

any dedicated hardware and, because the approach avoids electroporation, which is damaging to cells, it may lead to an improved product profile. “Our current data suggest that the cells are doing just fine. That’s one of the goals, to put the cells in a healthier state, that is less impacted by electroporation, to improve engraftment and minimize risks of adverse events,” he says.

The team is now refining a protocol for editing hematopoietic stem and precursor cells of patients with sickle cell disease before transferring the technology and know-how to Brazil. Bruno Solano, a physician-scientist

who has posts at the Instituto D’Or de Pesquisa e Ensino and Hospital São Rafael in Salvador, will lead the clinical development and rollout of the therapy in the country. A cell therapy specialist, he already has experience in administering chimeric antigen receptor T cell therapy to patients with cancer. Brazil has close to 100,000 people with sickle cell disease, which is similar in scale to the US patient population, but, says Solano, the prevalence is particularly concentrated in the Bahia region in the northeast, where about one in every 650 people has the condition. “It’s the highest incidence in the country.”

Successfully delivering a CRISPR-based therapy to Brazilian patients would represent an important step in globalizing this transformative approach. There is still a long way to go before all patients can receive effective therapies. Sub-Saharan Africa is where the need is greatest and is growing most rapidly: according to a [study](#) published last year, the region accounted for 79% of all new cases in 2021. Tackling this huge burden of disease remains a critically important task.

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Food security

Cell-based coffee future-proofs world’s favorite brew

Your next caffeine jolt could come from a lab. Scientists from Pluri Biotech, a regenerative medicine and cultivated meat company based in Haifa, Israel, propose to make coffee without the need to grow the entire plant. Coffee crops are expected to be [hit](#) hard by climate change. Arabica, *Coffea arabica*, which is the world’s most popular coffee and has been harvested for millennia, is threatened with extinction from climate change and the spread of fungal pathogens. Cell-based coffee could prove the solution to a shrinking supply of coffee and an ever-increasing number of coffee drinkers.

Lior Raviv, Pluri’s chief technical officer, says: “We hypothesized we could take the cells from the plant and put them in a bioreactor [to grow coffee].” Through their work in cell therapy and cultivated meat, the Pluri team knew that not all cells like the same growing conditions. Taking plant cell samples, they made cell lines and, instead of growing them swirling around in suspension culture, they used a packed-bed bioreactor.



The coffee cells slowly flow through, taking on a tissue-like structure. The cells are fed salts and vitamins, and their natural metabolism then takes over to produce secondary metabolites such as caffeine. The resulting biomass, which forms as small clumps, is dried and gently roasted. The final product looks

and tastes like ground coffee. Pluri is now focusing on scaling up and seeking regulatory approvals.

Stem, a Paris-based company, is also propagating and fermenting coffee cells lines derived from coffee plants in bioreactors. The company adds natural flavors taken

from coffee byproducts to the resulting green coffee powder, which they dry and roast like coffee beans. Another startup, California Cultured, is applying plant cell culture technology to both coffee and cocoa beans.

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