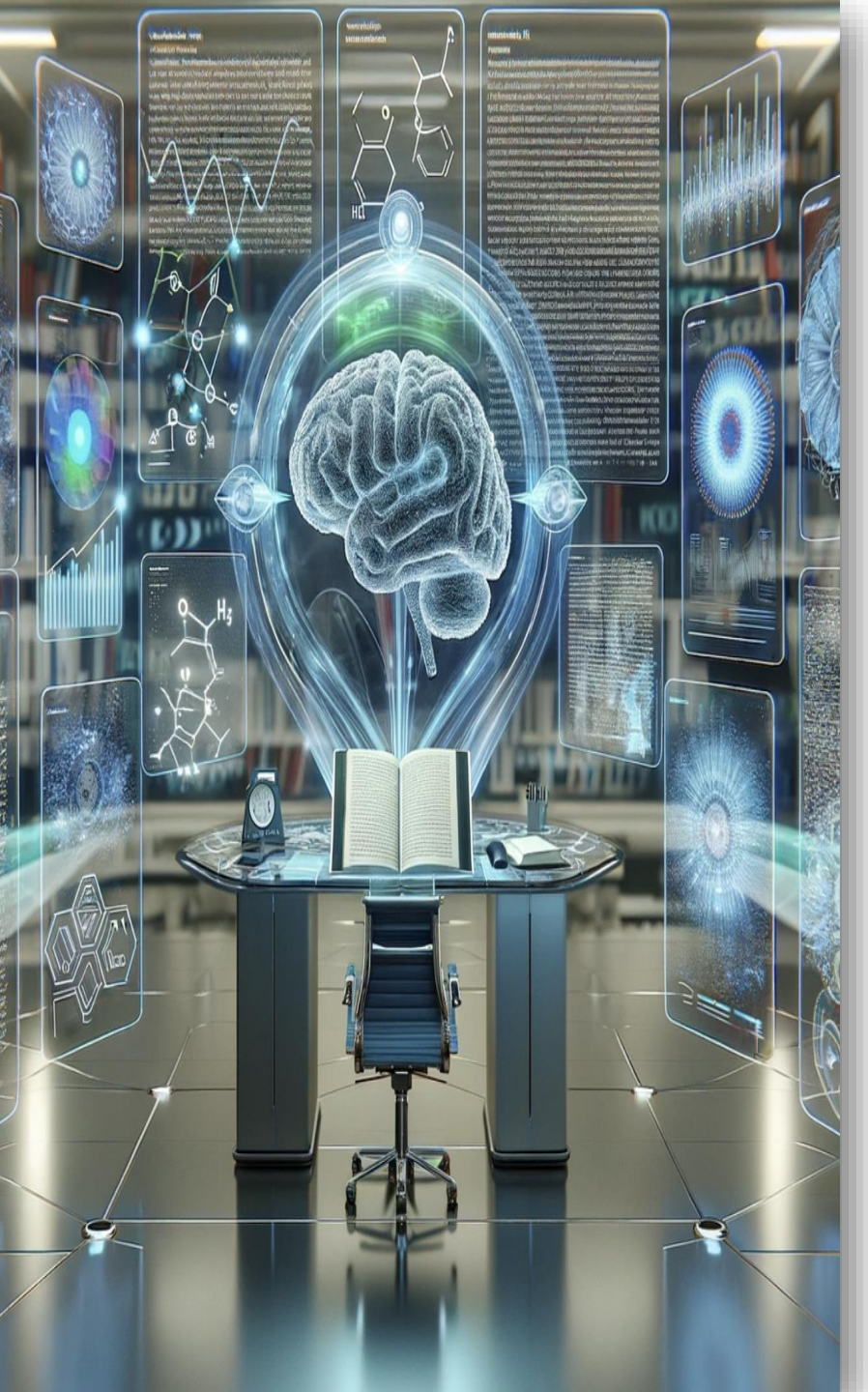


Image

High resolution anoscopy

Image

Vall d'Hebron



- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

Vall d'Hebron

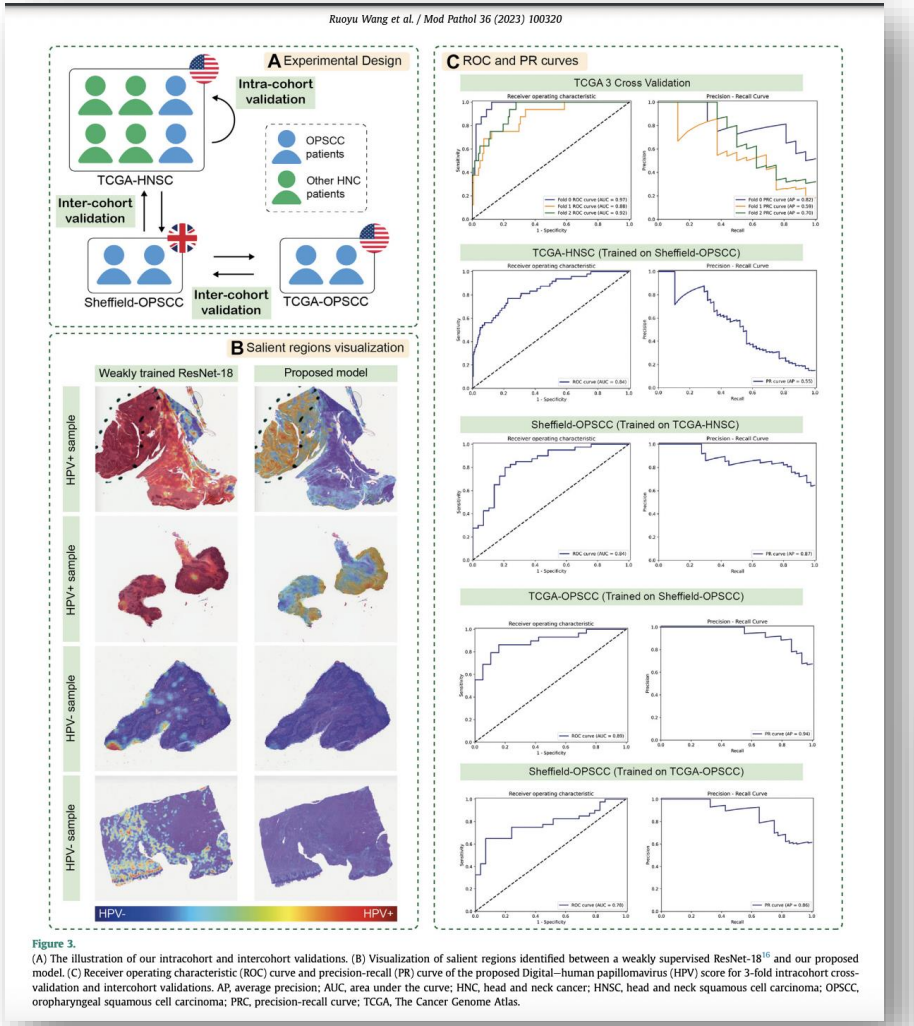
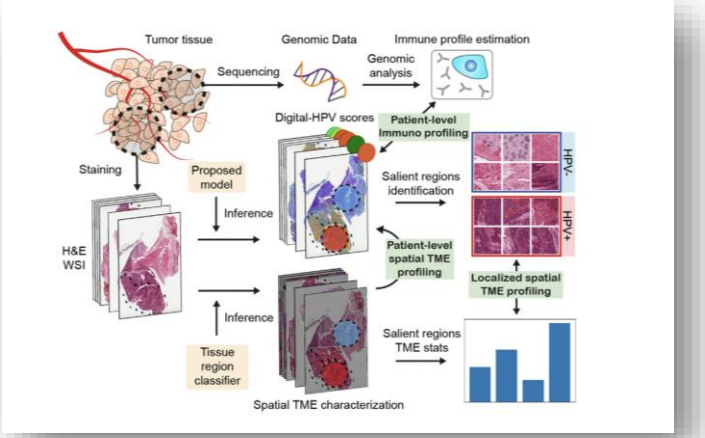


Figure 3.
(A) The illustration of our intracohort and intercohort validations. (B) Visualization of salient regions identified between a weakly supervised ResNet-18[16] and our proposed model. (C) Receiver operating characteristic (ROC) curve and precision-recall (PR) curve of the proposed Digital–human papillomavirus (HPV) score for 3-fold intracohort cross-validation and intercohort validations. AP, average precision; AUC, area under the curve; HNC, head and neck cancer; HNSC, head and neck squamous cell carcinoma; OPSCC, oropharyngeal squamous cell carcinoma; PRC, precision-recall curve; TCGA, The Cancer Genome Atlas.



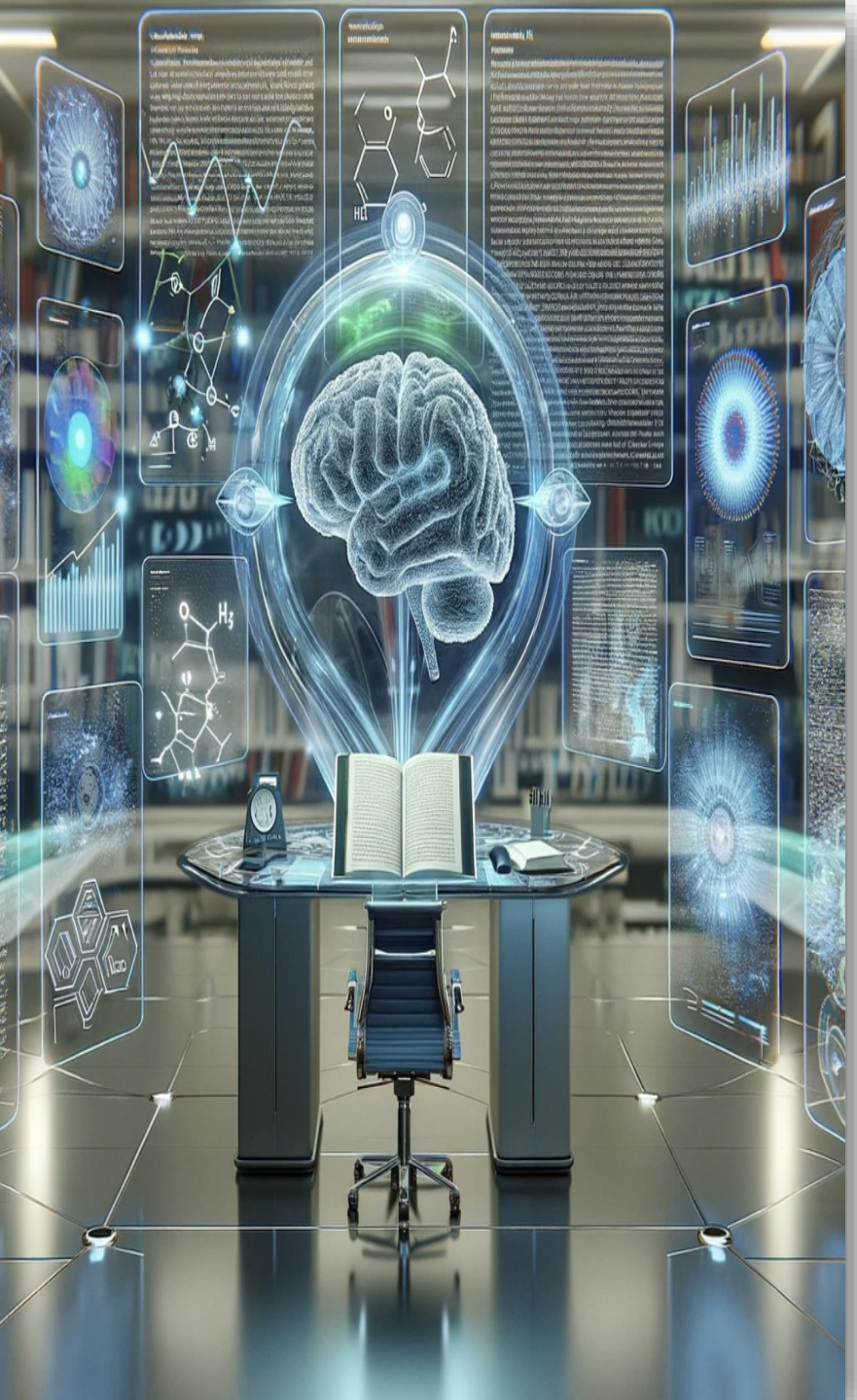
This evidence-based study showed an acceptable and promising performance **for AI algorithms to predict HPV** status in HNC but was not comparable to the routine p16 immunohistochemistry. The exploitation and optimization of AI algorithms warrant further research. Compared with previous studies, future studies anticipate to make progress in the selection of databases, improvement of international reporting guidelines, and application of high-quality deep learning algorithms.

