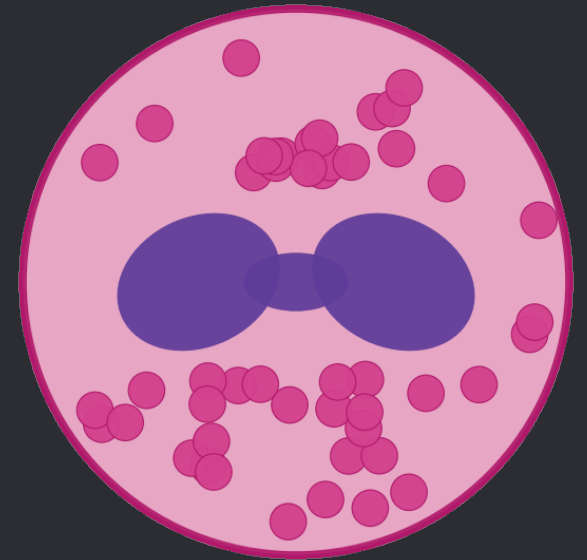


BUILT WITH CLAUDE · LIFE SCIENCES HACKATHON · RESEARCHER TRACK

I have EoE.

This week I designed a therapy for it.

A PhD scientist and rare-disease advocate who doesn't code —
empowered by Claude Science to build from the bench.

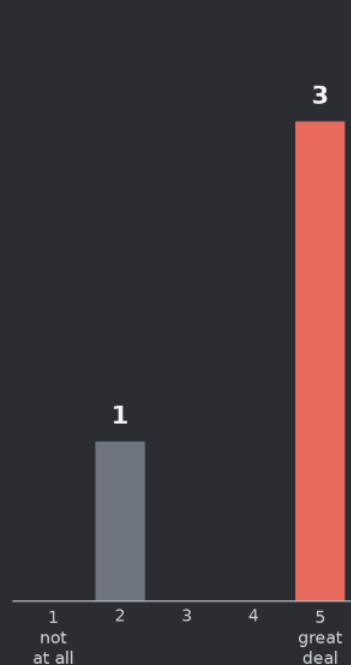


Ruth-Anne Pai, PhD · Project Tolera

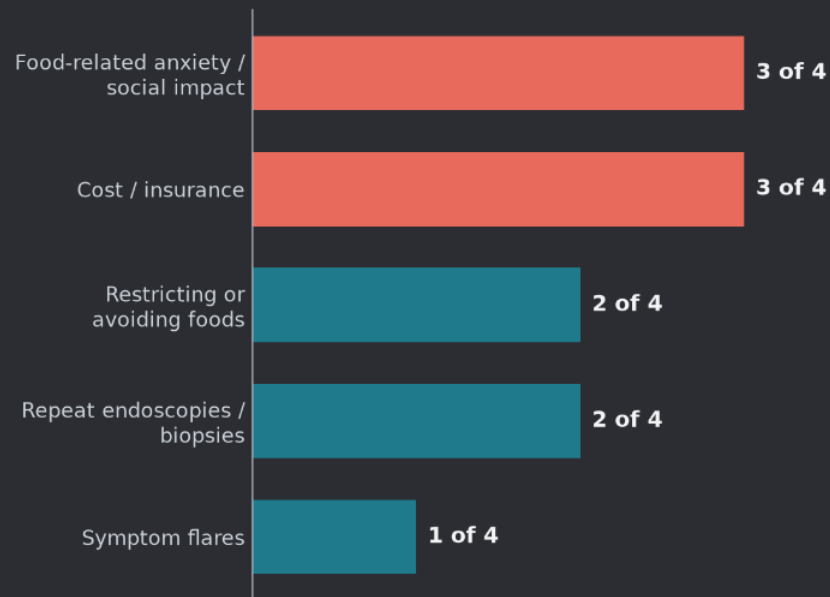
Why we are here

EoE Patient Perspectives survey · pilot, n = 4 respondents

Daily-life interference
mean 4.25 / 5



Most burdensome parts (select up to 3)



3 of 4 rate EoE's interference at the top of the scale — and the heaviest burdens are anxiety, cost, and food restriction.

