

## The Girl Who Would Live Forever



Two-year-old Matheryn Naovaratpong. Image provided by the family.

Matheryn Naovaratpong was two years and two months old when she didn't wake up one spring morning. On April 19th, 2014, she was rushed to a hospital in Bangkok, where doctors discovered an 11 centimeter-long tumor in the left half of her brain. Matheryn—her family called her Einz for short—had ependymoblastoma, a rare form of brain cancer that afflicts the very young. The prognosis is exceedingly grim; at its highest, the [five-year survival rate is 30 percent](#). Einz had fallen into a coma.

In that first surgery, doctors extracted half the tumor and drilled through Einz's skull to relieve the pressure on her brain. After it was over, they told her parents, both of whom are PhD-holding scientists, that she would probably never awaken. Even if she did, they said, the cancer was incurable—the hospital advised them to take Matheryn off life support.

“But in a week,” Dr. Sahatorn Naovaratpong told me in an email, “Einz woke up and regained her 2 years' consciousness, she responded to stimulation, and surprised everyone. Einz represents the worth of Life.” Sahatorn is Matheryn's father. (He spoke to me via email through his sister Dararat, who translated the messages.)

The event inspired the family to push on with treatment. “We decided to fight against this cancer,” Sahatorn told me. “We may not beat it, but her life can lead to a further step of mankind to overcome cancer in the

future.”

Over the next year, the two-year-old would receive 12 brain surgeries, 20 chemotherapy treatments, and 20 radiation therapy sessions. Einz lost 80 percent of her left brain, essentially paralyzing the right side of her body. There were moments of great hope and pitched sorrow; Sahatorn described the period as an emotional roller coaster.

“[W]e noticed a power struggling for life in her beautiful round eyes,” he said. “Finally, Einz was able to stand up on her feet again and could see with both eyes, as if she had survived from brain cancer. Couldn't help wishing she could be back to her normal childhood even with only a single right brain.”

She regained her vision, the ability to stand, and, with therapy, began moving some parts of the right side of her body. She outlasted other patients in the treatment ward, according to Sahatorn. Many ependymoblastoma victims perish before they turn two.

The Naovaratpong family began doing social media outreach to raise awareness of childhood cancer, and started a genetic cancer research foundation. “Let Einz be the first to guide us,” was their motto, Sahatorn said.

But in November 2014, the cancer spread across Matheryn's brain, and finally paralyzed her face and muscles.

“We realized it was the end,” Sahatorn said. “We had to prepare to say goodbye.” On January 8th, 2015, Matheryn was released from the hospital. She was fully conscious.

“Among family and relatives, we played and held her before we relieved her from the life support system, released her heavy load off her shoulder at 18:18,” Sahatorn told me. The “cancer cells and other cells from her body have been kept for further study.”

“Her body has been cryopreserved in Arizona awaiting coming technology,” he said.

This year, Matheryn Naovaratpong became the youngest person to be cryogenically frozen and preserved for future revival.

\*\*\*\*\*

“Prior to her, the youngest we had done was a 21-year-old female,” said Aaron Drake, the Medical Response Director at [the Alcor Life Extension Foundation](#). “It ranges all the way up to 102, the oldest person we've preserved.”

Alcor is one of [the largest organizations that practices cryonics](#), the act of preserving humans and mammals in a freezing “biostasis” for later resuscitation. Alcor's chief mission objectives are as follows: “Maintain the current patients in biostasis. Place current and future members into biostasis (when and if needed). Eventually restore to health and reintegrate into society all patients in Alcor's care.” For a fee, Alcor claims to be able to preserve the bodies that have deteriorated beyond modern medicine's ability to help, until the day that science and biotech might improve enough to restore them.

Over the years, Alcor's physicians and technicians have performed over 130 cryopreservations. Matheryn is their latest patient.