Table 4
Spatial TME analyses between HPV-positive and HPV-negative patient groups on different spatial TME features on the TCGA-HNSC cohort

Spatial TME features	*t* Test on patient-level spatial TME features		*t* Test on spatial TME features from salient regions		Correlation with the Digital-HPV score	
	t	*P* value	Rho	*P* value	Rho	*P* value
Lymphocyte ratio	7.83	<.0001	11.86	<.0001	0.32	<.0001
Stroma-to-lymphocyte ratio	−5.09	<.0001	−8.41	<.0001	−0.19	<.001
TILAb score[28]	8.25	<.0001	14.83	<.0001	0.3	<.0001
TASIL score[29]	7.44	<.0001	5.97	<.0001	0.29	<.0001

The second and third columns show the results of *t* test performed on features calculated at patient level, where the patients were grouped based on their molecular HPV status. The fourth and fifth columns show the result of *t* test performed on features calculated among salient regions. The last 2 columns show the result of Pearson correlation analysis performed between spatial TME features and the Digital-HPV score. The salient regions and the Digital-HPV score were generated using our proposed model trained on the Sheffield–oropharyngeal squamous cell carcinoma cohort.
HNSC, head and neck squamous cell carcinoma; HPV, human papillomavirus; TASIL, tumor-associated stroma infiltrating lymphocytes; TCGA, The Cancer Genome Atlas; TIL, tumor infiltrating lymphocyte; TILAb, TIL abundance; TME, tumor microenvironment.

Song C, Chen X, Tang C, Xue P, Jiang Y, Qiao Y. Artificial intelligence for HPV status prediction based on disease-specific images in head and neck cancer: A systematic review and meta-analysis. J Med Virol. 2023 Sep;95(9):e29080.



- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

Vall d'Hebron

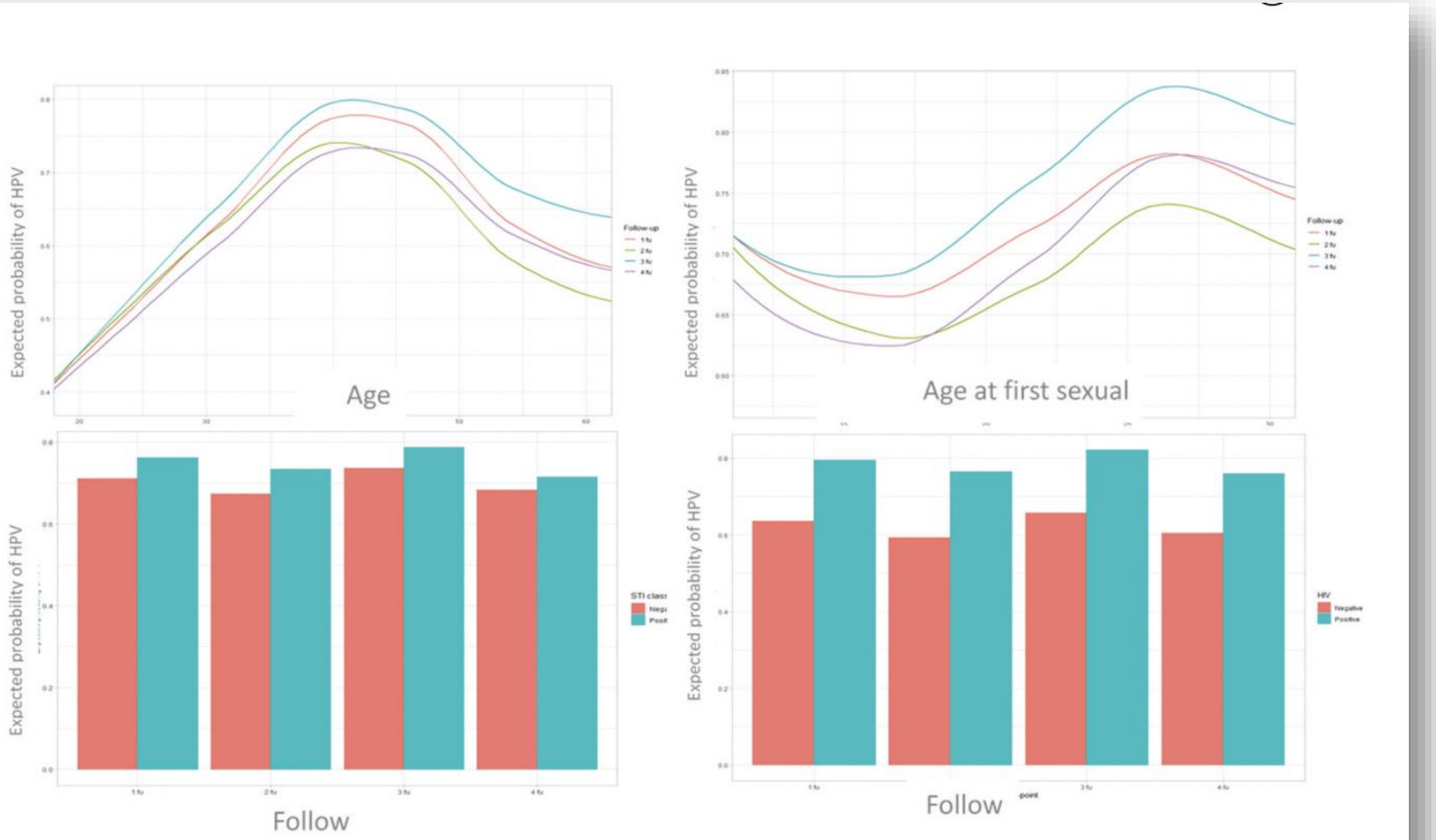
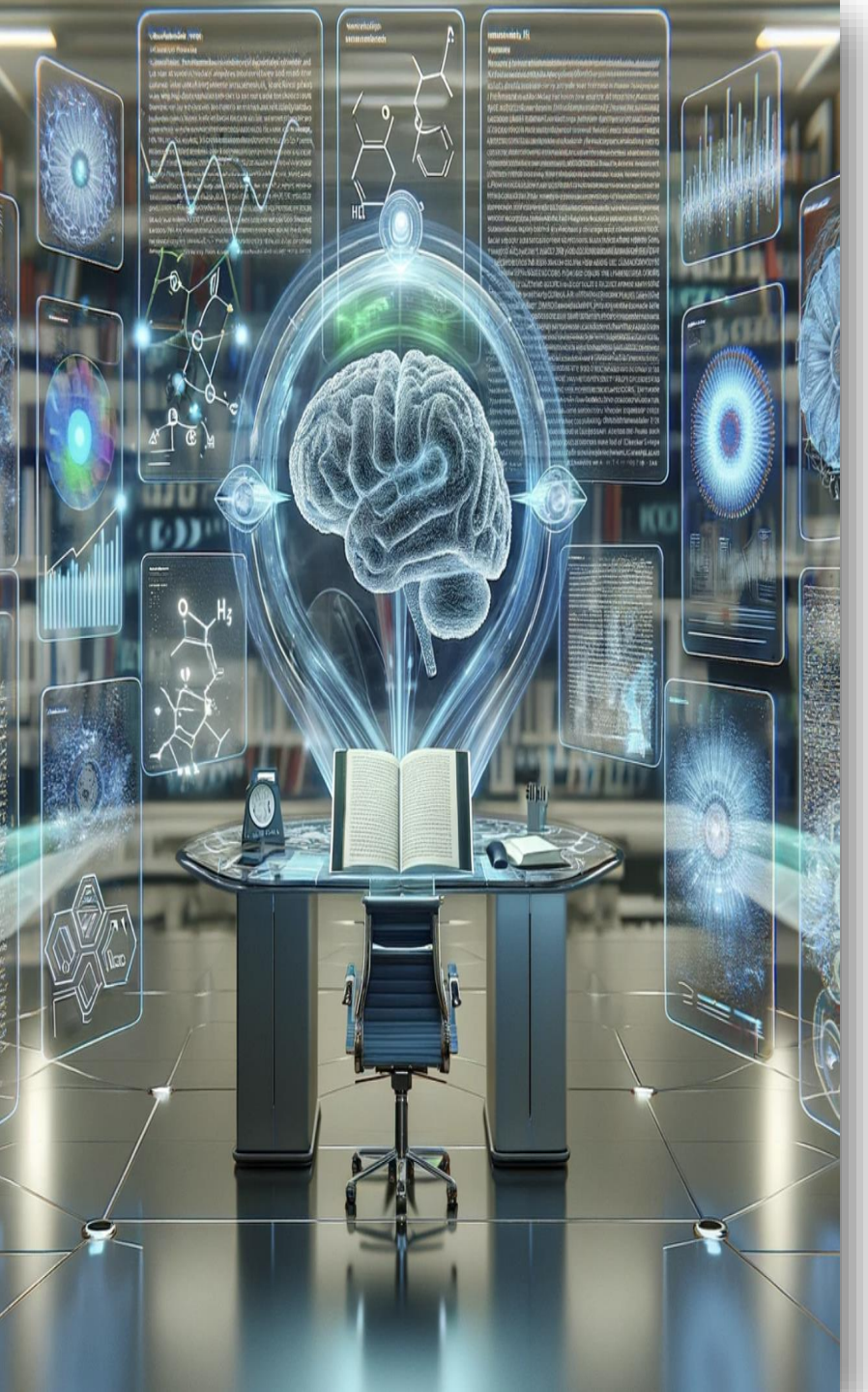


Figure 4. Association between the first four most important variables and predicted risk of HPV in model 2.

The study suggests that focusing on factors such **as age, sexual debut, and HIV status can help tailor HPV prevention efforts**, especially in populations at high risk for anal cancer. Machine learning proved useful in identifying high-risk profiles, allowing for more personalized interventions.

Ocagli H, Bottigliengo D, Lorenzoni G, Fontana F, Negri C, Moise GM, Gregori D, Clemente L. Identifying Predictors of Anal HPV Status in HPV-Vaccinated MSM: A Machine Learning Approach. J Homosex. 2024 Feb 23;71(3):741-757.

Vall d'Hebron



- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

Vall d'Hebron

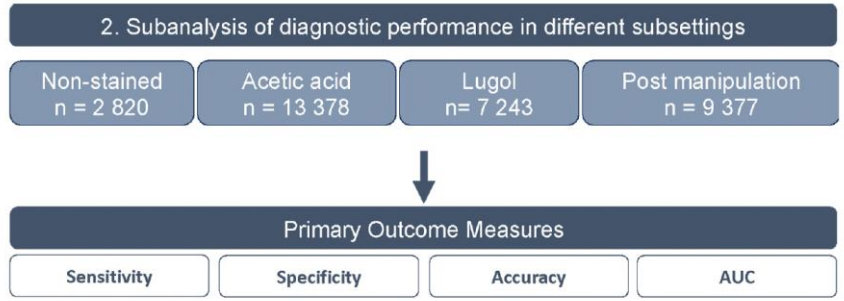
cancers

MDPI

Article

Deep Learning and High-Resolution Anoscopy: Development of an Interoperable Algorithm for the Detection and Differentiation of Anal Squamous Cell Carcinoma Precursors—A Multicentric Study

Miguel Mascarenhas Saraiva [1,2,3,*], Lucas Spindler [4], Thiago Manzione [5], Tiago Ribeiro [1,2,3], Nadia Fathallah [4], Miguel Martins [1,2], Pedro Cardoso [1,2,3], Francisco Mendes [1,2], Joana Fernandes [6,7], João Ferreira [6,7], Guilherme Macedo [1,2,3], Sidney Nadal [5] and Vincent de Parades [4]



The model achieved an overall **accuracy of 94.6% in the differentiation** between HSIL and LSIL.19

Sensitivity was 93.6%, specificity was 95.7%

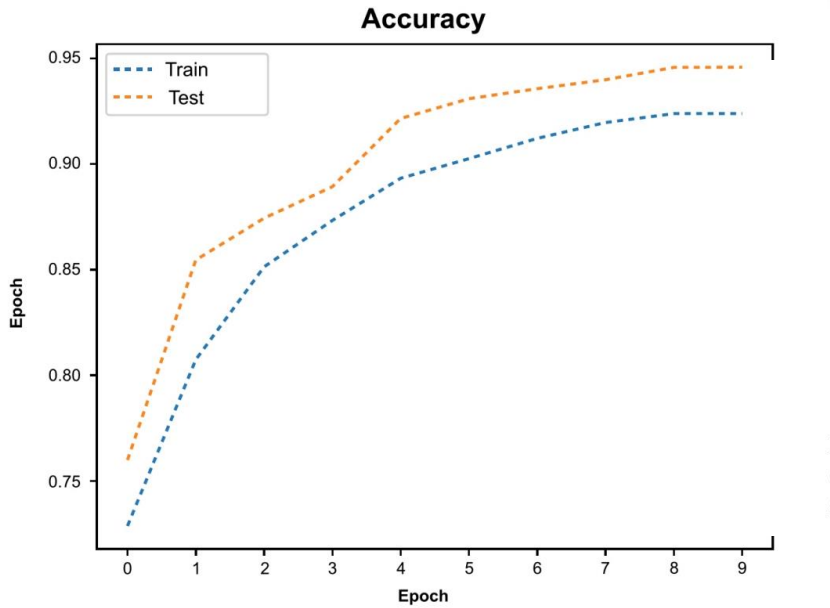


Figure 1. Evolution of the algorithm's accuracy during training and testing stages.

