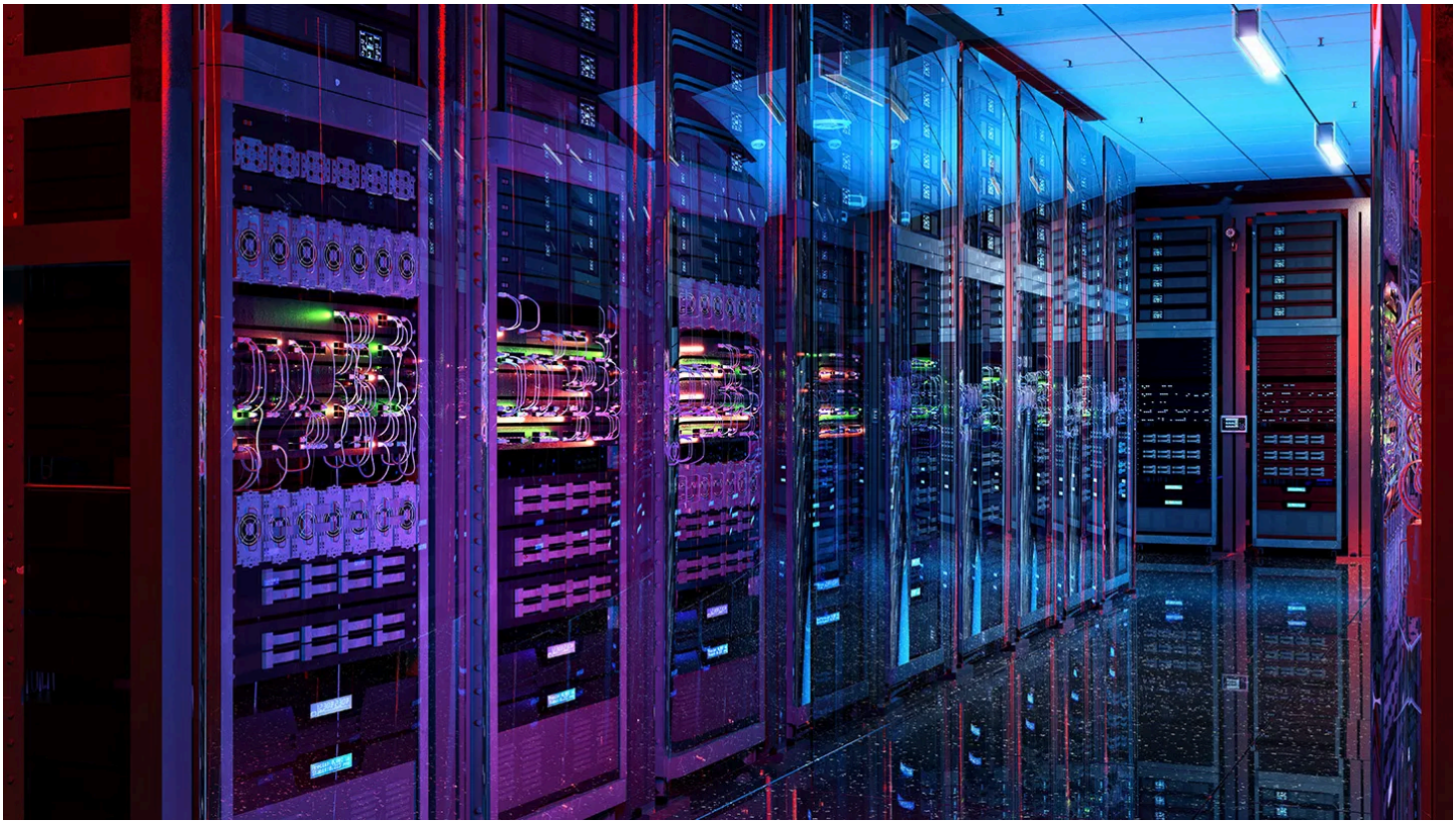
AI goes small, GLP-1s go big(ger), fungus for dinner, and more



As the use of generative AI goes up, the need for more data centers and electricity also rises.
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AI goes small

📸 The big picture: compute

Generative artificial intelligence (AI), for all its promises and rewards, is a notorious energy hog. The massive models that understand and generate human language inside market frontrunners ChatGPT, Gemini, Claude, and even Chinese upstart DeepSeek, require tremendous computational power (a.k.a. "compute"). All those millions of queries to servers tax energy grids, suck up tons of water, and pump out climate-warming carbon emissions. What can be done?

🧪 Scientists respond

Lauren Leffer reports for SN on efforts to mitigate the energy impact. Big tech is retooling its data centers and mobilizing AI developers to lessen their carbon emissions and resource use. Adjusting day-to-day operations could minimize the energy demand. For example, training models only when there's ample carbon-free power on the grid (say, on sunny days when solar panels produce abundant energy). Or, implementing server-cooling solutions that recycle water or involve alternative coolants.

