AI Beyond the Hype

What Leaders Need to Know Now

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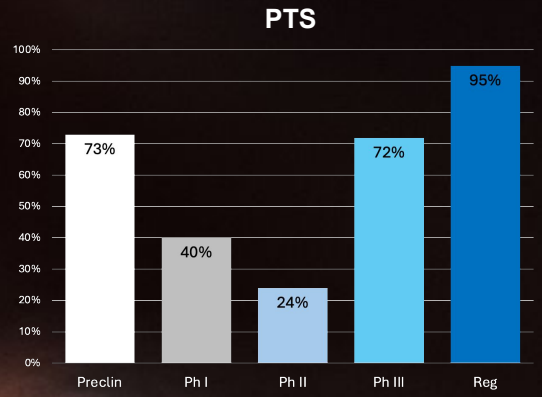
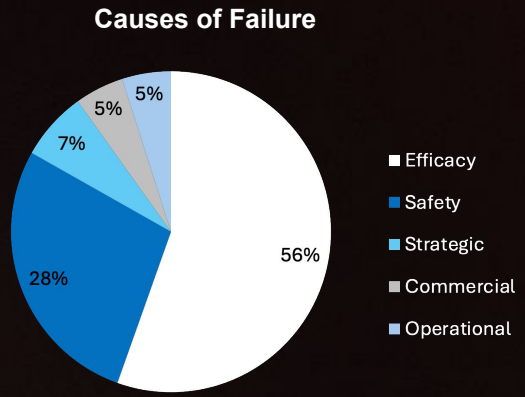
Very few molecules make it from bench to bedside

Some statistics show success rate of less than 4% from target identification to launch (average development time of 10-12 years)[1,2,3]

STAGE OF DRUG DEVELOPMENT	Target-to-Hit	Hit-to-Lead	Lead Optimize	Pre-Clinical	Phase I	Phase II	Phase III	Submission to Launch
SUCCESS RATE	80%	75%	85%	69%	54%	34%	70%	91%





1. V Subbiah. The next generation of evidence-based medicine. Nature Medicine. 2023. 29:49-58.

RK Harrison. Phase II and phase III failures: 2013-2015. Nat Rev Drug Discov. 2016. 15(12):817-818.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This
is not
sustainable