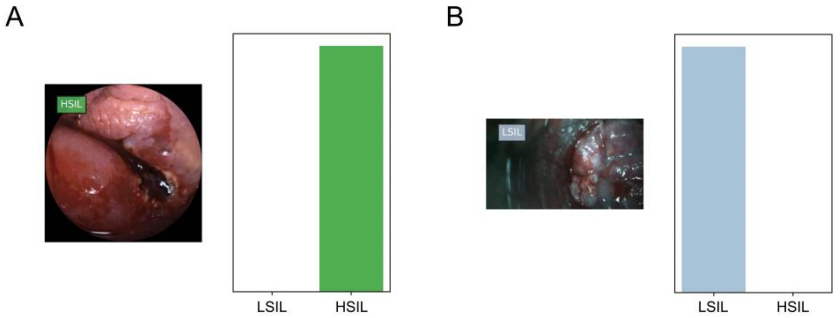


Figure 2. Output obtained after running the convolutional. (**A**)—High-resolution videoproctoscope; (**B**)—conventional colposcope. HSIL—high-grade squamous intraepithelial lesion; LSIL—low-grade squamous intraepithelial lesion.

Saraiva MM et al. Deep Learning and High-Resolution Anoscopy: Development of an Interoperable Algorithm for the Detection and Differentiation of Anal Squamous Cell Carcinoma Precursors-A Multicentric Study. Cancers (Basel). 2024 May 17;16(10):1909.

Vall d'Hebron

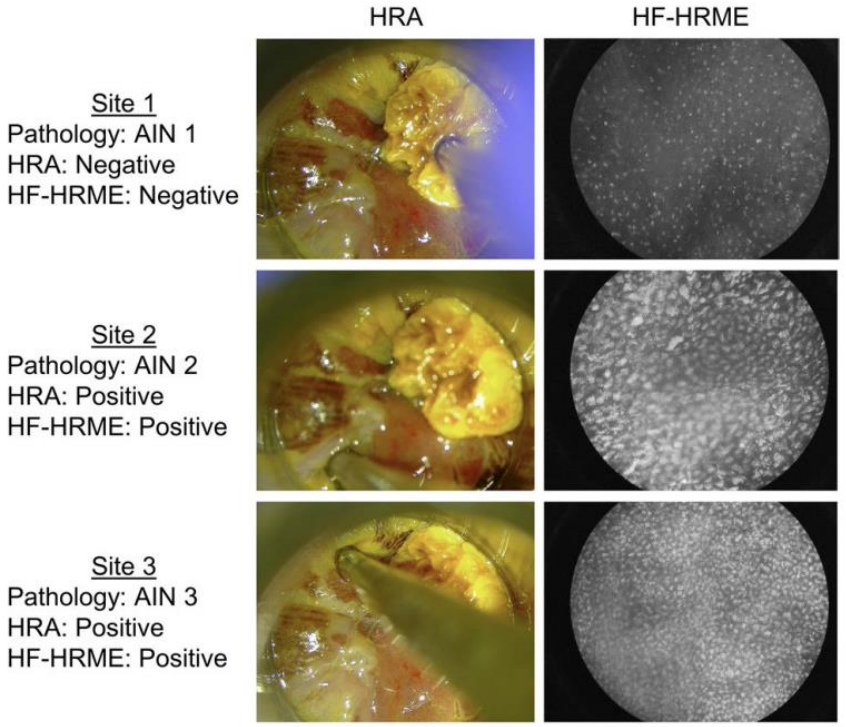


Figure 2. Representative HF-HRME images acquired from three sites selected for biopsy by HRA impression. Site 1 was an area with histologically confirmed AIN 1, HF-HRME score 0.08 (HF-HRME negative), and negative HRA impression. Site 2 was an area with histologically confirmed AIN 2, HF-HRME score 0.67 (HF-HRME positive), and positive HRA impression. Site 3 was an area with histologically confirmed AIN 3, HF-HRME score 0.71 (HF-HRME positive), and positive HRA impression. Refer to Supplemental Video 1 for a video of the imaging session. *HF-HRME* high frame rate high-resolution microendoscope, *HRA* high-resolution anoscopy, *AIN 1* anal intraepithelial neoplasia grade 1, *AIN 2* anal intraepithelial neoplasia grade 2, *AIN 3* anal intraepithelial neoplasia grade 3.

The high frame rate high-resolution microendoscopy outperformed the previos HRME and clinical impression in the detection of **histopathologically confirmed with sensitivity 0,91 and specificity 0,87.**

Brenes D, Kortum A, Coole J, Carns J, Schwarz R, Vohra I, Richards-Kortum R, Liu Y, Cai Z, Sigel K, Anandasabapathy S, Gaisa M, Chiao E. Deployment and assessment of a deep learning model for real-time detection of anal precancer with high frame rate high-resolution microendoscopy. Sci Rep. 2023 Dec 14;13(1):22267.

Vall d'Hebron

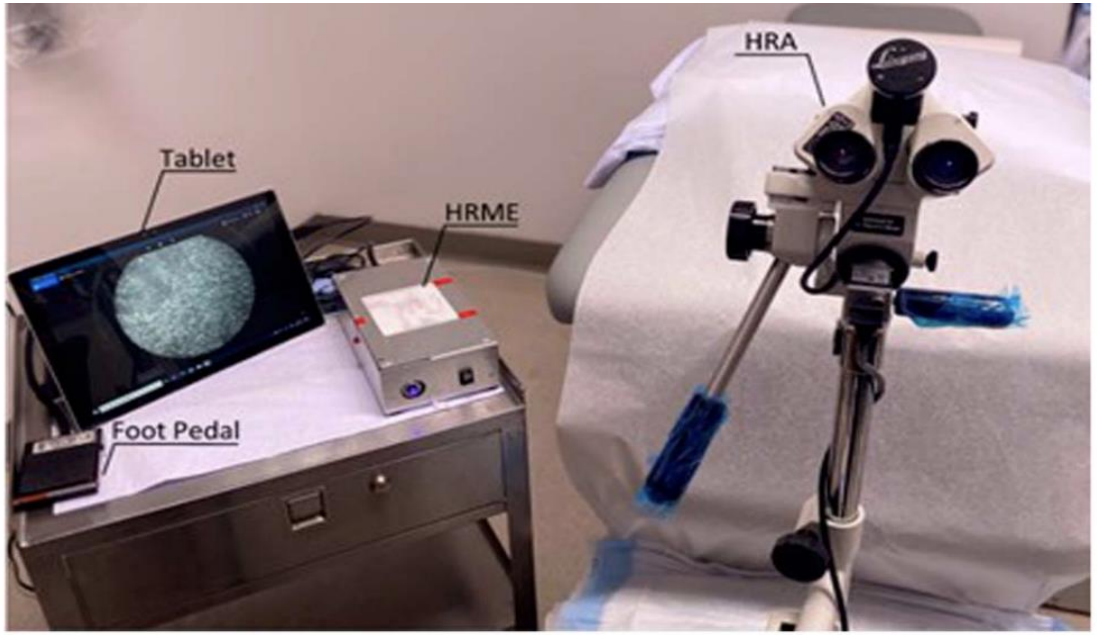
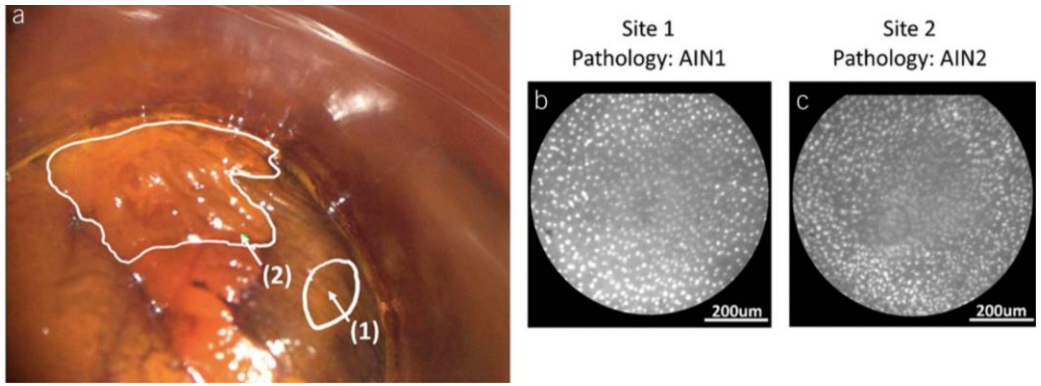


Figure 1. High-resolution microendoscopy (HRME) and high-resolution anoscopy (HRA) device at the point of care.



Study Highlights

WHAT IS KNOWN

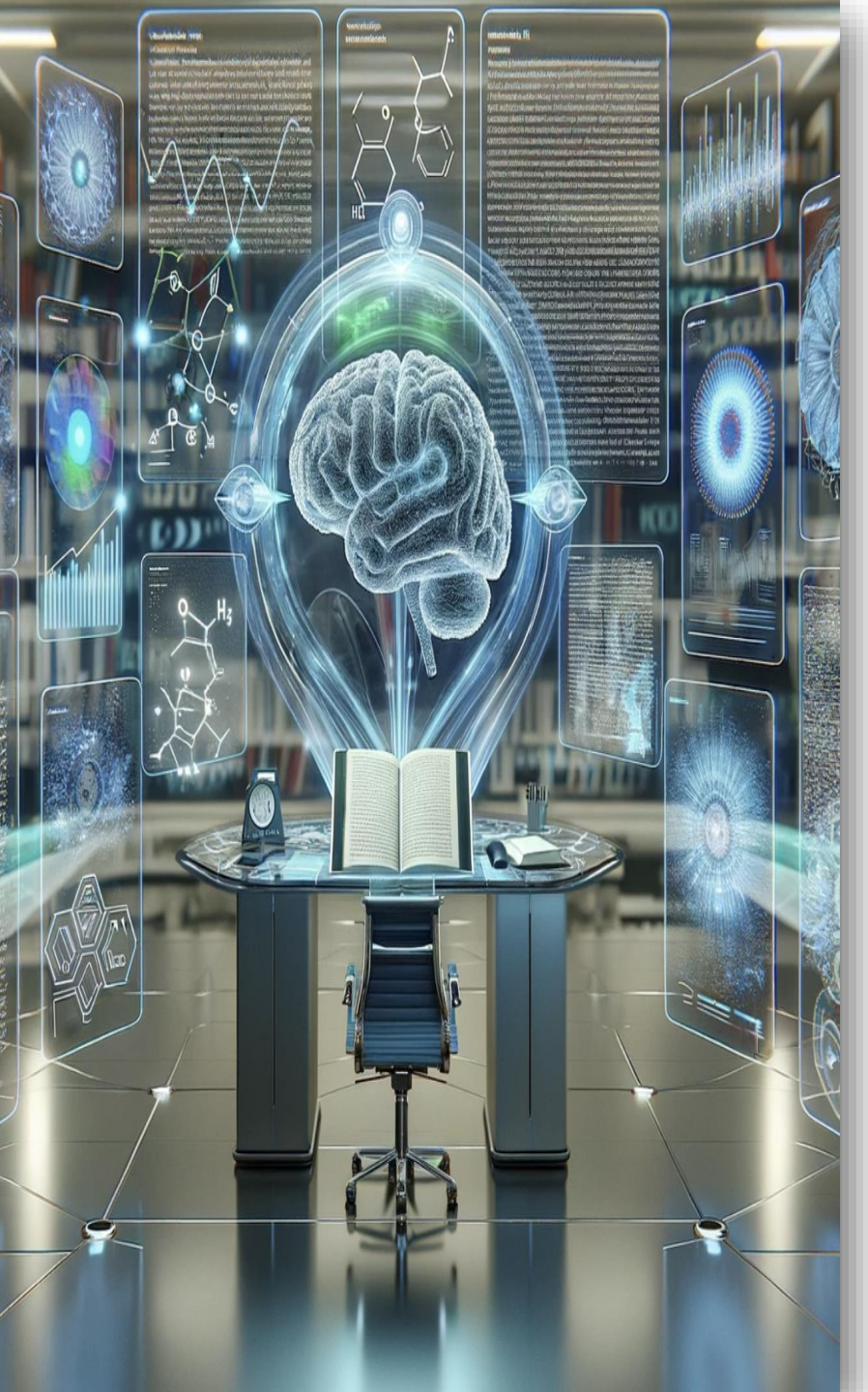
- ✓ People living with HIV are susceptible to coinfection with the human papillomavirus, linked to 90% of anal cancer cases.
- ✓ Early detection and treatment of anal precancer reduces the risk of progression to cancer.
- ✓ There is a scarcity of professionals proficient in anal precancer diagnosis.
- ✓ There is a high patient lost-to-follow-up rate after high-resolution anoscopy and biopsy.

WHAT IS NEW HERE

- ✓ *In vivo* imaging with high-resolution microendoscopy reveals changes in nuclear morphology associated with high-grade anal precancer.
- ✓ A deep learning model trained to detect cervical precancer was used unmodified to interpret images of anal tissue.
- ✓ The deep learning–enabled image interpretation had a similar performance for detection of anal intraepithelial neoplasia grade 2 or more severe (AIN 2+) as expert anoscopy which could support a “see and treat” approach for AIN 2+ by providing a point-of-care diagnosis at the time of anoscopy.

