WOMEN IN DATA

28 03 2024 – Antwerp

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First something about me...

2010 Start studying **Bioscience Engineering**

2014 Switched to Civil Engineering - Master in **Biomedical Engineering**

2016 Master in **AI**

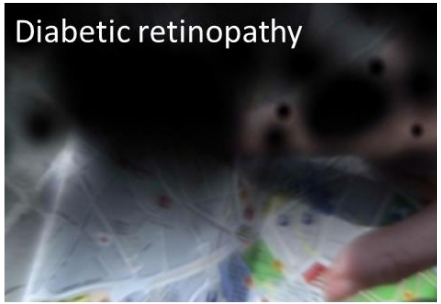
2017 Researcher at **VITO** for 5 years
Focusing on deep learning applied on medical images
Involved in setting up spinoff company Mona.Health

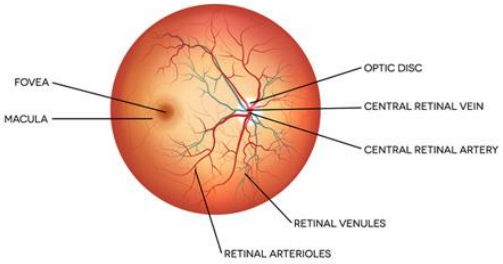
2022 'Shaper' at **imec**
Setting up collaborations & writing project proposals on the health x AI intersection

Also happy wife of Jonas, loving mother of Flo and side hussling in De goei plek.

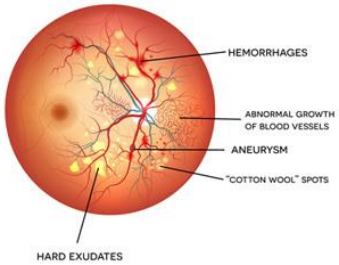
Deep learning for diabetic retinopathy detection

Diabetic retinopathy





NORMAL RETINA



DIABETIC RETINOPATHY

Effects of DR are noticed in a late stage.

An eye scan in combination with image analysis can make an early diagnosis.

The number of people with vision impairment due to DR is growing.

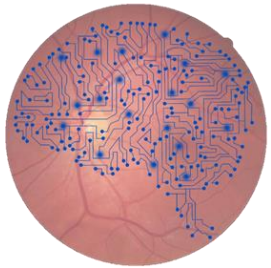
How do we identify individuals with DR from those without DR?

DR detection using deep learning

Intelligence from data

DR

AI supporting decisions



Diabetic retinopathy
None (0)
Mild (1)
Moderate (2)
Severe (3)
Proliferative (4)
Referral

97% AUC, **94%** sensitivity, **90%** specificity

vito MONA UZ LEUVEN

Peeters et al. (2023). Artificial Intelligence Software for Diabetic Eye Screening: Diagnostic Performance and Impact of Stratification. Journal of Clinical Medicine.

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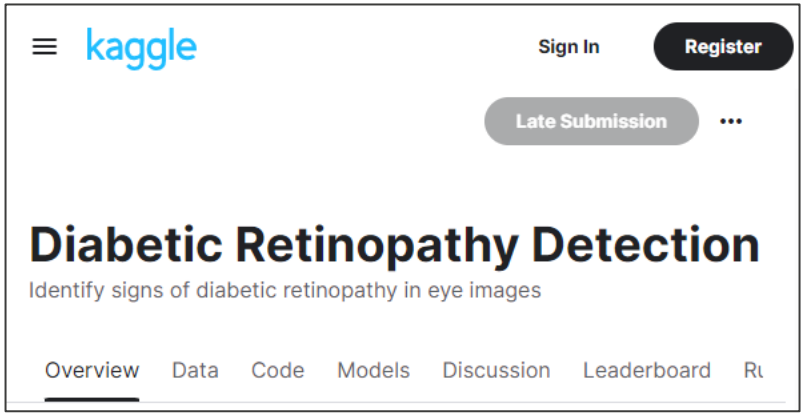
Possible thanks to large-scale databases