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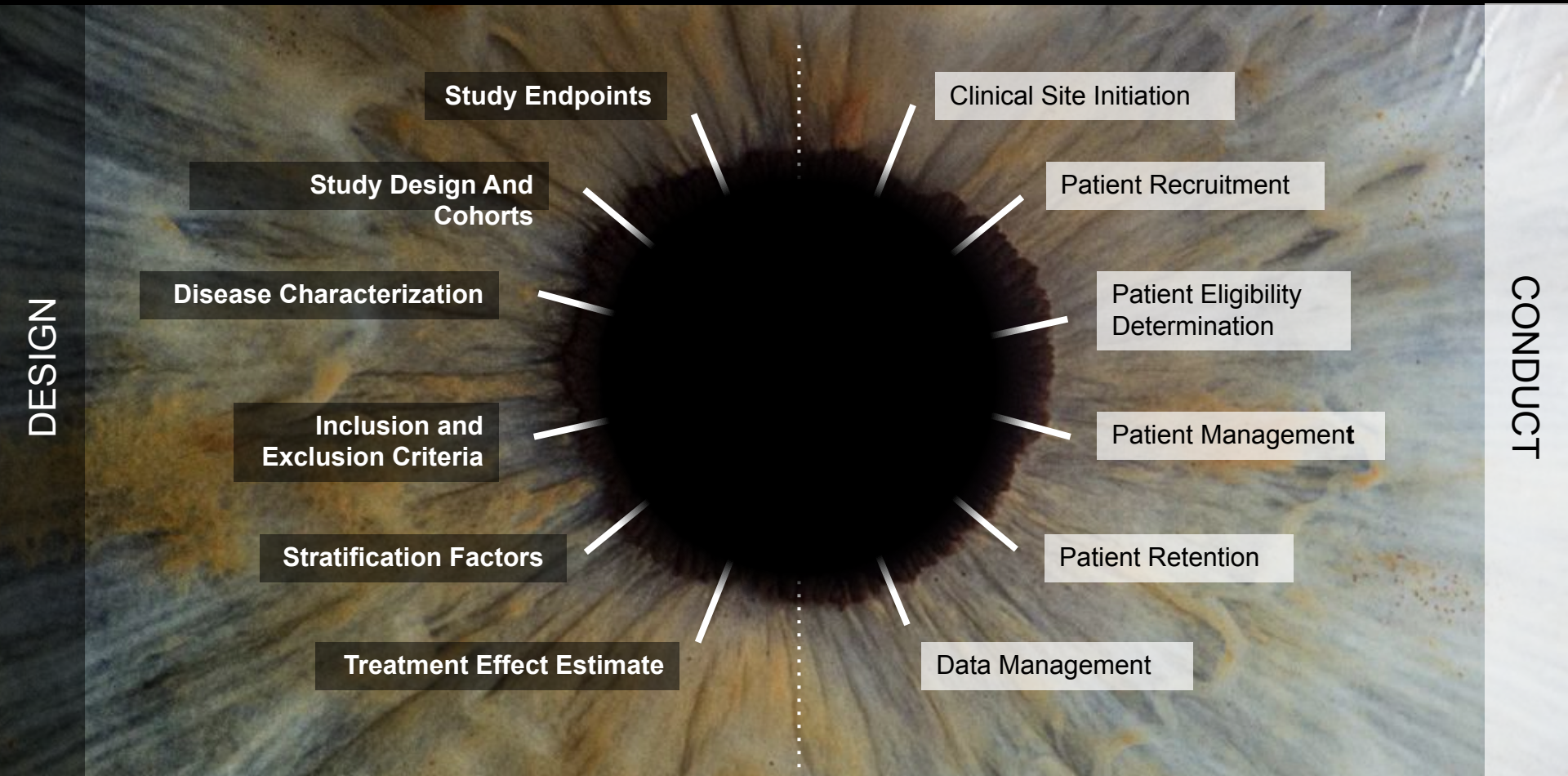
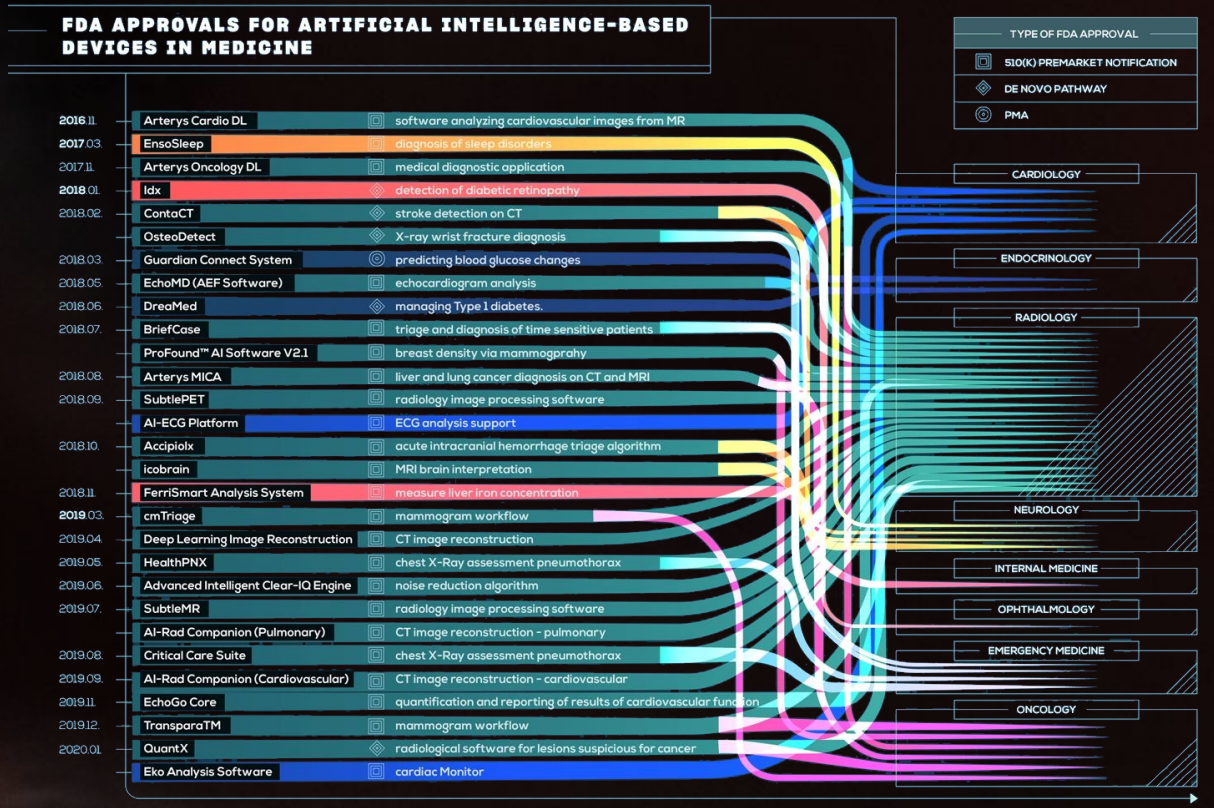
The need for new solutions is obvious