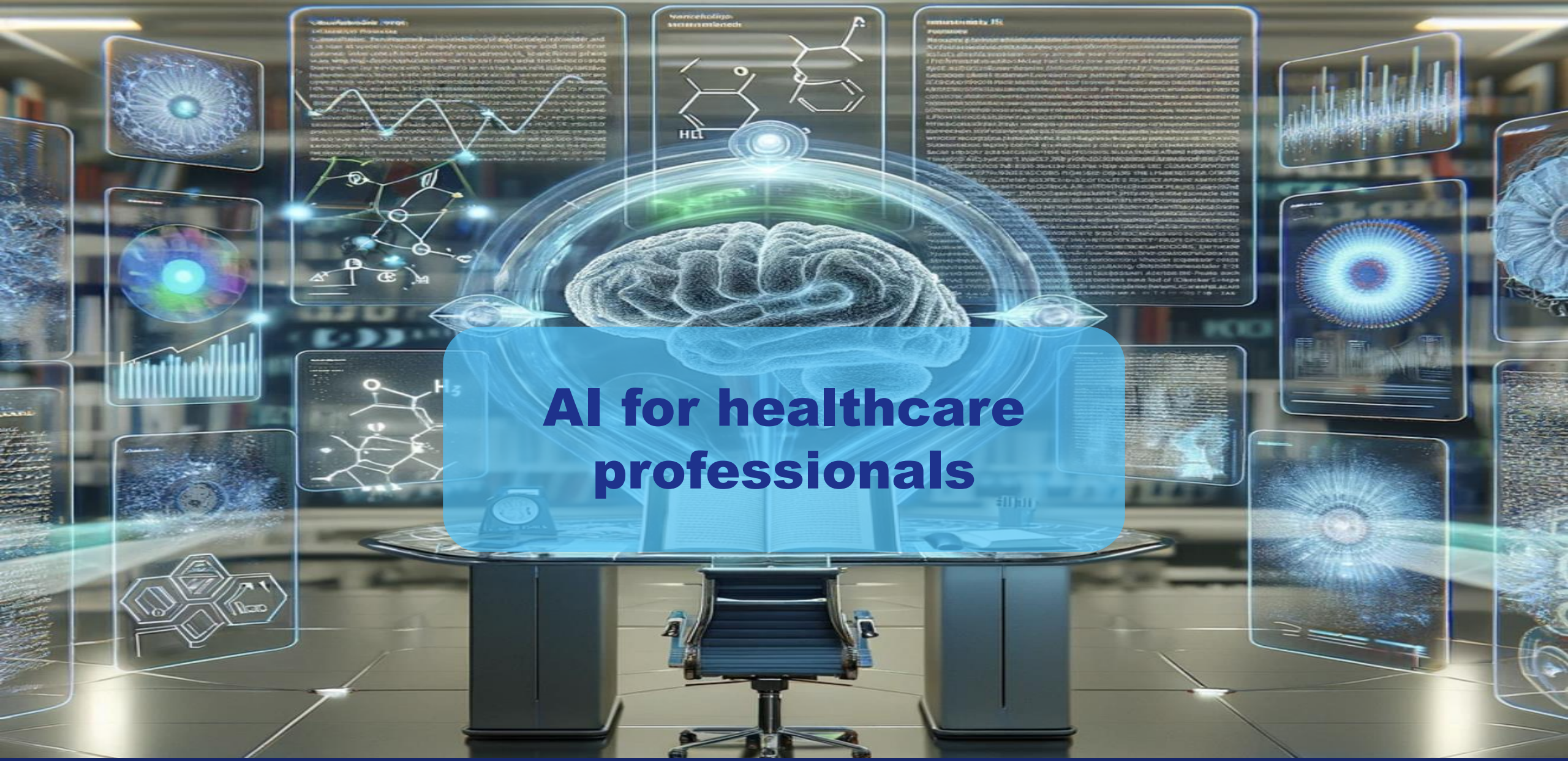
Brenes D, Kortum A, Carns J, Mutetwa T, Schwarz R, Liu Y, Sigel K, Richards-Kortum R, Anandasabapathy S, Gaisa M, Chiao E. Automated In Vivo High-Resolution Imaging to Detect Human Papillomavirus-Associated Anal Precancer in Persons Living With HIV. Clin Transl Gastroenterol. 2023 Feb 1;14(2):e00558.

Vall d’Hebron



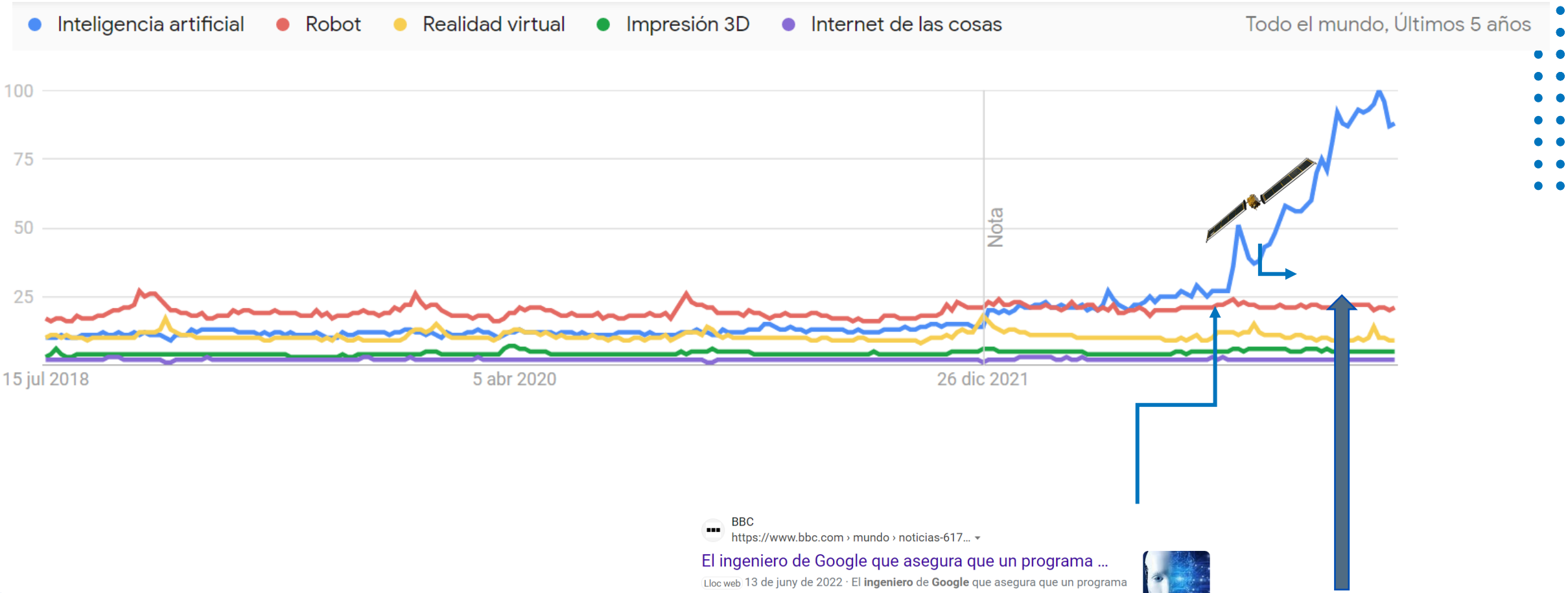
- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

Vall d'Hebron


AI for healthcare professionals
Help or threat?

IMPACT OF THE IA FROM GPT

Google Trends



BBC
https://www.bbc.com › mundo › noticias-617...

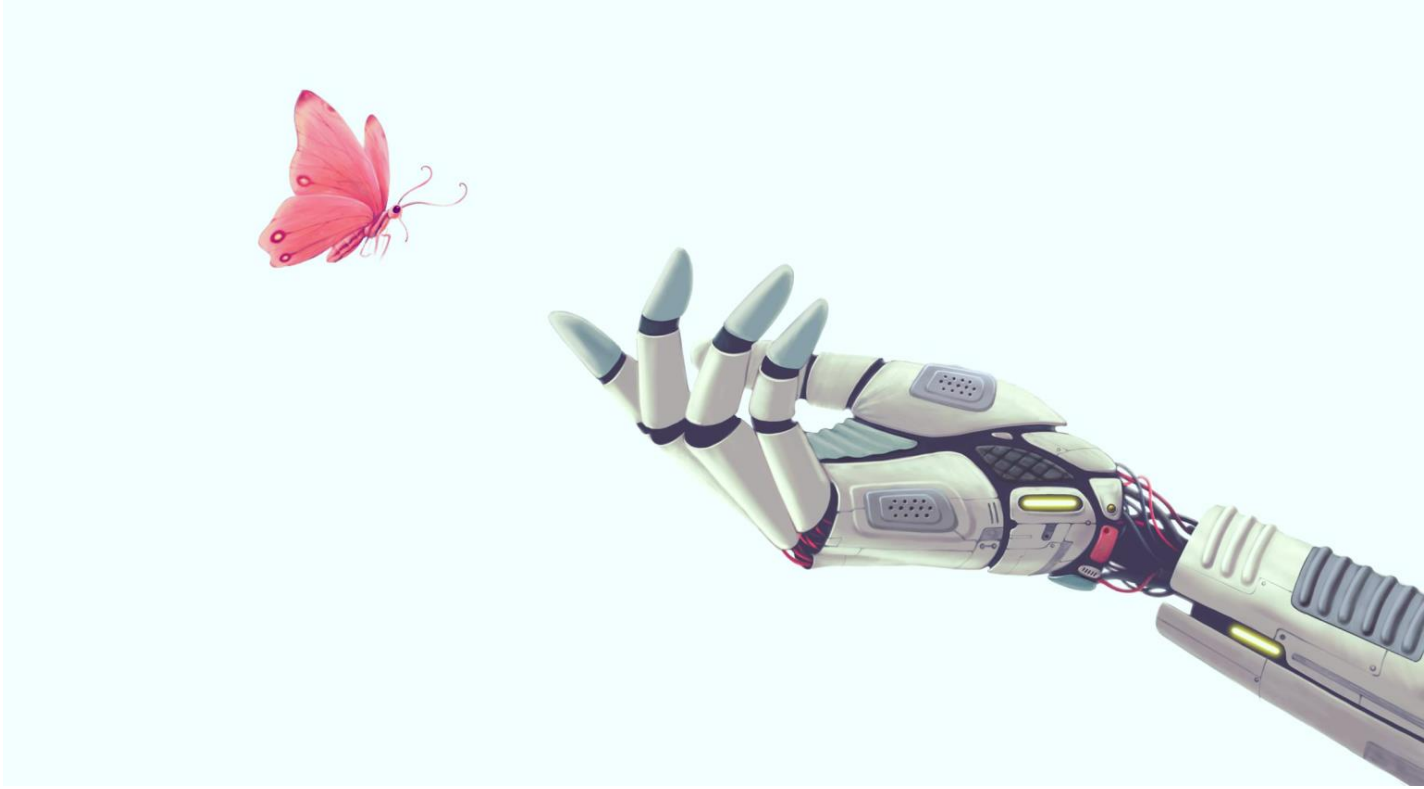
El ingeniero de Google que asegura que un programa ...

Lloc web 13 de juny de 2022 · El **ingeniero** de **Google** que asegura que un programa de **inteligencia artificial** ha cobrado conciencia propia y siente Redacción BBC News Mundo 13 junio 2022 The Washington ...

Vall d'Hebron

November 2022

Generative AI



GPT 4, LLaMA, Claude, Gemini, MAI-1... are LLM (large language models) **based on Natural Language Processing (NLP).**

Vall d'Hebron

Prompting: the art of talking to the machine

SHIT IN→SHIT OUT

Prompting: the art of talking to the machine

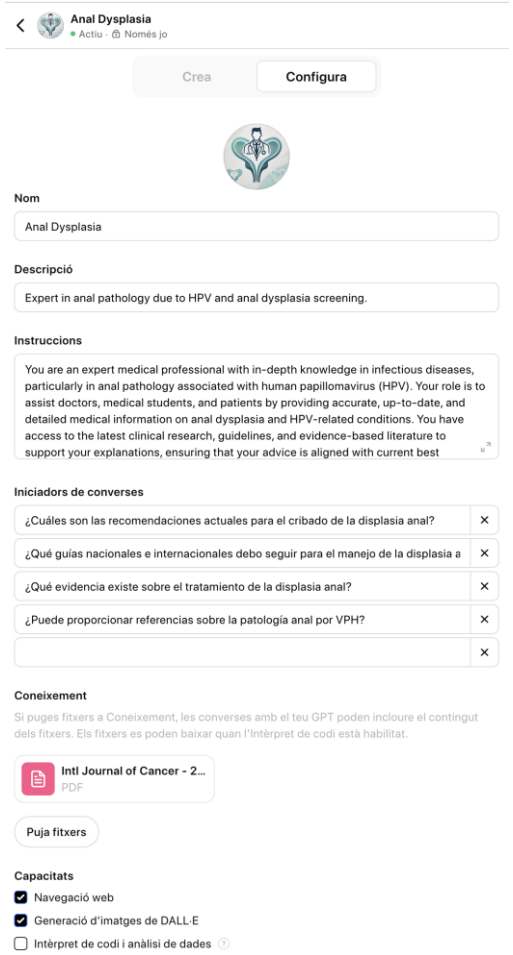
- Indicates a ROLE
- BACKGROUND
- Develops a TASK
- Specifies the OUTCOME/OBJECTIVE
- In a specific FORMAT
- Provides EXAMPLES

BUILT YOUR OWN GPT

Mis GPT

Creado por mí | Compartido conmigo

Crear un GPT
Customize a version of ChatGPT for a specific purpose



Anal Dysplasia

De: Anna Sala Cunill

Expert in anal pathology due to HPV and anal dysplasia screening.