WHAT THE LITERATURE REPORTS

larger EoE studies echo the same pattern

- **Disease-related anxiety is the highest-scoring quality-of-life domain in adults.**
Lucendo et al., United Eur Gastroenterol J 2018 · n=170
- **Dysphagia anxiety and food-centred social activities are the greatest QoL impacts.**
Real-world EoE programme, Dis Esophagus 2025 · n=161
- **Adults report anxiety above the general population and poorer vitality.**
Gold et al., Gastro Hep Advances 2024 · n=184
- **EoE care costs ≈ \$1 billion / year in the US — endoscopies, biologics, diets.**
Taft et al., J Asthma Allergy 2019 (review)

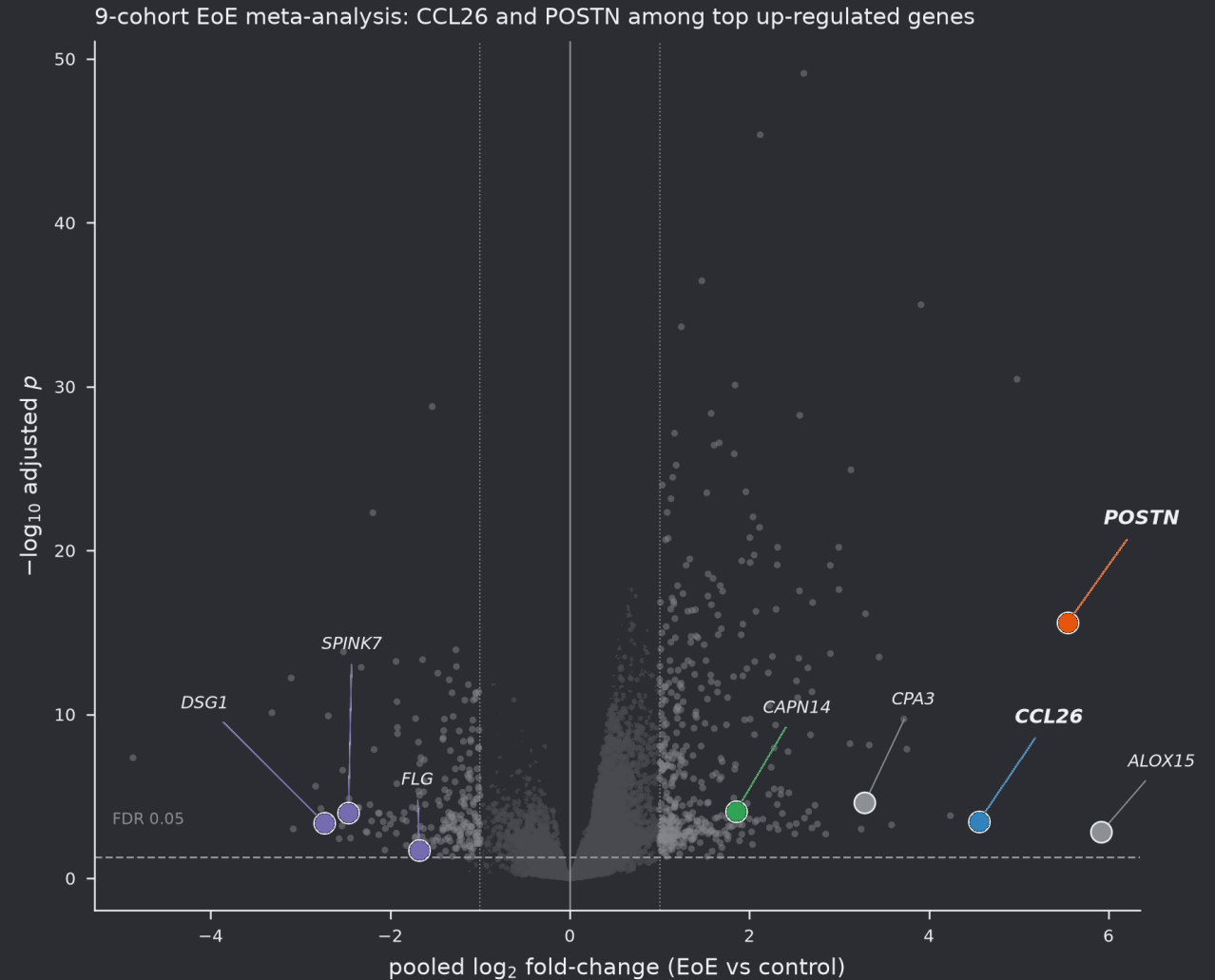
Our n = 4 pilot mirrors these larger studies:
anxiety and cost lead the burden, not symptoms alone.