As a whole, the field of cryonics has been undergoing something of a renaissance. In the last decade, an open letter declaring cryonics “a legitimate science-based endeavor” has [collected 63 signatures](#) from doctors and researchers, the practice has become a core plank of the transhumanist movement, and its [key players](#) have [crept steadily](#) closer to the [mainstream spotlight](#). Cryonics has earned high-profile supporters; baseball legend Ted Williams was [famously frozen by Alcor](#).

In the process, the company has contended with accusations of impropriety—in [an exposé book and an interview with ABC](#), an ex-Alcor employee claimed that the company used a chisel and a hammer to remove one patient’s head, and that it may have administered a lethal drug dose to a still-living member. Alcor [denies the allegations](#), and filed a lawsuit against the employee.

The major cryonics organizations are still based solely in the US (the [Cryonics Institute](#), for instance, is probably Alcor’s largest “competitor”). Besides Alcor’s UK chapter, the only other serious international operation is a [fledgling Russian outfit, KrioRus](#). But due to renewed interest and the expanding reach of social media, word has spread far abroad.

“The family learned about Alcor on the internet,” Marji Klima, a spokesperson for Alcor told me. “They were both doctors. After they did 11 surgeries, when they realized that she wasn’t going to be able to pull through, they contacted us.”

Alcor agreed to accept Matheryn as a patient, and enrolled her as a member. The initial plan was to fly Einz to the United States while she was still alive, so Alcor’s team could perform the procedure domestically. [That procedure](#) is complex and highly invasive; the [BBC calls](#) it “intense.”



Alcor's facility in Scottsdale. Image: Xavier Aaronson

It involves moving the patient onto an ice bed, coating her in freezing materials, artificially restarting the heart with a “heart-lung-resuscitator,” administering over a dozen different medications, draining the blood and replacing it with medical grade antifreeze, opening the chest cavity to attach the major blood vessels to a machine that flushes out all remaining blood, then slowly lowering the body’s temperature, at a rate of 1° Celsius every hour. (After two weeks, the body reaches deep cryofreeze at -196° C.) Alcor had selected a well-equipped pediatrics hospital in California for the job.

“It was hoped that this young 2-year-old girl was going to relocate to this hospital as her health declined so distance would be minimized,” Drake told me in an email. “Unfortunately, her breathing declined more quickly than her doctors anticipated and two days before she was to fly to the US, she was placed on a ventilator, essentially eliminating the possibility for airline travel.”

Alcor would have to go to her.

“We decided to have a physician go,” Klima said, “because of her age and her size, they wanted someone who was very skilled. When you’re looking at the vasculature of a small child like that, it’s a very different thing. And this was a small child with multiple brain tumors.”

So Alcor flew Drake and [Dr. Jose Kanshepolsky](#), a retired neurosurgeon, to Thailand. They spent two days on “standby,” Alcor’s term for the [phase of the cryopreservation process](#) in which physicians remain stationed near the ailing member, waiting for her to pass and preparing for the procedure. Kanshepolsky examined the girl at the hospital before she was taken home, and discovered an alarming complication: since so much of her brain had been removed, her skull had filled with cerebrospinal fluid, which would make the procedure difficult.

“We typically drill two holes in the skull, so we can visually see the brain. If the brain begins to contract, it shows it’s working,” Drake said. That’s because the medical antifreeze Alcor uses dries the brain, and shrinks it. Alcor technicians also insert crucial instruments through the perforations. “Into those holes we’ll insert thermo-couplings, temperature probes basically, to monitor the brain temperature,” Drake said.

Because there was so much fluid, Dr. Kanshepolsky decided to hold off on extracting the brain, but to begin the full-body preservation process instead.

**Matheryn’s procedure was what Alcor calls a “neuro” in shorthand—where ultimately, just the brain is extracted and preserved, as opposed to the entire body**

According to Drake, they decided “to undertake cryoprotective perfusion of Matheryn’s brain in Thailand.” The team decided to do so without separating her brain from the rest of the body. “This worked out to be an effective way to move through the repatriation process and back to the US,” Drake wrote in a [post-procedure synopsis](#) co-authored with Alcor CEO, Max More.