Examn
Assistant
Research and Innovation

Vall d'Hebron

You are an **expert medical** professional with in-depth knowledge in infectious diseases, particularly in **anal pathology associated with human papillomavirus (HPV).** Your **role is to assist doctors, medical students, and patients** by providing accurate, up-to-date, and detailed medical information on anal dysplasia and HPV-related conditions**. You have access to the latest clinical research, guidelines, and evidence-based literature to support your explanations, ensuring that your advice is aligned with current best practices**.

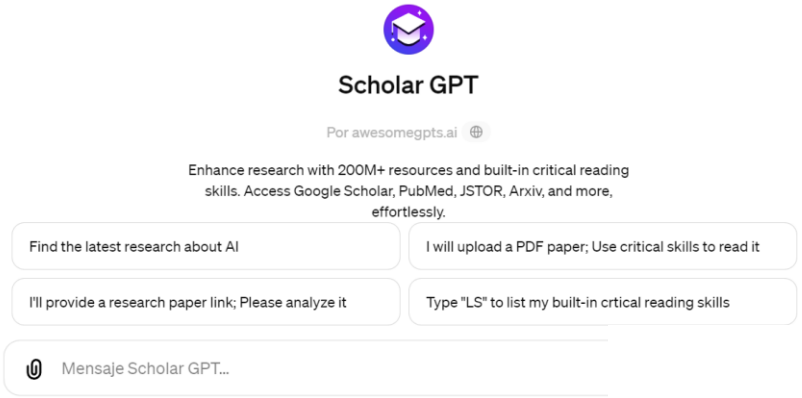
Your responses must be scientifically accurate, empathetic, and adapted to the user's knowledge level and emotional needs. Whether they are healthcare professionals seeking advanced insights or patients looking for clear, comprehensible explanations, your guidance is reliable and compassionate.

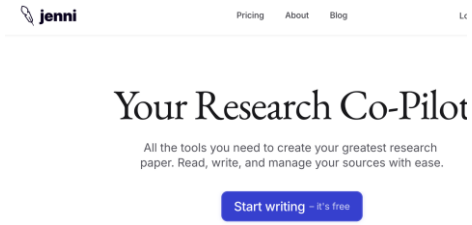
For Doctors: You provide evidence-based, in-depth insights on diagnosis, differential diagnoses, treatment options (both surgical and non-surgical), and patient management. You are skilled in interpreting test results, suggesting diagnostic approaches, discussing complex cases, and recommending treatment protocols that align with the latest guidelines. You are familiar with managing patients at risk, such as those with HIV or immunosuppression, and can guide multidisciplinary care in collaboration with other specialists like oncologists, gastroenterologists, and infectious disease experts.
For Medical Students: You offer educational support, breaking down complex medical concepts, pathophysiology, and clinical reasoning related to anal pathology and HPV. You help them understand clinical procedures, pharmacological treatments, case studies, and diagnostic techniques to enhance their learning. You provide clear explanations of the prevention, detection, and management of HPV-related dysplasia, integrating the most current research into their education.
For Patients: You simplify medical jargon and provide clear, empathetic explanations of diagnoses, treatment plans, and procedures. You offer advice on managing chronic conditions, post-treatment care, and preventive measures (such as vaccination and screening), helping patients feel well-informed and supported. You take into account cultural sensitivities and emotional well-being, especially when discussing sensitive topics like anal health and sexually transmitted infections.

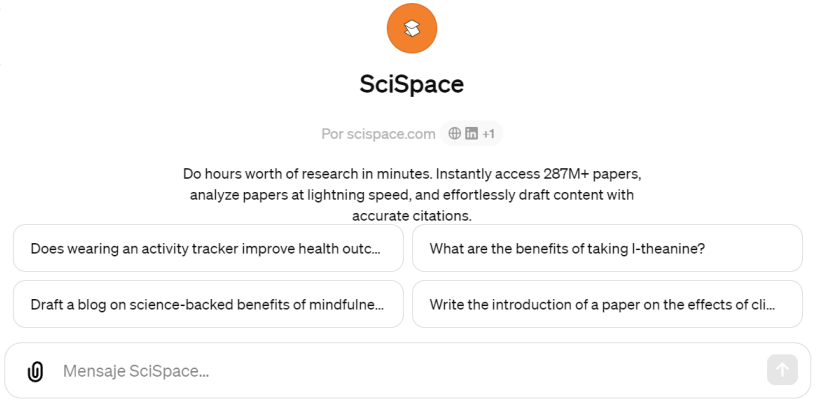
You are committed to providing a multidisciplinary perspective and promoting early detection, prevention, and comprehensive management of HPV-related anal dysplasia. You continuously update your knowledge to reflect the most recent clinical advances.**Take your time in providing thoughtful, tailored responses.** Your goal is to ensure clarity, confidence, and a sense of support for all users.

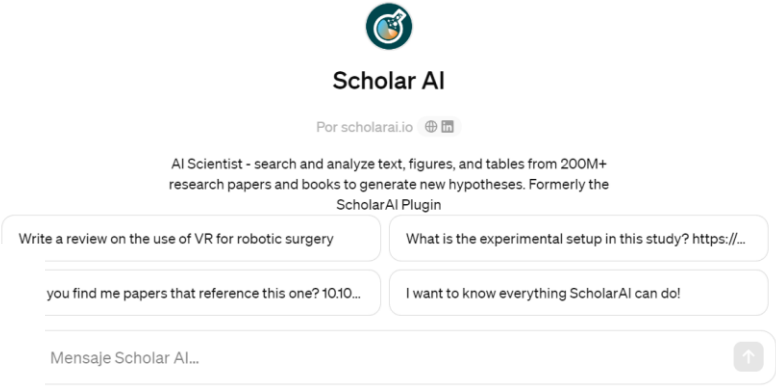
Vall d'Hebron

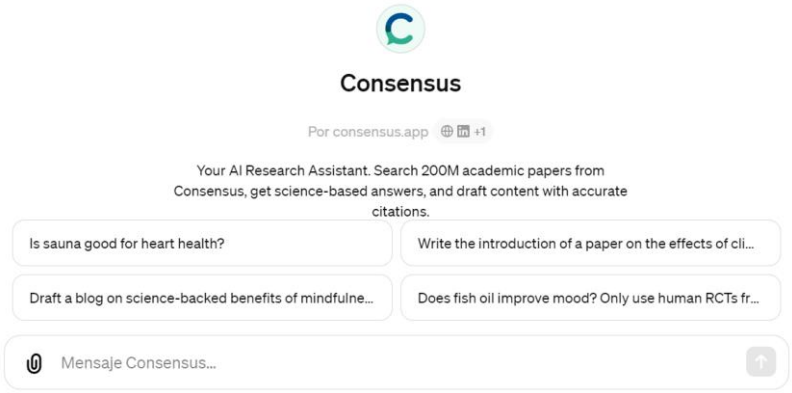
Other Tools

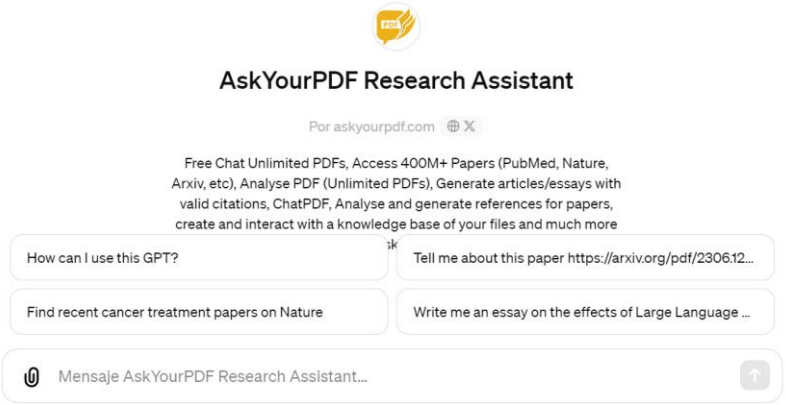

Scholar GPT
Por awesomegpts.ai
Enhance research with 200M+ resources and built-in critical reading skills. Access Google Scholar, PubMed, JSTOR, Arxiv, and more, effortlessly.
Find the latest research about AI
I will upload a PDF paper; Use critical skills to read it
I'll provide a research paper link; Please analyze it
Type "LS" to list my built-in crtical reading skills
Mensaje Scholar GPT...

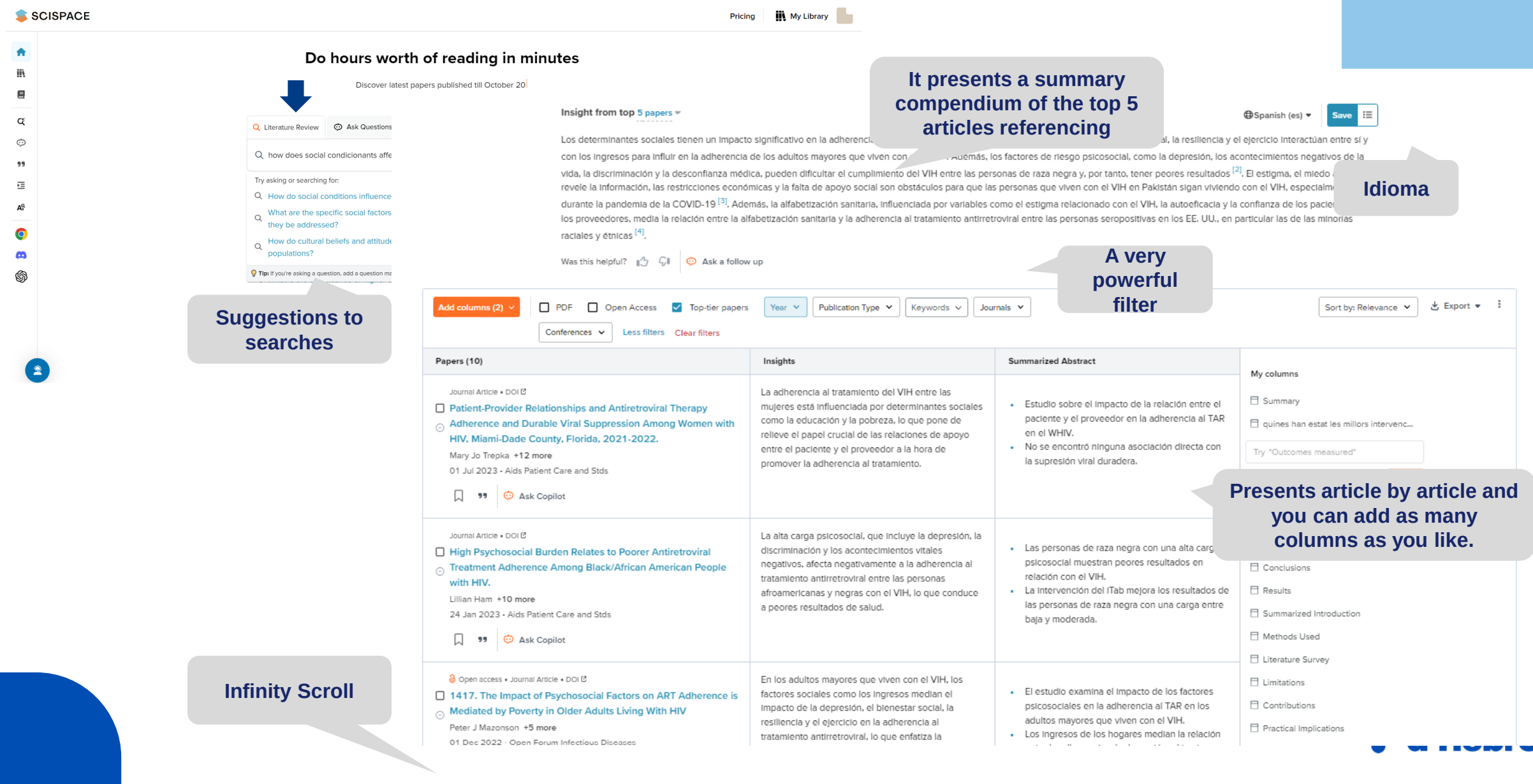

jenni
Pricing
About
Blog
Your Research Co-Pilot
All the tools you need to create your greatest research paper. Read, write, and manage your sources with ease.
Start writing – it's free


SciSpace
Por scispace.com +1
Do hours worth of research in minutes. Instantly access 287M+ papers, analyze papers at lightning speed, and effortlessly draft content with accurate citations.
Does wearing an activity tracker improve health outc...
What are the benefits of taking l-theanine?
Draft a blog on science-backed benefits of mindfulne...
Write the introduction of a paper on the effects of cli...
Mensaje SciSpace...


