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PART I · THE ATOMIC WORLD

The Last Human in the Loop: Governance in the Post-AGI Life Extension Economy

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FDA chemist Joseph Caliway Jr. at work, Washington, DC, 1938. That year, he was appointed to support a board bringing state and federal officials together to coordinate regulatory authority over food standards.
Photograph by Harris & Ewing / Library of Congress.

SUMMARY

AGI compresses the marginal cost of every input to drug development toward zero, except one: in-human biological evidence. That bottleneck sits at the center of what becomes the most valuable industry on earth: life extension biotechnology, where supply is capped by human data and consumer demand is capped by lifespan. Post-AGI autonomous firms with trillions in capital will set their sights on the rules themselves, financing special economic zones or even buying jurisdictions, and demanding regulatory protocols that are more efficient to them while granting access to large consumer markets. The US already has the pieces to lead this: federalism, state-level experimentation, and an FDA who could do better by doing less. This essay argues for biotech federalism, and explains why the window to build it is short.

EVERY DIGITAL SYSTEM TRACES BACK TO A HUMAN WHO BUILT IT FROM ZEROS AND ones. The first electronic computer was built around 80 years ago. Biology is a different order of object. The chemistry running human cells has been iterating for four billion years; whatever is encoded in DNA and cellular machinery, no human wrote it. A single human cell coordinates tens of thousands of molecular pathways at once; that cell is one of trillions in a body whose systems are constantly talking. Even the Boehringer Biochemical Pathways[1] chart captures only a fraction. We understand biology only by heuristic, and apply it for medicine through trial and error. The human body is a black box. We reliably fail to predict what medicine does to it.

Don't expect AGI to deterministically reverse-engineer biology. Even Dario Amodei[2] concedes that "data, the speed of the physical world, and intrinsic complexity" are the three fundamental challenges of applying intelligence to biology.

AGI robot-scientists will do the same work as human scientists: run experiments, collect data and synthesize. The data they collect is where the last bottleneck remains—the human in the loop. AGI can generate trillions of conjectures about what a molecule might do to a human body. Confirming any of them still requires the human body to give a feedback signal. The role of the human is as a test subject, a validator of AGI-generated biological hypotheses.

The human is an element in this equation, the economics of in-human data collection are shaped by governance. In the current world, a lot of rules that are supposed to protect humans make in-human data collection expensive. It costs $100,000+ per patient in many areas of research in a clinical trial. In an alternate dystopian world, humans could be bred or enslaved to serve as experimental subjects. This is an extreme scenario. It's more likely that competition in governance will be a driving economic force, which could look more like today with slow public national regulators competing, or more flexible, privatized, market-driven models.

Value of the biological economy

Life extension biology will be the by far most valuable industry in the world, for two key reasons: i) in-human data is the last remaining production bottleneck, ii) life extension is the rate-limiting factor for human consumption. Supply is capped by data, demand is capped by lifespan.

The production bottleneck will be in industries that happen *through humans* and *in humans*. The "through human" economy will price in status signalling, Baumol-bound goods such as care, presence, hospitality etc. The "in human" bottleneck in life extension biology is the only industry where production requires the "last human in the loop" as a test subject.

1 GarysCrispLettuce, "The Biochemical Pathways Chart Is a Large Poster Drawn Up by Gerhard Michal of the Boehringer Mannheim Company That Gives a Cross-Section of General Metabolism in Various Species and Organs," Reddit, r/Damnthatsinteresting.

2 Dario Amodei, "Machines of Loving Grace," October 2024, sec. 1, "Biology and Health."

Category	Human's role in production	Scaling property
(1) Production happens to humans	Pure recipients; production is fully automated	Trivially scalable (no human in the loop), zero marginal cost
(2) Production happens through humans	Humans are the deliverable: care, presence, hospitality, status labor	Not scalable. Baumol-bound, one human-hour per unit
(3) Production happens in humans	Humans are the substrate from which the product (evidence) is drawn	Scalable, but bottlenecked by the rate of human biological observation

When food, entertainment, transportation, housing, and labor all collapse toward superabundance, what does an extra year of life let you do? It lets you consume everything else. Lifespan becomes the multiplier on every other unit of consumption. Estimates of the economic value of an additional lifeyear are already astronomical (a Nature paper[3] says it's $38 trillion in the US alone)—this will be accelerated even further in a post-AGI world.