The potential for AI-powered tools in clinical trial design & conduct



Growing Trust and Validation: FDA Approvals of AI Solutions in Healthcare



ROSA

Retinal OCT Segmentation Algorithm, ROSA, enables automated, rapid and reliable assessment and quantification of disease activity based on routinely acquired OCT images

From Subjective Image Analysis to Objective Trend Curves & Precise Data Analytics

Image 1: Traditional Reading Center Readings of OCT images

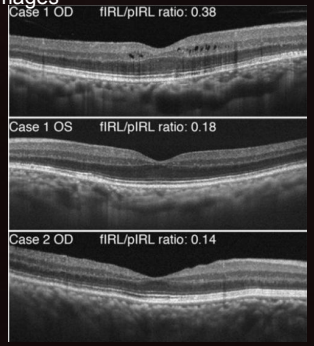
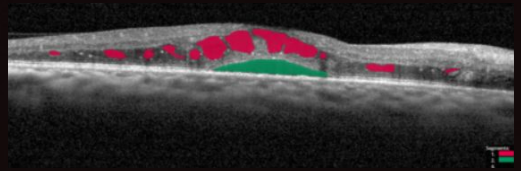


Image 2: Automated Headmap Wave of Fluid Compartments & Trend curve with Quantification of Biomarkers



Advancing OCT Analysis in nAMD and DR/DME Treatment

Retinal fluids, layers, biomarker quantification, and thickness measurements

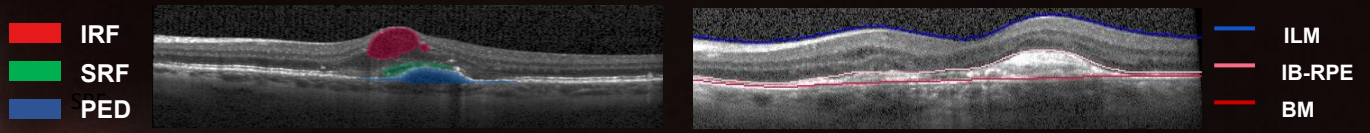
Retinal segmentation = Pathology + Layer

Retinal Pathology Segmentation
- Intraretinal Fluid (IRF)
- Subretinal Fluid (SRF)
- Pigment Epithelial Detachment (PED)

Biomarker Quantification
- SRF, IRF, and PED area and volume

Retinal Layer Segmentation
- Internal Limiting Membrane (ILM)
- Retinal Pigment Epithelium (RPE)
- Bruch's Membrane (BM)

Thickness Measurements
- Central Subfield Thickness (CST)



The Broader Impact of AI Implementation

Enhanced Productivity

Distribute tasks for enhanced productivity and reduced workload

Time Savings

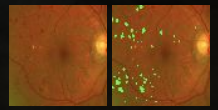
B-scan segmented by ROSA in seconds

Novel Insights

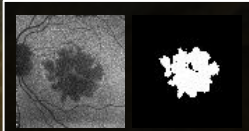
Ability to analyze immensely growing image dataset across studies

Roche's Ophthalmology Imaging Suite

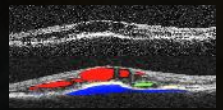
Image Segmentation Algorithms



DR Severity



GA Lesion



DME/nAMD ROSA

Future Prediction Algorithms

DR Progression

GA Progression

DME/nAMD Treatment Prediction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Thoughts of an
AI Deployment Lead