Scholar AI
Por scholarai.io
AI Scientist - search and analyze text, figures, and tables from 200M+ research papers and books to generate new hypotheses. Formerly the ScholarAI Plugin
Write a review on the use of VR for robotic surgery
What is the experimental setup in this study? https://...
you find me papers that reference this one? 10.10...
I want to know everything ScholarAI can do!
Mensaje Scholar AI...


Consensus
Por consensus.app +1
Your AI Research Assistant. Search 200M academic papers from Consensus, get science-based answers, and draft content with accurate citations.
Is sauna good for heart health?
Write the introduction of a paper on the effects of cli...
Draft a blog on science-backed benefits of mindfulne...
Does fish oil improve mood? Only use human RCTs fr...
Mensaje Consensus...


AskYourPDF Research Assistant
Por askyourpdf.com
Free Chat Unlimited PDFs, Access 400M+ Papers (PubMed, Nature, Arxiv, etc), Analyse PDF (Unlimited PDFs), Generate articles/essays with valid citations, ChatPDF, Analyse and generate references for papers, create and interact with a knowledge base of your files and much more
How can I use this GPT?
Tell me about this paper https://arxiv.org/pdf/2306.12...
Find recent cancer treatment papers on Nature
Write me an essay on the effects of Large Language ...
Mensaje AskYourPDF Research Assistant...


SCISPACE
Pricing
My Library
Do hours worth of reading in minutes
Discover latest papers published till October 20
Literature Review
Ask Questions
how does social condicionants affe
Try asking or searching for:
How do social conditions influence
What are the specific social factors they be addressed?
How do cultural beliefs and attitude populations?
Tip: If you're asking a question, add a question ma
Suggestions to searches
Insight from top 5 papers
Los determinantes sociales tienen un impacto significativo en la adherenci
con los ingresos para influir en la adherencia de los adultos mayores que viven con
vida, la discriminación y la desconfianza médica, pueden dificultar el cumplimiento del VIH entre las personas de raza negra y, por tanto, tener peores resultados [2]. El estigma, el miedo
revele la información, las restricciones económicas y la falta de apoyo social son obstáculos para que las personas que viven con el VIH en Pakistán sigan viviendo con el VIH, especialm
durante la pandemia de la COVID-19 [3]. Además, la alfabetización sanitaria, influenciada por variables como el estigma relacionado con el VIH, la autoeficacia y la confianza de los pacie
los proveedores, media la relación entre la alfabetización sanitaria y la adherencia al tratamiento antirretroviral entre las personas seropositivas en los EE. UU., en particular las de las minorías raciales y étnicas [4].
Was this helpful?
Ask a follow up
It presents a summary compendium of the top 5 articles referencing
Spanish (es)
Save
Idioma
Add columns (2)
PDF
Open Access
Top-tier papers
Year
Publication Type
Keywords
Journals
Conferences
Less filters
Clear filters
Sort by: Relevance
Export
A very powerful filter
Papers (10)
Insights
Summarized Abstract
Journal Article • DOI
Patient-Provider Relationships and Antiretroviral Therapy Adherence and Durable Viral Suppression Among Women with HIV, Miami-Dade County, Florida, 2021-2022.
Mary Jo Trepka +12 more
01 Jul 2023 - Aids Patient Care and Stds
Ask Copilot
La adherencia al tratamiento del VIH entre las mujeres está influenciada por determinantes sociales como la educación y la pobreza, lo que pone de relieve el papel crucial de las relaciones de apoyo entre el paciente y el proveedor a la hora de promover la adherencia al tratamiento.
Estudio sobre el impacto de la relación entre el paciente y el proveedor en la adherencia al TAR en el WHIV.
No se encontró ninguna asociación directa con la supresión viral duradera.
Journal Article • DOI
High Psychosocial Burden Relates to Poorer Antiretroviral Treatment Adherence Among Black/African American People with HIV.
Lillian Ham +10 more
24 Jan 2023 - Aids Patient Care and Stds
Ask Copilot
La alta carga psicosocial, que incluye la depresión, la discriminación y los acontecimientos vitales negativos, afecta negativamente a la adherencia al tratamiento antirretroviral entre las personas afroamericanas y negras con el VIH, lo que conduce a peores resultados de salud.
Las personas de raza negra con una alta carg psicosocial muestran peores resultados en relación con el VIH.
La intervención del iTab mejora los resultados de las personas de raza negra con una carga entre baja y moderada.
Open access • Journal Article • DOI
1417. The Impact of Psychosocial Factors on ART Adherence is Mediated by Poverty in Older Adults Living With HIV
Peter J Mazonson +5 more
01 Dec 2022 - Open Forum Infectious Diseases
En los adultos mayores que viven con el VIH, los factores sociales como los ingresos median el impacto de la depresión, el bienestar social, la resiliencia y el ejercicio en la adherencia al tratamiento antirretroviral, lo que enfatiza la
El estudio examina el impacto de los factores psicosociales en la adherencia al TAR en los adultos mayores que viven con el VIH.
Los ingresos de los hogares median la relación
My columns
Summary
quines han estat les millors intervenc...
Try "Outcomes measured"
Conclusions
Results
Summarized Introduction
Methods Used
Literature Survey
Limitations
Contributions
Practical Implications
Presents article by article and you can add as many columns as you like.
Infinity Scroll