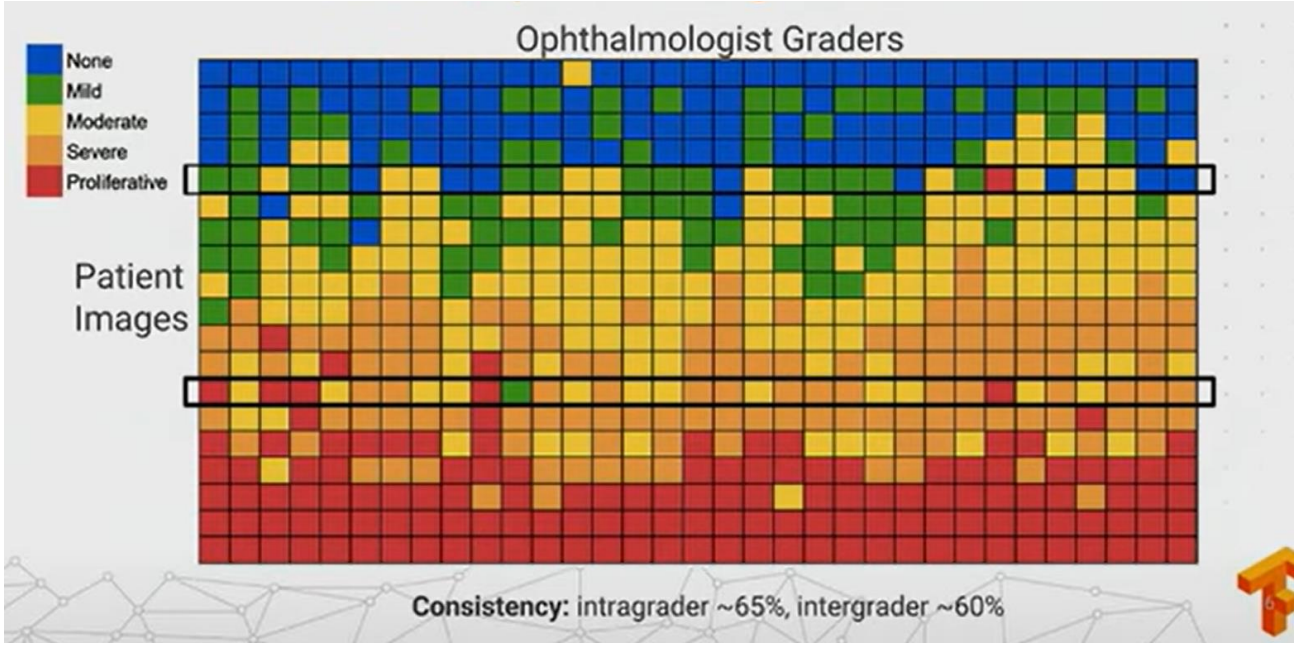
eyePACS

Large US screening program for DR



+80k fundus images graded for DR according to the International Clinical Diabetic Retinopathy Disease Severity Scale

Even when groundtruth is available, ophthalmologists are inconsistent



Peng, Lily. (2017). Case study: TensorFlow in medicine. Work presented at the Dev Summit Meeting, Mountain View, CA.

But what to do next?

MIT Technology Review

ARTIFICIAL INTELLIGENCE

Google's medical AI was super accurate in a lab. Real life was a different story.

If AI is really going to make a difference to patients we need to know how it works when real humans get their hands on it, in real situations.

By Will Douglas Heaven April 27, 2020

Establishing accuracy in a lab is just a first step.

Beede et al. (2020). A human-centered evaluation of a deep learning system deployed in clinics for the detection of diabetic retinopathy. Conference on Human Factors in Computing Systems.