We began with the omics

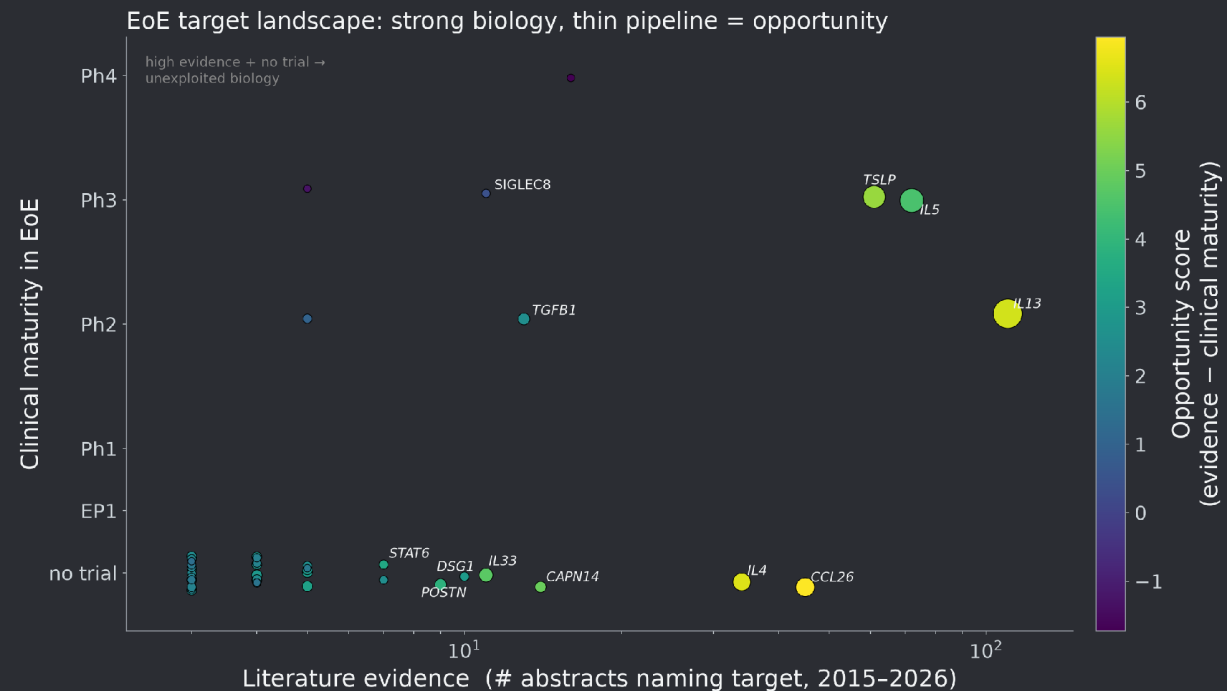
Public EoE datasets — the 'existing data and tools' the brief asks for:

- Bulk transcriptomes of esophageal biopsy
- Single-cell atlases of inflamed mucosa
- Proteomic & clinical-trial evidence

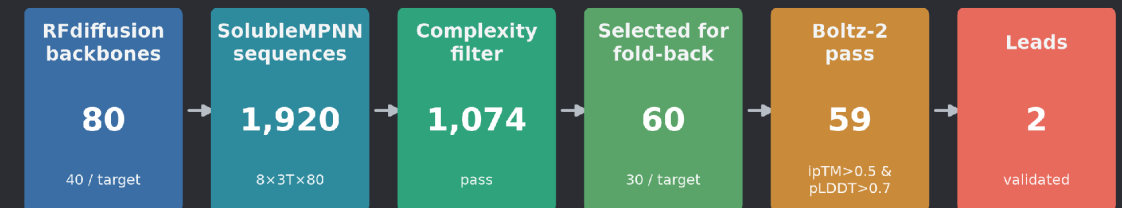
The question that started it all:
what is truly dysregulated here —
and can we act on it?