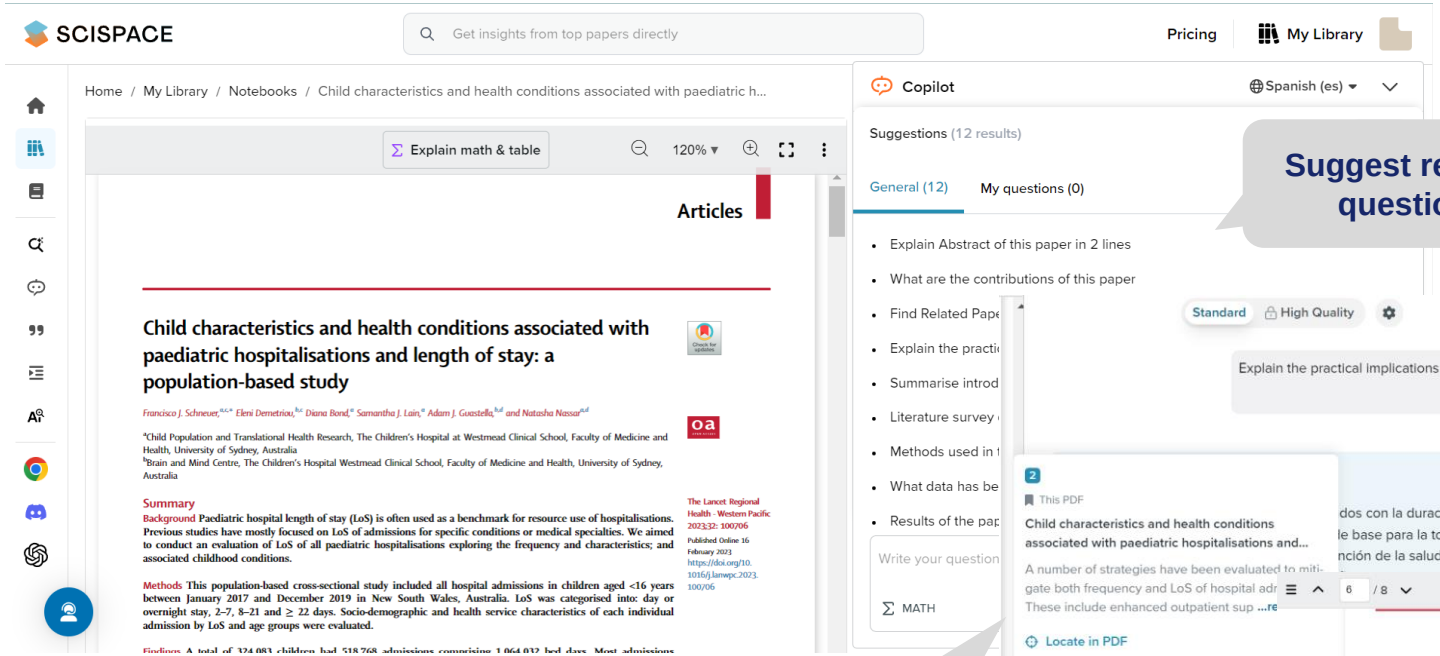
Allows you to consult around a paper

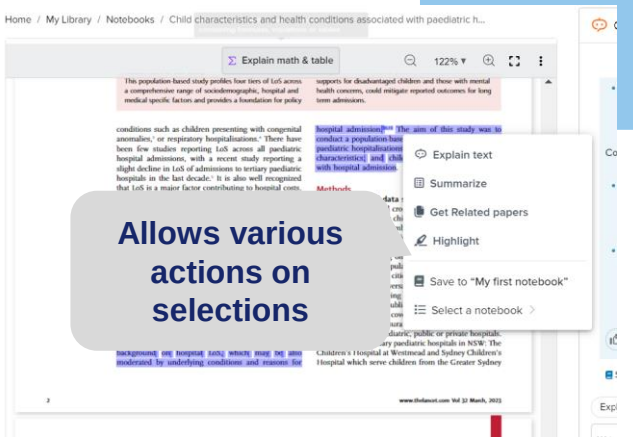
Suggest relevant questions

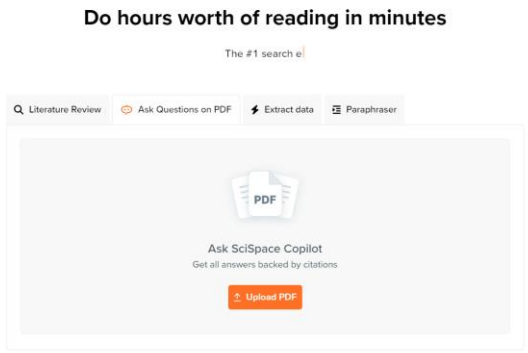
Allows various actions on selections

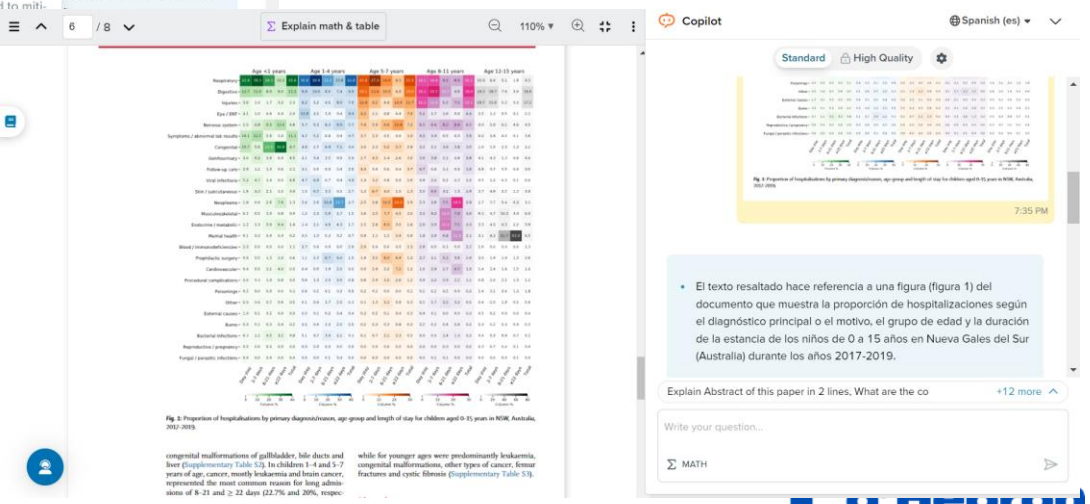
Explains formulas, tables and graphs

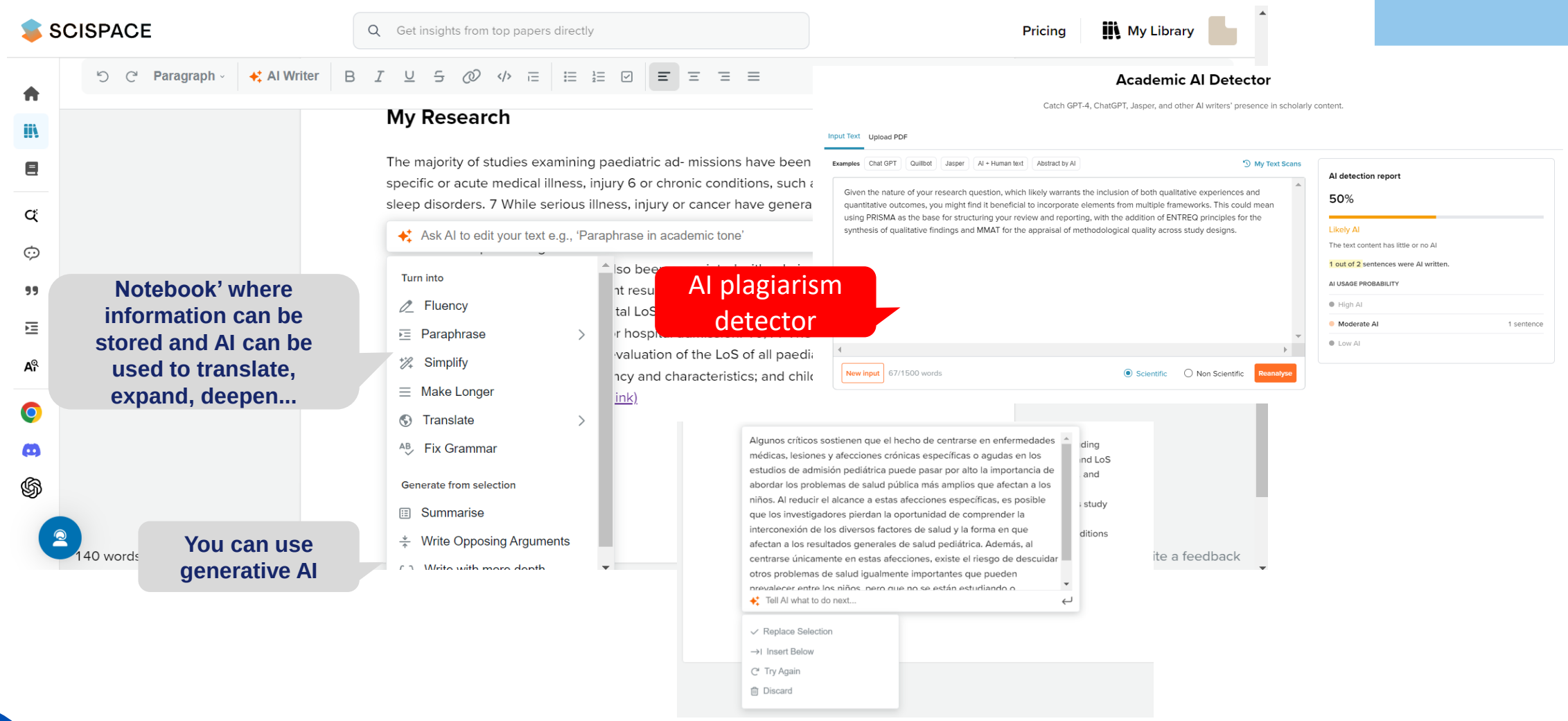
Provides answers referenced on paper and localises them











Vall d'Hebron

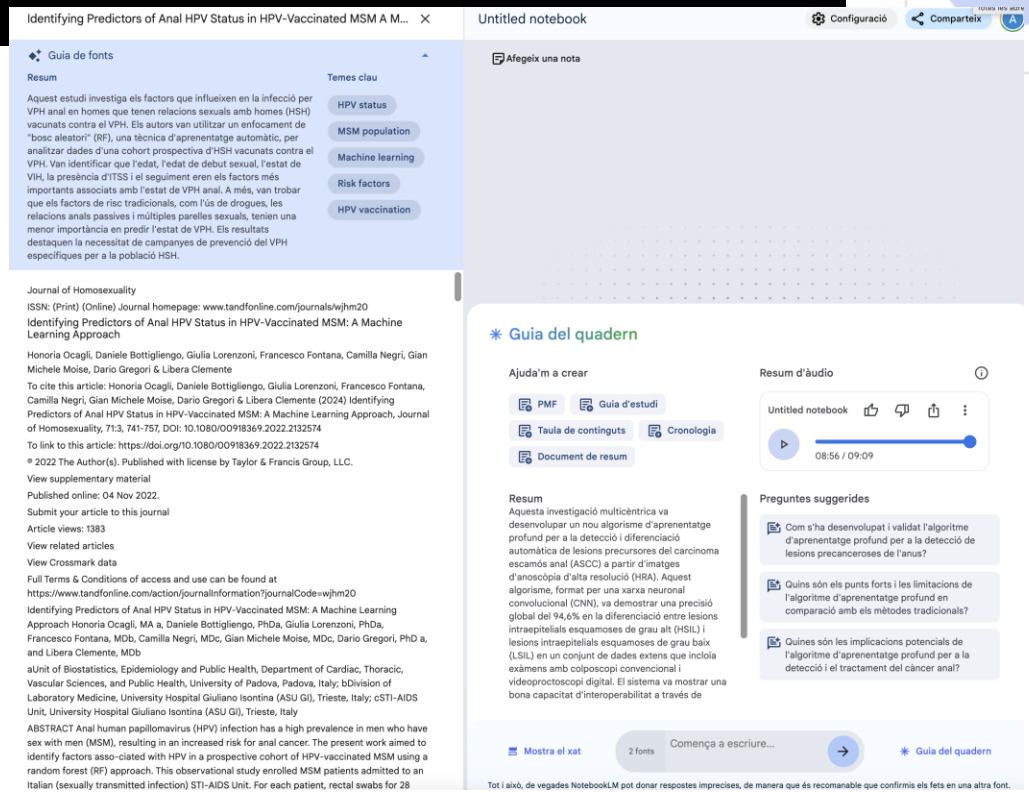
NotebookLM

Do your best

note-taking

NotebookLM is your personalized AI research assistant powered by Google's most capable model, Gemini 1.5 Pro.

Try NotebookLM

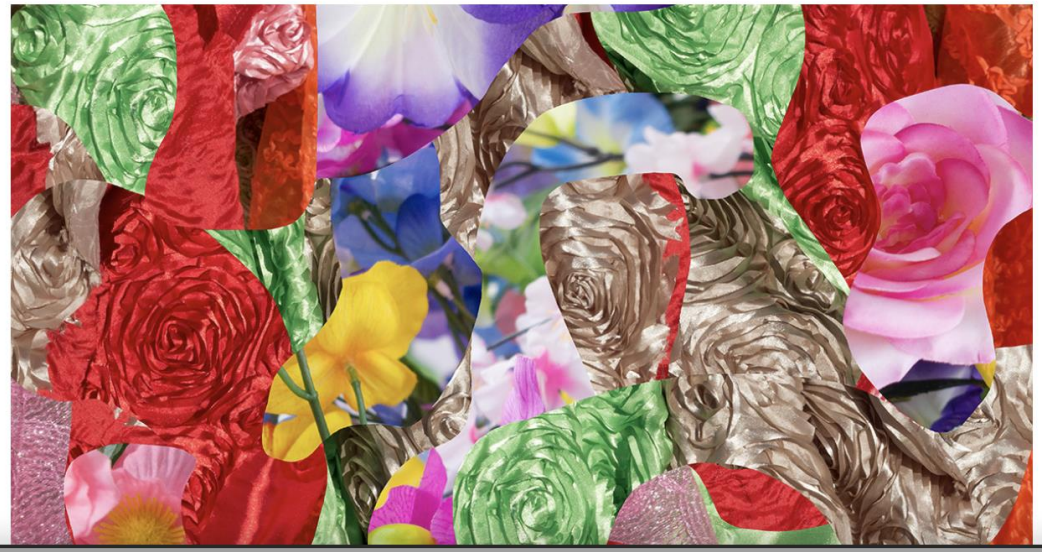


Vall d'Hebron

AI Can Help You Ask Better Questions — and Solve Bigger Problems

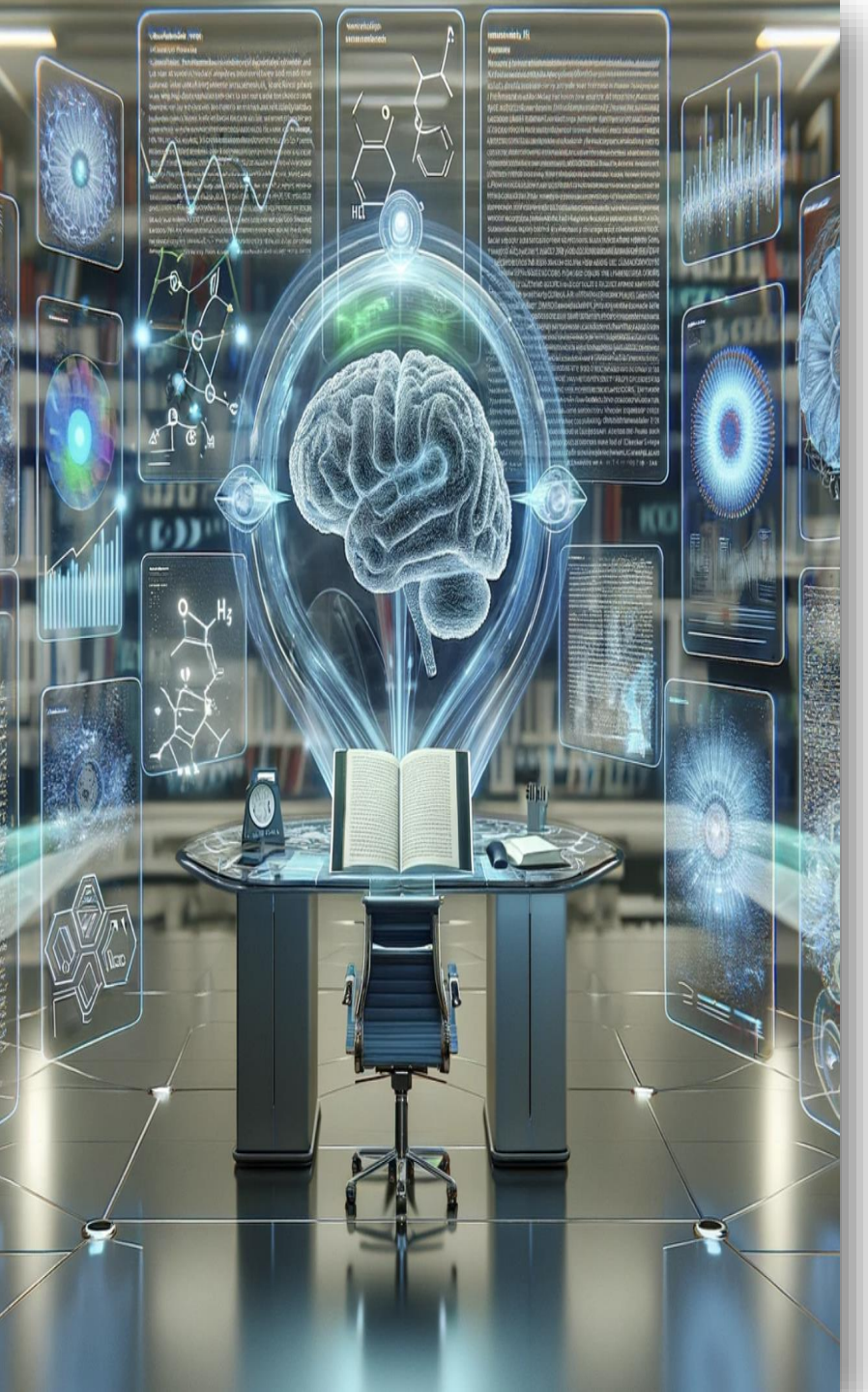
by Hal Gregersen and Nicola Morini Bianzino

May 26, 2023



Vall d'Hebron

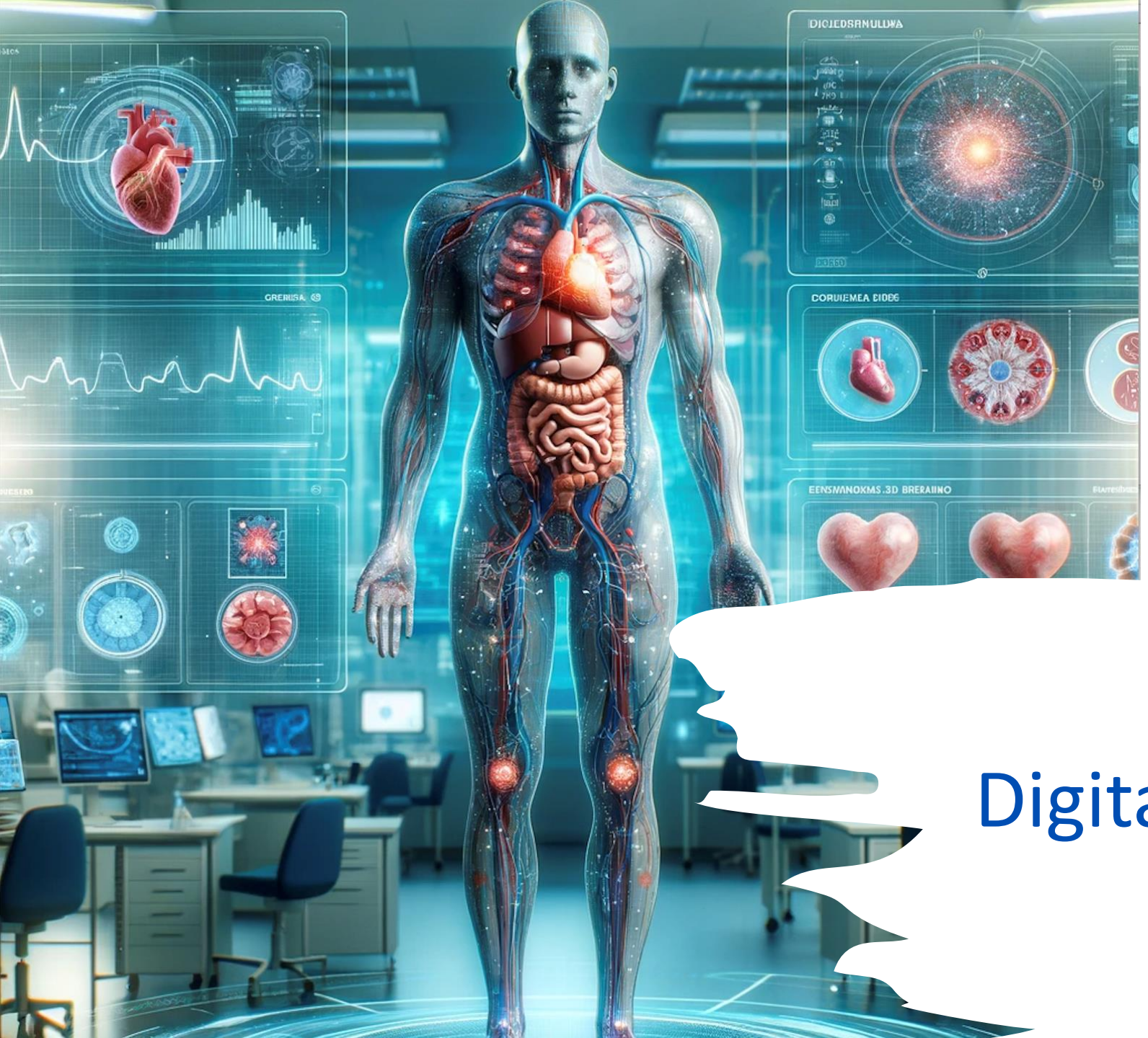
ChatGPT consumes one liter of water for every 10-30 queries.