AGI firm competition & governance demand

What will the industry structure be like? I don't think there will be a single super intelligence outcompeting everyone. Instead automated firms are competing with each other through ordinary capitalism, like Dwarkesh Patel[4] said. I add: post-AGI firms won't just compete within the existing legacy rules. They'll have the capital to compete over what the rules are.

I lived in Prospera for the past almost 5 years, building a company called "Infinita". The core insight is that the territorial governance layer is the foundation for "settlement finality". You can't take drugs online. Drugs enter actual bodies. Surgeries happen in actual rooms. Data is generated in actual people in actual places. The territorial layer matters more for biotech than for any other industry AGI is going to reshape. In US territory, the FDA access fee for a new product is often $1bn+ and review time is 14+ years but you get access to a massive market. China is competing with its large market size and lower cost as the advantage. Prospera doesn't have the large market, but much lower access costs. These lower access costs do matter a lot, because they allow more rapid iteration that de-risks IP that is globally transferable into producing drugs in other, larger consumer markets. Anthropic or Isomorphic Labs can raise hundreds of billions; buying land with legal autonomy abroad, or financing a Special Economic Zone in the US, won't be capital-constrained. They can buy a Prospera-type startup with legal jurisdiction just like they're currently starting to buy biotech companies like Coefficient Bio. They can equip the "startup city" with automated labs and clinics, to feed AI with in-human data.

But the territorial layer alone doesn't scale. The governance protocol has to API-integrate with other jurisdictions, via mutual recognition, treaties, and harmonized stan-

3 Andrew J. Scott, Martin Ellison, and David A. Sinclair, "The Economic Value of Targeting Aging," *Nature Aging* 1 (2021): 616–623.

4 Dwarkesh Patel, "The Mistake of Conflating Intelligence and Power," *Dwarkesh Podcast*, May 16, 2026.

dards. This is where FDA power resides: it gatekeeps the world's largest biopharma consumer market, which gives it leverage to demand reciprocity from others to the advantage of FDA-compliant firms. If Anthropic goes "rogue", buys a jurisdiction and conducts experiments, the US government can just say "good luck, we won't accept the data you're generating for US market access."

Vertical and horizontal governance providers

The FDA is a near-global monopoly on this horizontal rule-setting layer, grounded in one vertical territory: the United States. That monopoly is already fading. Biotech is shifting clinical trials to Australia for phase-1 lower cost and speed, to China for scale and recruitment cost. Post-AGI, the competition intensifies, and it splits cleanly along two layers. Vertical territory-bound providers (Large: USA, China; Smaller: El Salvador, Singapore, Dubai, Próspera-type SEZs) compete on market size and the ability to host in-human trials at lower cost and higher speed. Horizontal providers (FDA, EMA, ICH, mutual recognition agreements) compete on the legitimacy of their protocol, on whose rules other territorial providers are willing to license.

The solution space is US biotech federalism.

Montana created a first-of-its-kind: the SB535 law and rules create specialized competitive review boards that govern post-phase-1 access for patients and the possibility to collect data faster and more cheaply. Full disclosure: my company Infinita has formed this first "Montana ETRB" and we made the first approval of a hearing loss treatment in late August 2026. I know of at least three other US states that are currently pursuing a similar legislation.

This "biotech federalism", competition for better rules within the US system. The US can use this competition to its advantage abroad in the post-AGI economy, with the right policy framework:

1. FDA/HHS SHOULD EMBRACE THE STATE-LED MODEL, ensure its flexibility (beyond minimal safety guardrails), and allow data from state programs to be used for national drug approvals.
2. FDA SHOULD DO LESS, BUT BETTER. Congress would need to act, but the right policy would be to remove the FDA as a pre-market approval authority (leave that to the states) and instead make it a gatekeeper for public insurance. This means it can focus on one thing only: strict science.

What this would lead to is a stronger federal regulator, because of a stronger domestic innovation pipeline and legibility. At the same time, the US would unleash its decentralized federal system of governance competition, to be the dominant force in the post-AGI life extension economy.

ABOUT THE AUTHOR

Niklas Anzinger is the founder and CEO of Infinita, a company enabling early clinical access pathways for biotechs. Infinita formed the first Experimental Treatment Review Board (ETRB) under Montana's SB 535 law. He separately founded Infinita VC in 2022 in the startup jurisdiction if Prospera in Roatan, Honduras, before he moved to Montana, and hosts the Stranded Technologies Podcast.



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