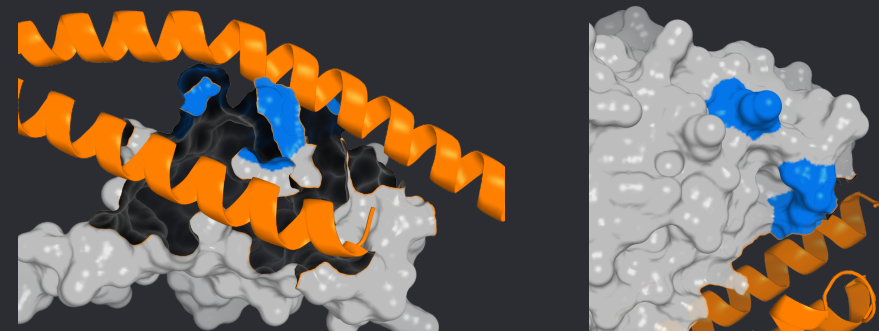
Differential expression → target discovery



Design funnel: 80 backbones → 1,920 sequences → 60 folded complexes → 2 leads

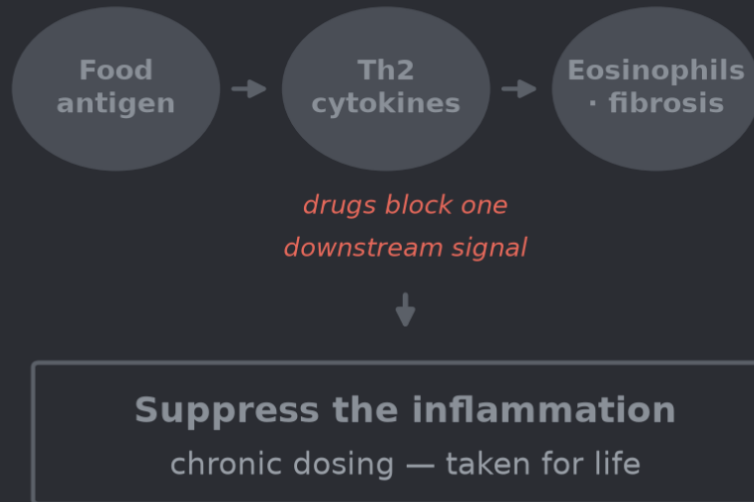


De novo binders, docked to real EoE targets

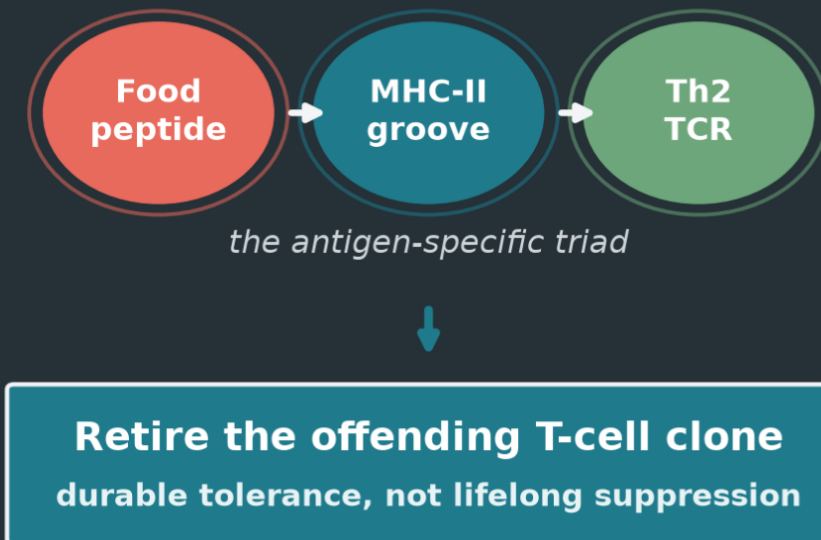


The Tolera Project: Target the cause

EVERY CURRENT EoE DRUG



OUR APPROACH — THE ROOT CAUSE

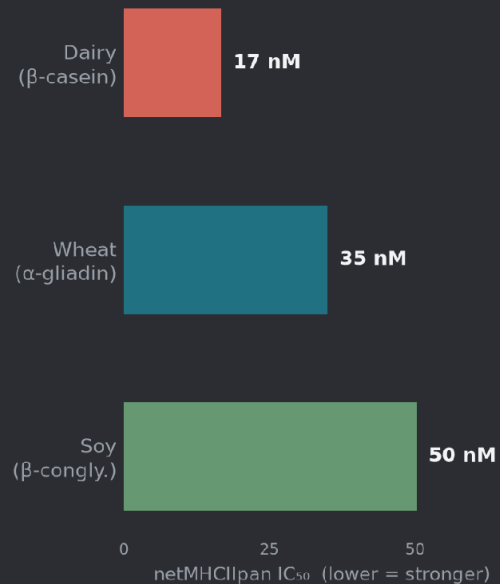


From target to designed protein

From food epitope to designed, validated construct

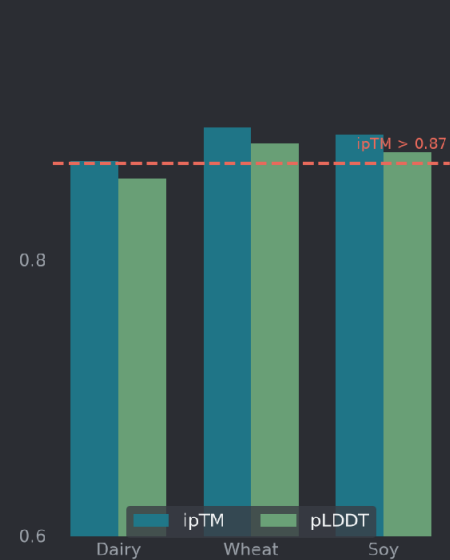
1 · Epitope selection

3 food epitopes · HLA-DRB1*07:01 · all <100 nM



2 · Structural validation

pMHC-II complexes · 15/15 peptide in groove
1.0



3 · Therapeutic modality

one epitope → three deployable formats



Single-chain

pMHC monomer · 449 aa



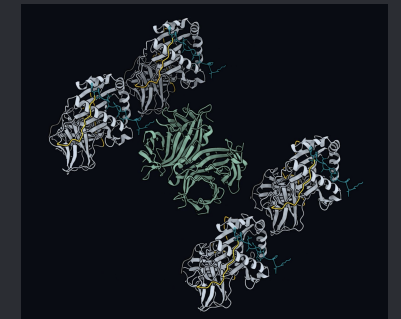
Nanoparticle

free-thiol handle · multivalent



Tetramer

AviTag→SA · diagnostic



I built skills and pushed them to the world

1 Created GitHub & Modal accounts

First time ever — from zero to publishing.

2 Published my first skills

Reusable pipelines anyone can run.

3 Learned ChimeraX & Blender

Rendered my own molecular videos...