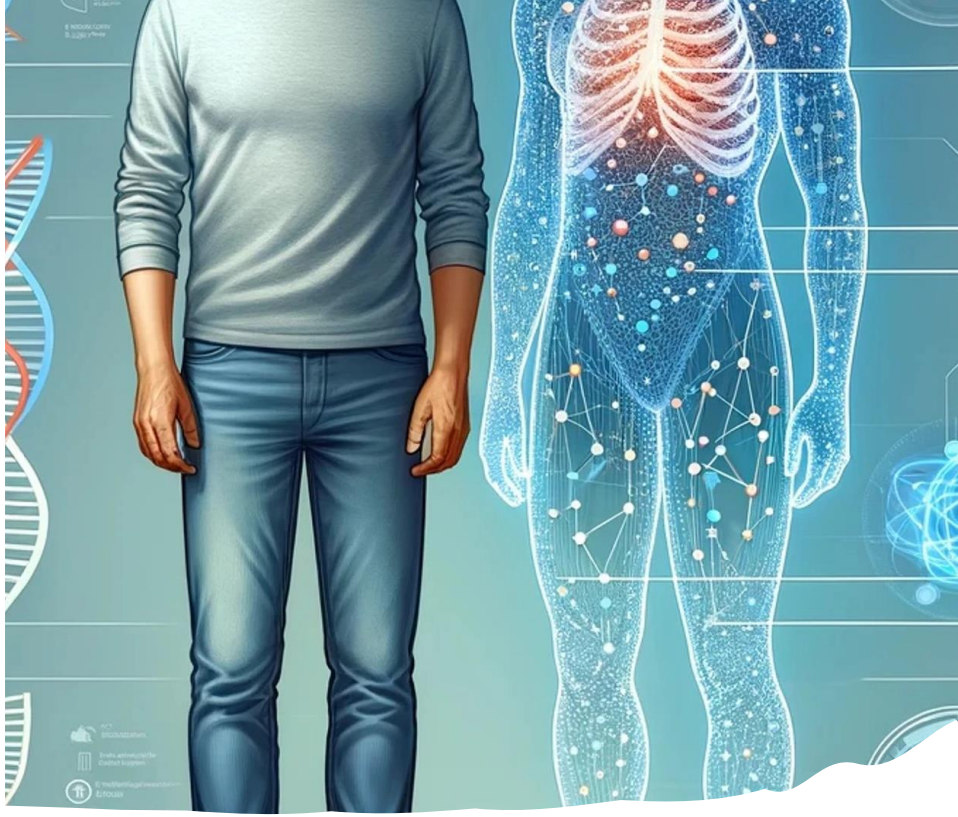


- **Dataset/ AI/ Machine Learning / Deep Learning**
- **Applications of Artificial Intelligence in Anal Dysplasia:**
  - Screening and Diagnostic Assistance
  - HPV Risk Stratification
  - High-Resolution Anoscopy (HRA) Support
  - Training
  - Future

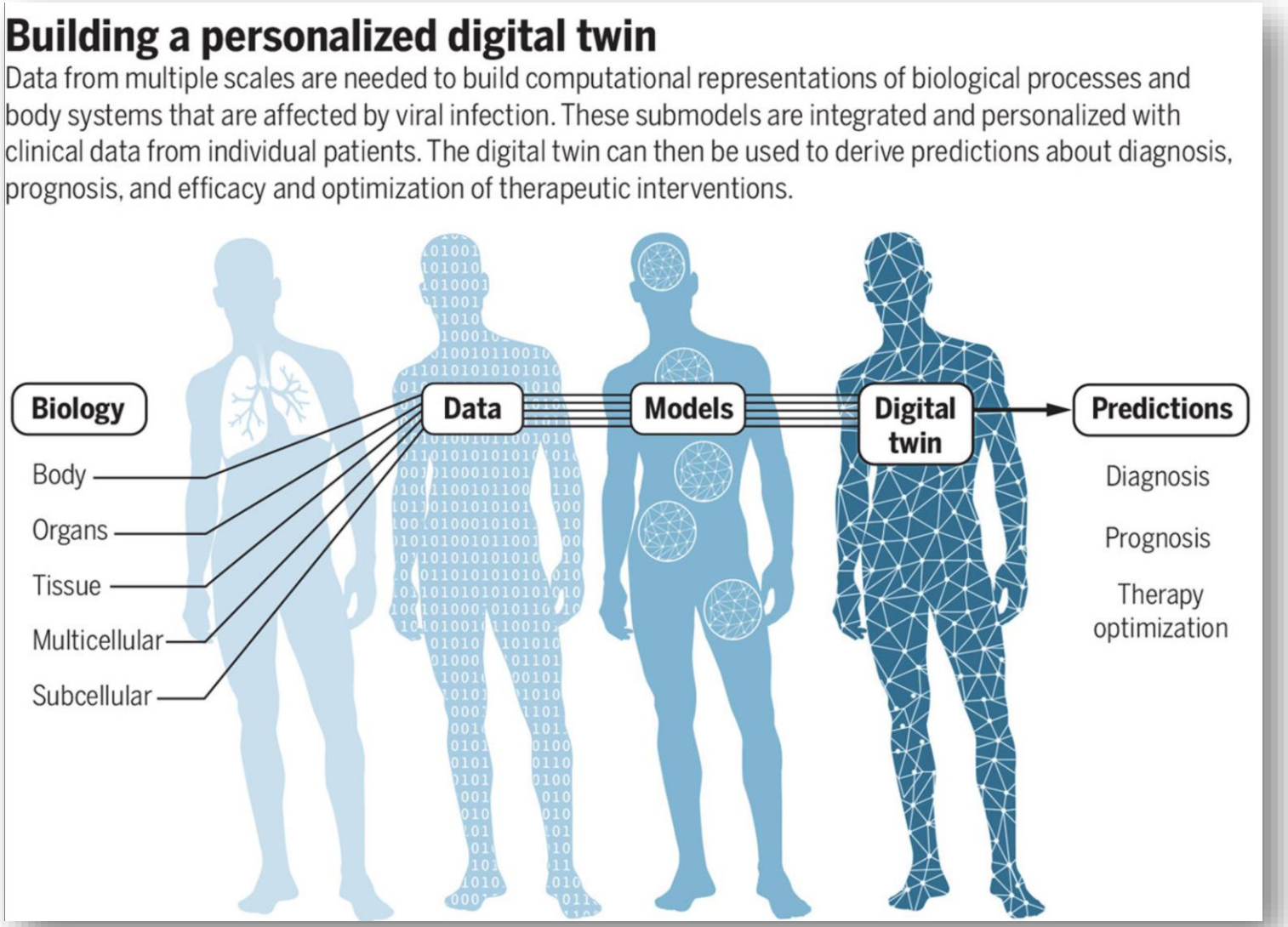
Vall d'Hebron

Digital Twins





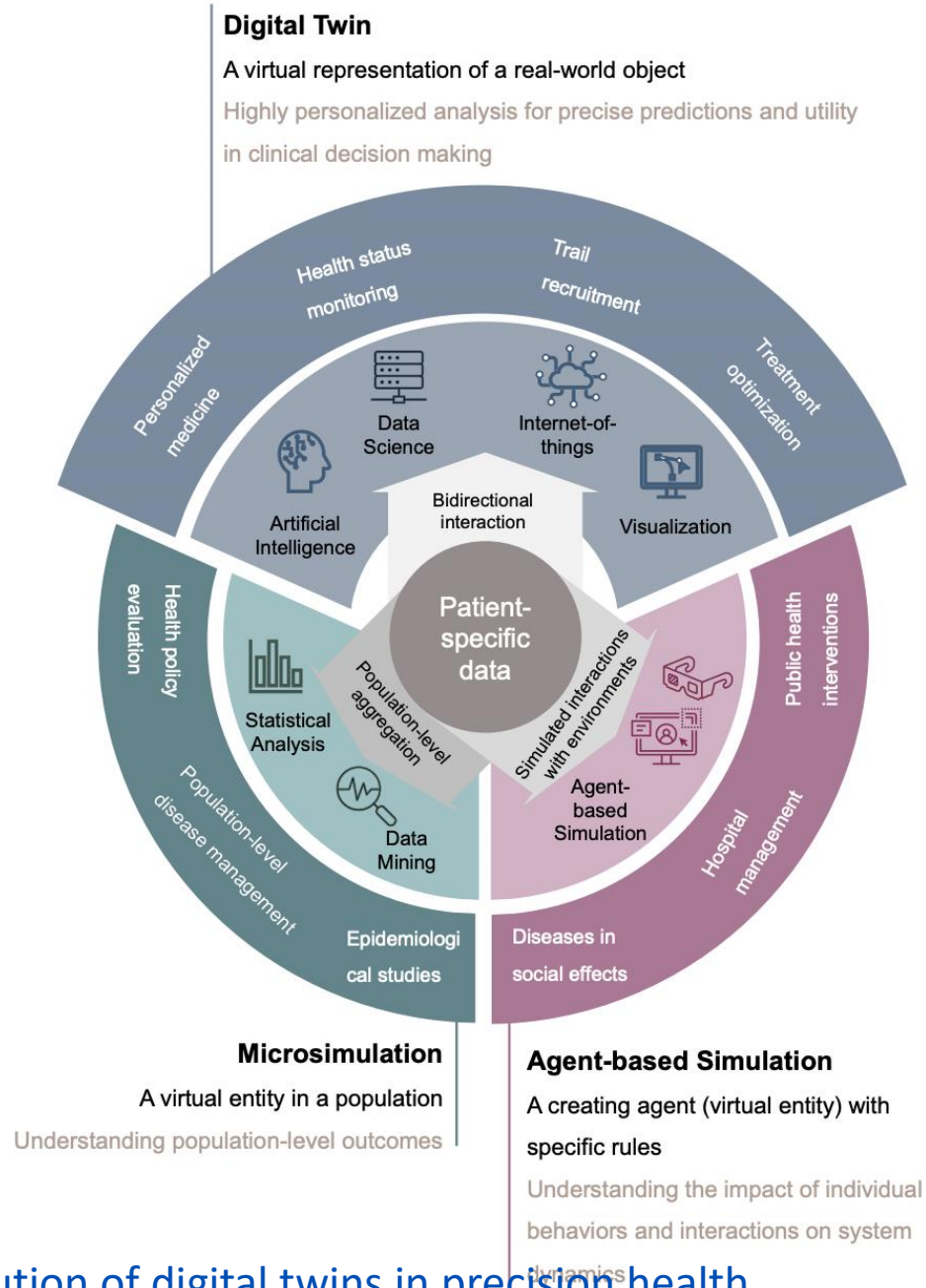
Digital Twins



https://medicalxpress.com/news/2021-03-digital-twins-proactive-personalized-medicine.html

Vall d'Hebron

Type of current health digital twins



Huang Y, Dai H, Xu J, Wei R, Sun L, Guo Y, Guo J, Bian J. Evolution of digital twins in precision health applications: a scoping review study. Res Sq [Preprint]. 2024 Aug 7:rs.3.rs-4612942.

TAKE HOME MESSAGES

- ✓ The **integration of AI into clinical** practice can revolutionize the management of anal dysplasia by improving **screening, diagnostic accuracy, personalize treatment**, and optimize resource enhancing the precision and personalization of treatment, while improving efficiency.

- ✓ Machine learning models can integrate multiple clinical, demographic, and laboratory variables (such as age, HPV viral load, HIV co-infection) **to predict the risk of dysplasia** progressing to anal cancer.

- ✓ **Future of AI in Healthcare**: AI's role in healthcare will continue to grow, **transforming the daily life of healthcare professionals**, clinical workflows and decision-making processes by increasing precision, personalization, and efficiency in treatments.

Thank you

anna.sala@vallhebron.cat