“On the second day, Matheryn was pronounced by a physician who was present at the bedside when clinical death occurred,” they wrote. “A surgery suite had been prepared in an adjoining room and access to the patient for stabilization and perfusion was immediate. Alcor’s field cryoprotection system was tested in the very remote field and proved effective.”

The surgical procedure went off without incident. “It went very smoothly,” Klima said. “It went better than some of the ones that happen right in our backyard.”

But since this was in fact very far from Alcor's backyard, arrangements had to be made to transport Matheryn's body to Arizona.

"We have to comply with the funeral industry regulations," Drake said. "There are airline regulations that deal specifically with shipping human remains. In this case, we contacted with a mortuary company out of England, the same company that was involved in David Carradine's international shipment; remember how he died in Bangkok? They provided us with all the documents we needed to fill out and complete. Death certificates in Thai, and in the US, and a variety of things." Then it was time to prepare the body itself for travel.

"Typically we'd move the head from the trunk of the body," Drake told me. "We didn't know what their reaction would be from the family, the mortuary, from border officials; this has to go through a number of shipping venues, customs, the TSA and so on. To see a frozen head in a box might have raised a number of red flags. In the US that's not a big deal, but there, they may not be accustomed." Instead, they kept the body intact, and frozen. "The entire patient was placed in a specially prepared dry ice shipping container and the cool down to dry ice temperature (-79 degrees C/-109 degrees F) began on-site," More and Drake wrote. It proved to be an astute calculation; the container passed inspection.

"After the US Embassy in Thailand approved the shipment, the container was topped off with dry ice and shipped by airline to LAX for customs approval," according to the official account. There, Alcor enlisted its mortuary agent in Buena Park to take the container. Drake and another Alcor operative drove down to collect it in what Klima called an Alcor response vehicle. They topped off the container with dry ice, loaded it into the truck, got the necessary transit permits, and brought the human cargo back to Scottsdale. "The neuro separation was performed at Alcor after arrival and Matheryn became Alcor's 134th patient," according to the company.

Matheryn's procedure was what Alcor calls a "neuro" in shorthand—where ultimately, just the brain is extracted and preserved, as opposed to the entire body. Her brain is now stored in a "Bigfoot Dewar," a stainless steel, vacuum-insulated container filled with liquid nitrogen and kept at -196°C, along with dozens of other masses of grey matter. The core of Einz's two-year-old being now rests in cryofreeze in Arizona, in wait of a cure, and a means to regrow her body.

"It took a tremendous amount of logistical planning, but yes, we are very pleased with the results," Drake told me.



Matheryn's brain now resides in a Dewar like this. Image: Xavier Aaronson

The desire for eternal life—or even just another shot—is about as universal as it gets, so it's unsurprising that cryonics has begun to traverse international boundaries. “We have had a lot requests from overseas,” Klima told me, but Alcor doesn't yet have the resources or the infrastructure to grant them all.

The expense is prohibitive, but not astronomical. [A membership](#), which guarantees the signee the right to be put on “standby” (and earns him or her an Alcor Emergency ID tag), costs 690.4€ a year, in addition to proof that financial arrangements for the final procedure have been made. Cryopreservation costs between 71,729.58€ (for a “neuro”) and 179,323.95€ (for the full body), depending on how much of her mortal coil a customer wishes to maintain. Alcor suggests prospective members purchase life insurance to cover the costs.

“Our market is growing,” Drake said. He attributes the interest to more attention from the media, the rise of social media, and open-minded youth. “The younger generation is more accustomed to seeing changes in technology. Any thing you can come up with, six months later, there's an app for it. The younger generation sees this and thinks ‘sure why not’?—they can figure everything else out, so why not this? They feel this is kind of an inevitable thing.”