💡 **What else matters: going small**

But there's another hopeful conversation around the future of AI: the rise of small language models (SLMs). Like the large language models (LLMs) in established chatbots, SLMs process, understand, and generate human language. Trained on smaller datasets than LLMs, they use fewer parameters to generate outputs, making them lighter and more efficient — thereby consuming less compute. SLMs are well-suited for simpler tasks, and can be fine-tuned to meet specific needs. They are cheaper to run (they don't need to search the whole internet) and easier to audit (the code is not a black box). Scientific applications where search functionality draws from a finite data subset or knowledge base (such as math or a code library) are promising.

🤗 **The big players in the small language market**

Hugging Face, headquartered in New York City, is hot among developers wanting to test new ideas (think code camps or hackathons). This community-focused, open source program excels at SLMs. In July, the company released its own line of compact, efficient models called "SmolLM." Spaces, a platform on Hugging Face's website, provides researchers access to thousands of curated datasets, machine learning models, and community-generated AI-powered demo apps. Hugging Face raised $235 million in a 2023 Series D funding round, bringing its total funding to $400 million and valuation to $4.5 billion. Europe's biggest small-language–focused model is Aleph Alpha, based in Heidelberg, Germany, with more than $533 million in funding.

Newcomers to the small-language AI market include:

- San Francisco–based Arcee AI, founded by veterans from Hugging Face and other startups, has raised a total of $29.5 million in funding over two rounds, most recently a Series A in July 2024.
- San Francisco–based Predibase, built by AI leaders from Uber, Google, Apple and Amazon, with $28.5 million in funding over 2 rounds, most recently in May 2023 from a Series A round including noted venture capital firm Greylock.
- United Kingdom–based Assisterr, a blockchain-based AI leader that's hot on the hackathon scene and lets users deploy SLMs with minimal technical expertise, with 2 million users and $1.8 million in pre-seed funding.

It's still early days, but we're betting big on going small. The energy and efficiency advantages look to be a game changer.

AI and the future of healthcare

🔮 **The outlook**

AI is poised to reshape health care, but the most hyped, futuristic benefits are years away from practical implementation, and facing significant political, scientific, and financial barriers to market adoption. Meghan Rosen and Tina Hesman Saey cover the future of drug research, surgical interventions and more in their fascinating SN feature article.

🧪 **The science, at a glance**

First deployed in a medical device in the 1990s, AI has since seen widespread medical applications such as assistive analytics (think mammograms and other medical imaging) and diagnostics based on medical databases. Today's innovators are exploring how new forms of artificial intelligence can make healthcare more effective, equitable and humane. The vision is an era where AI catches cancer early, designs life-saving drugs, assists surgeons and even forecasts people's health futures so doctors can prevent diseases.

👁️ **A closer look: AI meets the OR**

Your next surgery may get an AI assist. For example, researchers from University Medical Center Utrecht in the Netherlands have developed Sturgeon, a new algorithm used routinely during brain surgery at Utrecht's Princess Máxima Center for Pediatric Oncology. Sturgeon gives surgeons a new superpower: the ability to rapidly analyze tumors and help them know how much tissue needs to be removed. Good news: the surgeon makes the final call.

Market newcomers include Malibu-based Horizon Surgical Systems, which is training robots to perform cataract surgery with their AI model Polaris. Citing human limitations such as varying dexterity and surgical skills, they have their eye on meeting the gap between increased demand and a decline in the numbers of trained surgeons. Their $30 million Series A round was completed in October 2024.

The prognosis: Today's AI discovery is rapidly becoming tomorrow's health care in more ways than one. (We'll be sure to cover this convergence in future Investors Lab issues!)

Beyond weight loss: GLP-1 drugs go big(ger)

💉 **Current state: GLP-1**

Weight loss drugs have taken the world by storm. Since its 2021 Food and Drug Administration (FDA) approval for weight-loss treatment, semaglutide has spawned startups, clinics, imitators and massive profits for Novo Nordisk, the Danish firm that makes Ozempic and higher-dose version Wegovy. Both drugs imitate the appetite-suppressing gut hormone GLP-1. Eli Lilly has introduced tirzepatide (sold as Mounjaro and Zepbound), a more powerful version that mimics two gut hormones. SN's Meghan Rosen weighs the advancements.

💊 **Future state: GLP-1 2.0**

Potential benefits extend far beyond weight loss. There's evidence GLP-1 drugs may help treat diseases of the heart, kidney, liver and more. Studies suggest semaglutide could even curb addiction and inflammation. And clinical trials are already underway for testing the drug's neuroprotective effects for symptoms of Parkinson's and Alzheimer's.