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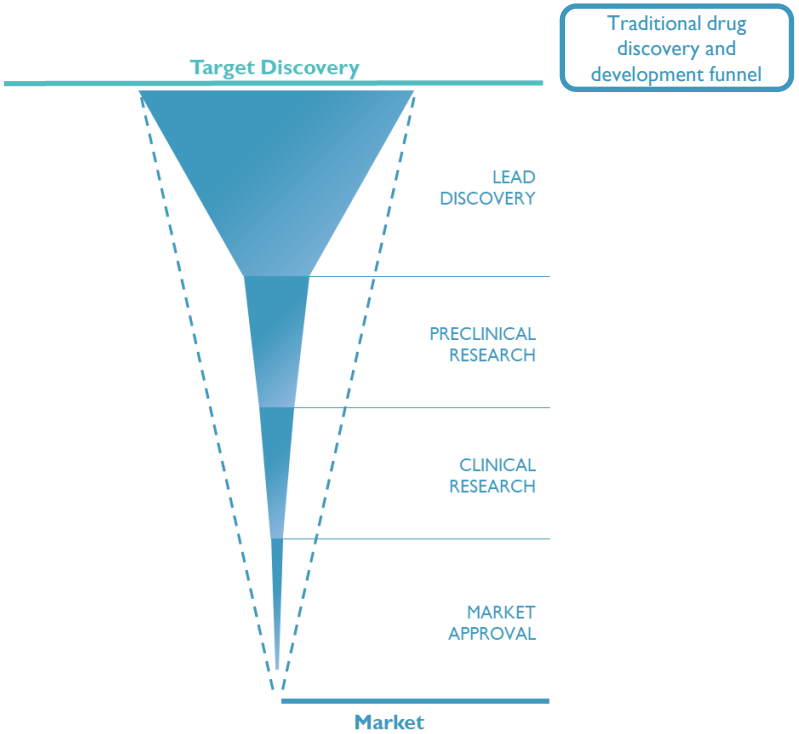
AI/ML for drug design and discovery

NAVIGATING THE CHALLENGE OF DRUG DESIGN & DISCOVERY



CHALLENGES

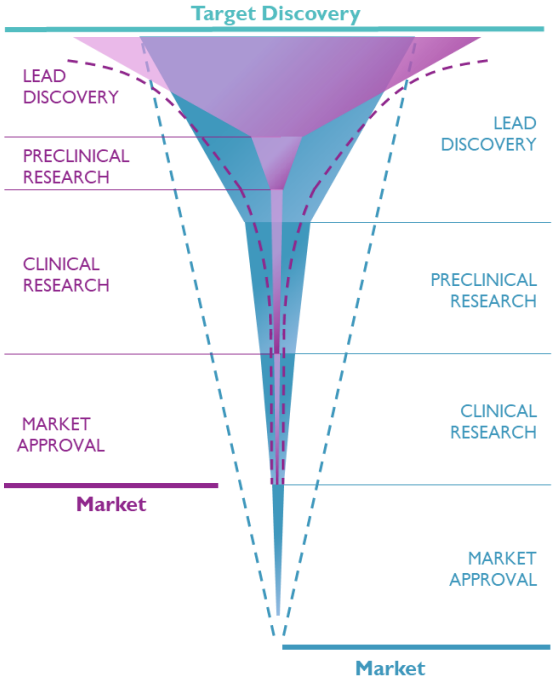
Going from hit generation to market approval takes approx. 10-15 years

Going from hit generation to market approval costs 1.3 billion USD on average

Only 7.9% of initial drug candidates are approved for use in humans

NAVIGATING THE CHALLENGE OF DRUG DESIGN & DISCOVERY

Optimized drug discovery and development funnel



Traditional drug discovery and development funnel

*Figure adapted from Recursion Pharmaceuticals.

MISSION DRIVEN INNOVATION

- Expand initial pool of drug candidates
- Faster selection of high potential candidates
- Accelerate design and discovery cycle at reduced total cost

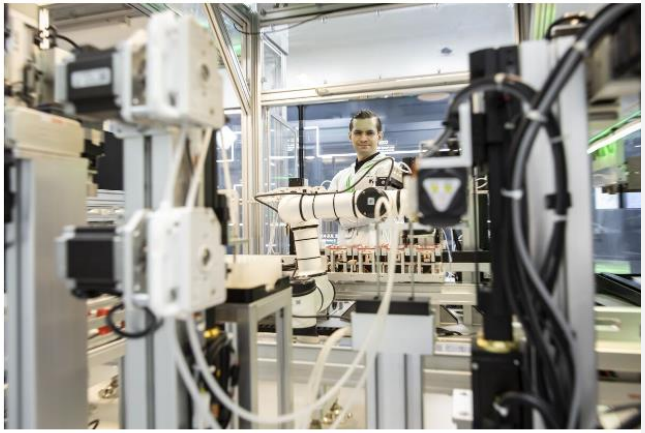
AI in Drug Discovery in the news

AI Takes On Drug Discovery

June 9, 2023

Race for First Drug Discovered Nears Key Milestone

- AI helped Insilico speed up discovery, cut costs for lun
- Insilico straddles geopolitical faultlines across borders