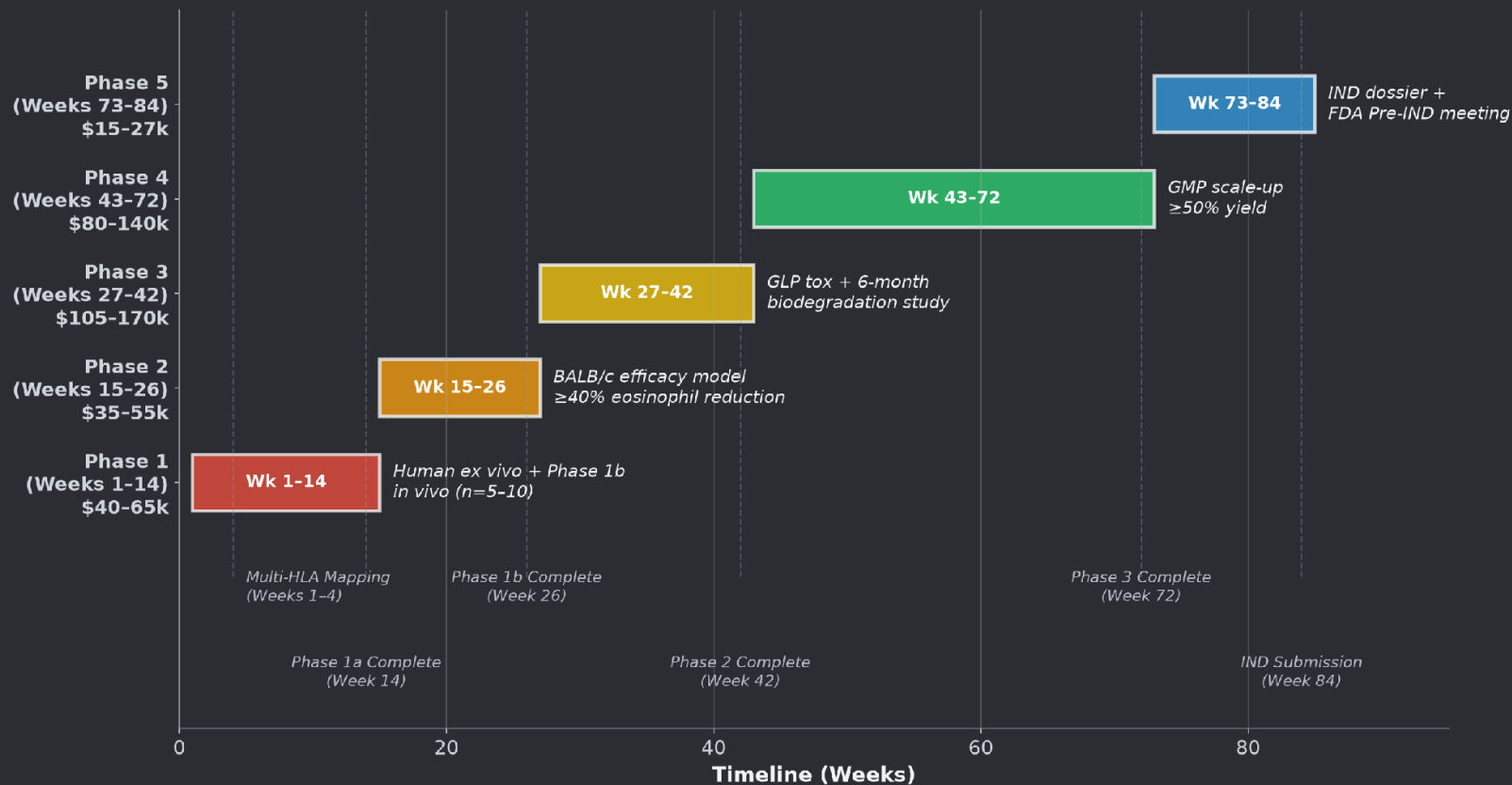
4 ...on Claude Science + Modal GPUs

Claude ran and rendered them for me.



A full AI-to-clinic plan

Preclinical Development Roadmap: 18-24 Month Timeline to IND Submission
Total Budget: \$275-457k



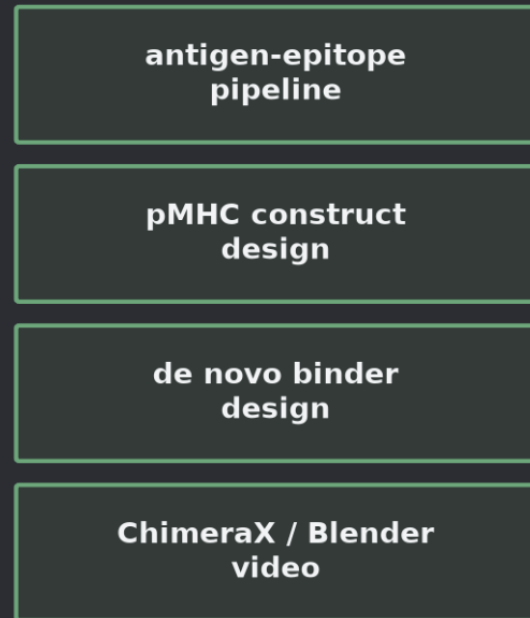
Out of one week:

- 3 Peer-review-style manuscripts with synthetic reviewer responses
- Preclinical → IND roadmap
- Regulatory & market strategy
- The Project Tolera deck

A credible line from a public dataset to the clinic.