💰 **The money**

The established players are household names:

- Novo Nordisk (NYSE: NVO) makes Ozempic, Wegovy and related drug Saxenda. In 2023, the company was the richest company in all of Europe, hitting a market capitalization of $424 billion. In 2024, sales increased by nearly 25% and operating profit grew by about 21% due to market demand.

- Eli Lilly (NYSE: LLY) makes Mounjaro and Zepbound. The firm announced a 66% increase in earnings per share (EPS) in the first quarter of 2024 compared to the same period in 2023.

Huge profits for big pharma also mean massive downstream business opportunities and revenue potential for a slew of adjacent companies — including telehealth providers, specialty pharmacies, and medical tourism agencies. The FDA permits pharmacies to make compounded or altered versions of drugs that are in short supply, as long as they meet specific regulatory requirements, and e-tailers are taking full advantage. For instance, telehealth provider Hims & Hers offers GLP-1 injectables and compounded forms of semaglutide, and Texas-based Eden, a "metabolic wellness" provider, sells semaglutide and tirzepatide in oral and injectable forms, and even GLP-1 Rx Gummies (a form not regulated by FDA). Therapy in combination with drug sales is another growing market, with Danish company Embla providing low-dose GLP-1 medication with 1:1 coaching.

Whether for weight loss or new alternative uses, the consumer appetite for GLP-1 drugs is not getting any smaller.

Fungus could turn garbage into dinner

📸 **The big picture:** A third of all food is lost or wasted globally. Food that's incinerated or rots in landfills contributes up to 10% of global emissions. Now, scientists are using microbes to transform food waste into sustainable, tasty bites. Anna Gibbs writes for SN about *Neurospora intermedia*, an orange-colored fungus that thrives on food waste such as soy milk byproducts and coffee grinds. The eco secret? Fermentation.

🍄 **Behind the news:** Vayu Hill-Maini, then of the University of California, Berkeley, checked out the microbial communities in red oncom, a meat substitute made by fermenting soy pulp, and learned that the *N. intermedia* fungus dominated. The fungus contains enzymes that break down cellulose and pectin, sugars that humans struggle to digest on their own. Taste testers have described red oncom's texture and flavor as "mushroom" or "nutty." When grown on rice custard, the fungus tastes a bit like pineapple.

🍴 **Waste with taste:** A foodie-turned-chemist and chef, Hill-Maini, now at Stanford University, has branched beyond the lab into food tech, collaborating with two–Michelin-starred restaurant Blue Hill at Stone Barns in New York state to grow the fungus on grains. He's also been part of a research effort transforming koji mold — another fungus — into better-tasting meat analogues. He's worked with Chef Rasmus Munk of Alchemist, a two-star Michelin restaurant in Copenhagen. Munk's side venture Spora, a food innovation center, focuses on upcycling food industry by-products and creating diverse protein sources. Spora opened in 2023 with $1.3 million in private funding. International partners include the Novo Nordisk Foundation Center for Biosustainability, a.k.a. DTU Biosustain (focused on scaling sustainable foods and sustainable bio-chemicals) and San Francisco–based Wildtype (developing technology for cultivated seafood), as well as UC-Berkeley and Copenhagen University.

💰 **The market:** The global market for precision fermentation — programming fungi and other microbes to make animal-free products — was valued at about $3 billion in 2024. It's expected to skyrocket to $57.01 billion by 2032. Fermented foods make up 57% of the total investment in the alternative protein sector. Fungus is known for its ability to reproduce. Several microbial ventures have recently gained attention, though they don't begin with food waste. Nature's Fynd uses a microbe called *Fusarium strain*

flavolapis (found in an acidic hot spring in Yellowstone National Park) to make their fermented, fungi-based foods: dairy-free yogurt, breakfast patties, and cream cheese. Nature's Fynd's total funding is $509 million across four rounds, the latest a July 2021 $350 million Series C round. Investors included SoftBank Vision Fund and Breakthrough Energy Ventures, a $1 billion fund backed by members including Bill Gates, Jeff Bezos, Meg Whitman and Richard Branson. That's some high-pedigree vetting.

Startups in this space include:

- Solar Foods: A company based in Helsinki with $66 million in Series B funding that's using electricity and carbon dioxide from air to create an edible microbial protein called Solein
- Turtle Tree: Singapore-based venture using microorganisms like algae and fungi to produce sustainable microbial proteins, with $39 million in Series A funding
- Circe: This Boston-based company, incubated at the Wyss Institute for Biologically Inspired Engineering at Harvard University, uses microbial fermentation to make tailored fats. The seed-stage startup has a total of $14.5 million in funding, most recently a $5 million seed round in September of 2024.

Mold: it's what's for dinner.