Learnings and Challenges

Tie your AI product vision to the corporate strategy

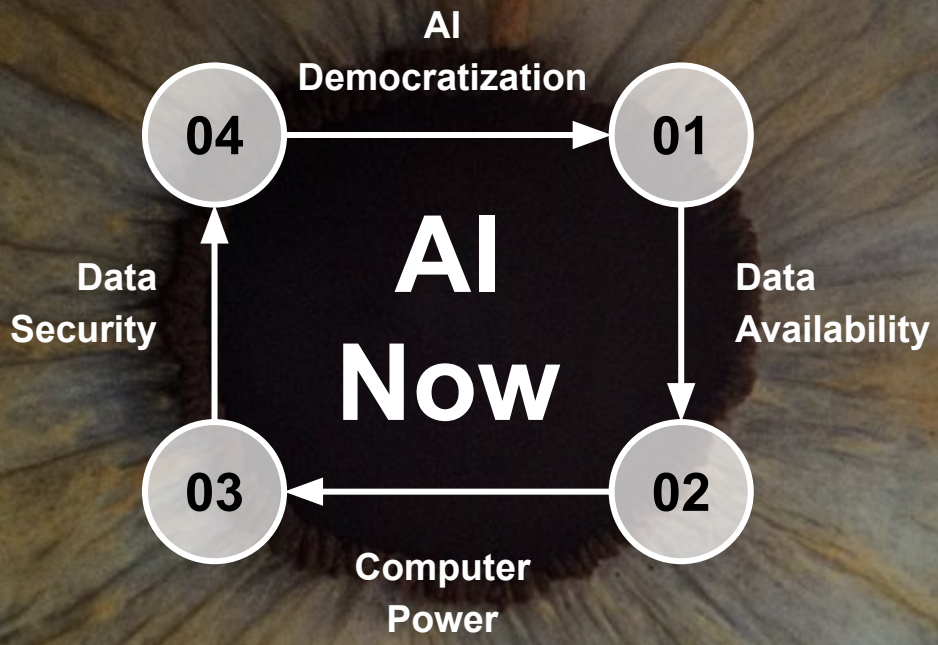
Long-term orientation is in short supply