Alex Zhavoronkov, founder and CEO of Insilico Medicine, at the company's AI-run robotic laboratory in Suzhou, China. *Photographer: Qilai Shen/Bloomberg*

From Start to Phase 1 in 30 Months: AI-discovered and AI-designed Anti-fibrotic Drug Enters Phase I Clinical Trial

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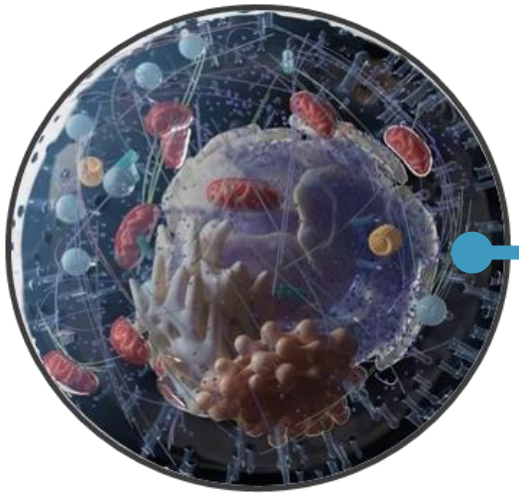
Drug design and discovery

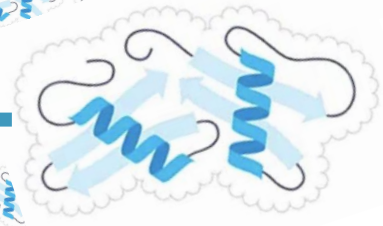
Based on activity screening



Target protein
involved in disease pathway

WET LAB

PHYSICS-BASED
SIMULATIONS



DRUG CANDIDATE

PROPERTY
PREDICTION

So we solve it with AI

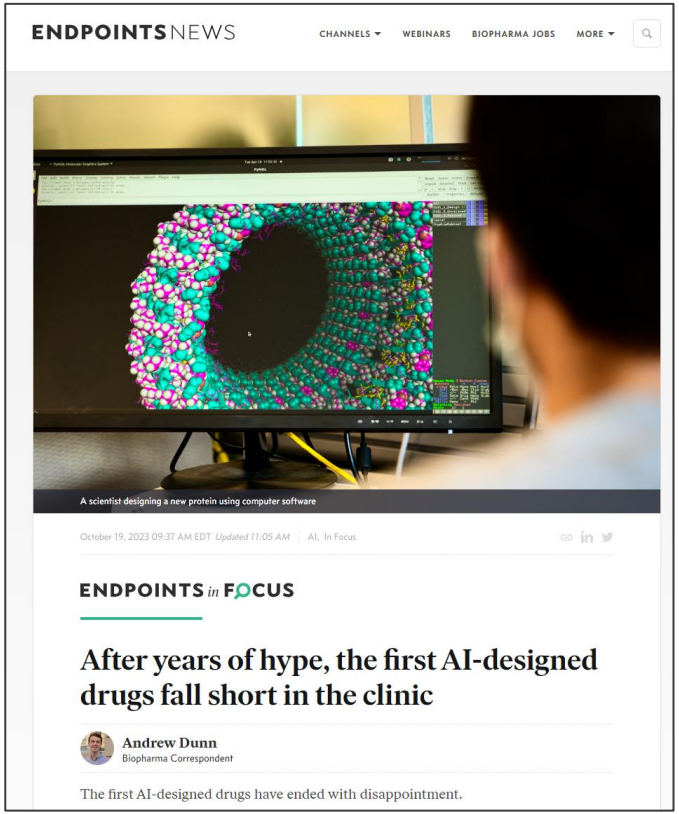
... But do we really?

AI-created drugs fall off hype cycle

Paige Twenter - Friday, October 20th, 2023

AI-created drugs fall off hype cycle (beckershospitalreview.com)

AI in DD — where are the success stories? | by Leo Wossnig | Oct, 2023 | Medium



First AI-designed drugs fall short in the clinic, following years of hype – Endpoints News (endpts.com)

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Personal advice

Don’t be afraid to ask advice

Follow your gut
& be kind to yourself

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embracing a better life