Built to overcome disease — at scale

OPEN SKILLS — THE TOOLS



feed



treats

DISEASES IT CAN TREAT

Eosinophilic
esophagitis

designed here

Celiac
disease

Type 1
diabetes

IBD /
Crohn's

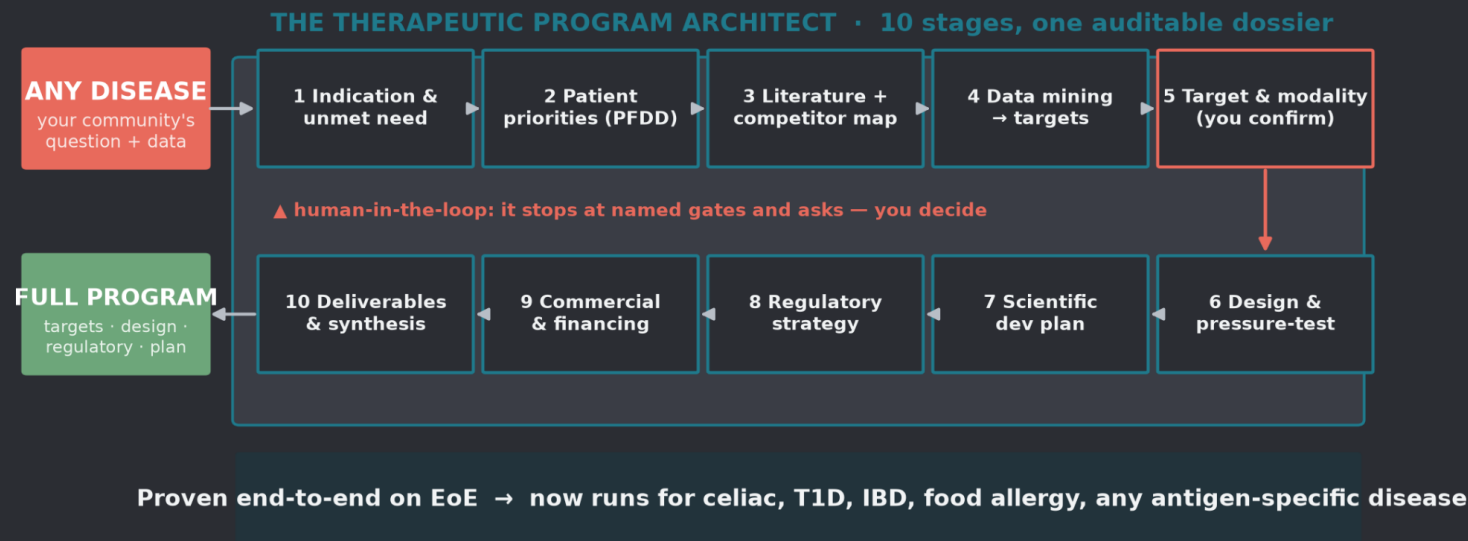
Food
allergy

Rheumatoid
arthritis

+ many
more

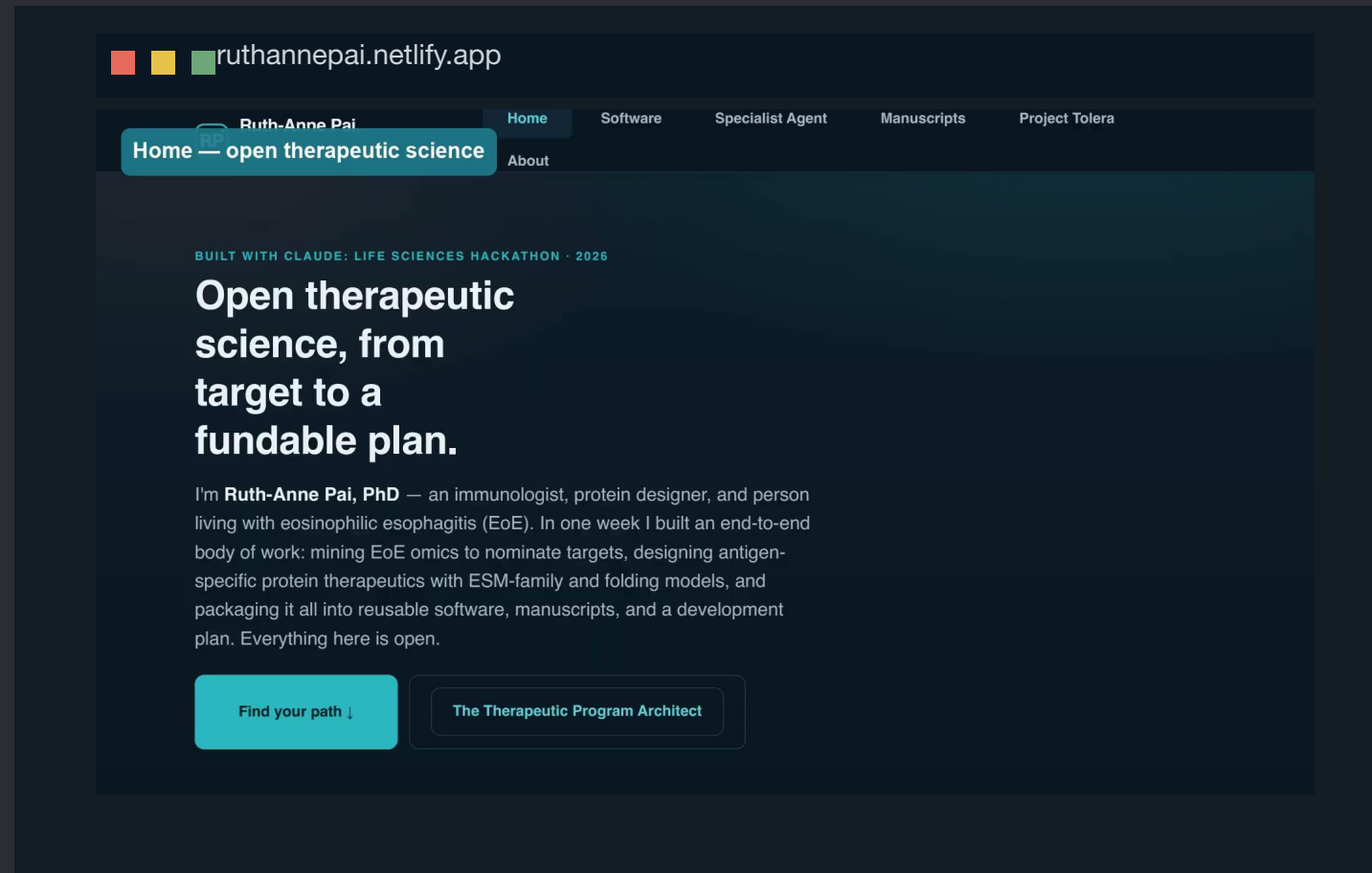
Any antigen-specific, HLA-restricted disease — every skill open on GitHub for anyone to run

The Specialist Agent: any disease → a full drug program



Demonstrated on EoE. I packaged the whole method as an installable specialist — **now anyone can point it at their disease and run. To**

One website — the whole project, open to anyone



Six pages, six audiences:

- Patient orgs & advocates
- Scientists using protein models
- Biotech, investors & partners
- Claude Science developers
- Academics & data scientists

3 manuscripts 10 repos

2 diseases 0.86–0.94 ipTM

**Every result, skill, and structure —
downloadable, open, reproducible.**

WHY THIS MATTERS

Science, democratized.

As an EoE patient, I was empowered to lean into the science and design a therapy for my own disease.

Patient-driven, patient-centered drug development is now genuinely possible.

500 hackers + a growing wave of AI adopters can close the gap — **and change lives.**



Thank you hackathon organizers — Anthropic · Gladstone Institutes · Cerebral Valley — **Ruth-Anne Pai, PhD**