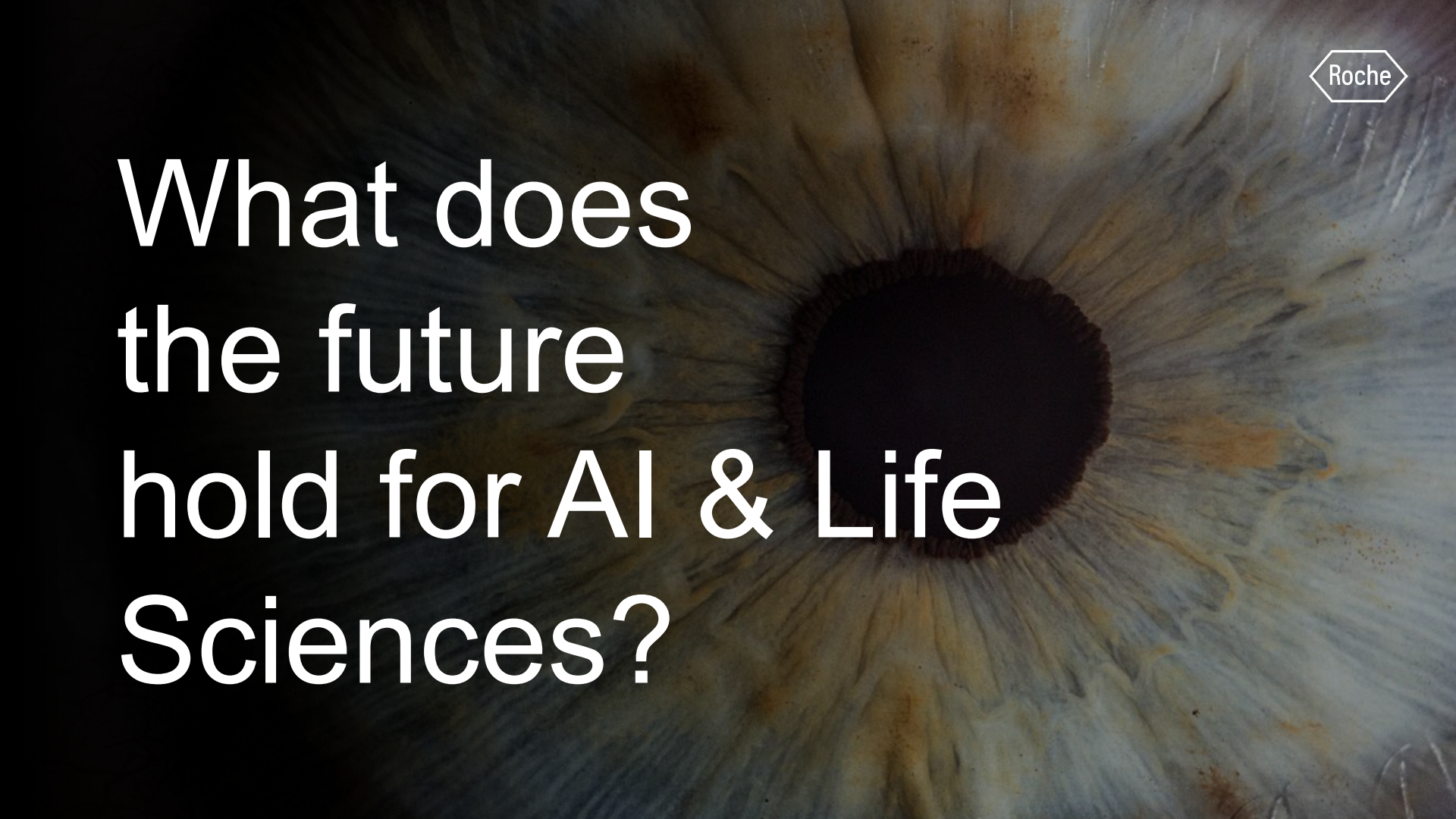
You Need One Small Use Case Done Well

20% code and 80% communication

Operational trust must be designed, not assumed

Why the Timing is Right

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What does the future hold for AI & Life Sciences?


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Q & A

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References

1. United Nations. Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019 (custom data acquired via website). Accessed 15 March 2022. https://population.un.org/wpp/.

2. United Nations. Department of Economic and Social Affairs. World Population Prospects 2019 Highlights.

3. Hajat C et al. *Prev Med Rep*. 2018;12:284-293.

4.World Health Organization. Health Workforce. WHO. Retrieved from www.who.int/news-room/fact-sheet/detail/health-workforce

5. Luca Lorenzoni, Alberto Marino, David Morgan, and Chris James (2019). Health Spending Projections to 2030: OECD Health Working Papers. OECD iLibrary.

6. Stan Benjamens, et al. Nature. Digital Medicine. 2020. The state of artificial intelligence-based FDA-approved medical devices and algorithms: an online database. https://www.nature.com/articles/s41746-020-00324-0

7. Artificial Intelligence and Machine Learning (AI/ML)- Enabled Medical Devices

https://www.fda.gov/medical-devices/software-medical-device-samd/artificial-intelligence-and-machine-learning-aiml-enabled-medical-devices

8.Arcadu, F., Benmansour, F., Maunz, A., Willis, J., Haskova, Z. and Prunotto, M., Deep learning algorithm predicts diabetic retinopathy progression in individual patients. *npj Digital Medicine*, 2(1), Article number: 92. 20 Sep. 2019, https://www.nature.com/articles/s41746-019-0172-3 (C)

9. Ferrara, D., Newton, E.M. and Lee, A.Y., “Artificial intelligence-based predictions in neovascular age-related macular degeneration.” Current Opinion in Medicine and Computer Science, 15 July. 2021, https://pubmed.ncbi.nlm.nih.gov/34265783/ (C)

10. Schmidt-Erfurth, Ursula, and Sebastian M Waldstein. "A Paradigm Shift in Imaging Biomarkers in Neovascular Age-Related Macular Degeneration." *Prog Retin Eye Res*, Jan. 2016, © https://pubmed.ncbi.nlm.nih.gov/26307399/

11.Zeppieri, M., Marsili, S., Enaholo, E.S., Shuaibu, A.O., Uwagboe, N., Salati, C., Spadea, L. and Musa, M., Optical Coherence Tomography (OCT): A Brief Look at the Uses and Technological Evolution of Ophthalmology. *Medicina*, 59(12), p.2114. Dec.2023 https://www.mdpi.com/1648-9144/59/12/2114