As an organization, Alcor has been hesitant to promote itself, Drake said. “I think the board is fearful we'd be trying to 'sell' immortality. But social media is going to grow with or without us.” And that's where its farthest flung customers are coming from.

**How do you reanimate a deceased human body? Even the CEO of Alcor doesn't claim to know**

Those who've heard about Alcor online and have gone seeking life extension services in Europe or elsewhere have [started clubs](#), [societies](#), and turned to [web forums](#). One group of advocates was so hopeful for a European cryonics organization it was tricked into thinking a publicity stunt featuring a group called the Siberian Mammoth, which promised to preserve British rappers in permafrost, [was real](#).

Parents are bringing their kids on board, even when they're not sick. "Our youngest member is three months old," Klima said. "Families sign them up." The process is legal, Drake says, if parents [prove legal guardianship of the minors](#). "The parents can make the decision for the child while they're still a minor. The child can opt out if they choose."

Matheryn, the youngest member ever, meanwhile, was also Alcor's first patient to receive a field treatment in Asia. If their optimism is a bellwether, there will be more.

"Alcor provides the opportunity for Einz to breathe again when the technology is provided and appropriate for her disease," Matheryn's father said. Her family is grateful for Alcor, but they are not mindlessly idealistic. They are a family of doctors, and the lesson they took from their daughter's battle with cancer is that there are still considerable frontiers left to be examined when it comes to medicine and human physiology. Matheryn's life was made possible by modern science in the first place, Sahatorn said; she was carried by a surrogate because her mother had lost her uterus birthing a son.

"Treating cancer needs changes," Sahatorn said. "The conventional methods could not treat Ependymoblastoma and many types of cancer. We need more research about genetic cancers. Without research, there will be no change." To that end, Matheryn's parents will continue to promote the children's cancer research initiative they began, which will be managed by [the Rama Foundation](#). Part of the reason they turned to Alcor was to continue the advancement of such research.

"They didn't want their daughter's life to end in vain," Drake said. "They're hoping that by preserving the tissue cells of this particular cancer, they can come up with a better treatment plan, and maybe even eventually cure it. If you look at the global picture of what they're trying to accomplish, it's very altruistic." The Naovaratpongs are never going to stop fighting their daughter's disease, ever.

"We used conventional methods for more than 50 years now," Sahatorn said. "It seemed to be hopeless until today."

Of course Alcor is all about hope. It's highly uncertain whether science will ever uncover a way to fundamentally repair the damaged bodies of the past. James Lovelock may have [reanimated frozen rats](#), but that's a far cry from rejuvenating whole humans who have been locked in icy stasis for decades. It's a hope that is contingent on a great many future factors aligning.

"Obviously, we'd need to come up with a cure for cancer," Drake said. "Then, we've really thought that you're going to need to be able to regenerate a new body. The passé term is to clone a new body, but that's not how they do that anymore." He points to [advances in 3D organ printing and tissue development](#), while also admitting that his entire enterprise may in fact never work, and is, at its heart, an "ever-progressing science experiment," though a valid one, Matheryn its most youthful subject.

"We know we can regenerate a small organ, and grow a new heart," he said. "We know we can 3-dimensionally print cells and hearts. So at some point we would need to regenerate her entire body, or at least her organs, and put it all together. Then we'd need to transplant that brain into a new body."

How do you then reanimate a deceased human body? Even the CEO of Alcor doesn't claim to know—he, along with thousands of the hopeful living, and hundreds of the frozen dead, have stocked their faith in the notion that science will find a way to thaw and revive the brain of a two-year-old girl.

"At least, we devoted her life and body for the progress and development of science," Nareerat, Matheryn's mother, told me in our lone communication. "This is also another treat for our family, we know that she's alive although we have been separated."

If the day somehow arrives when humans can resurrect their dead, at least Matheryn won't be alone. Her parents have pledged to become members of Alcor, too, so they might be reanimated together in some better future.

This story is part of a Motherboard series about the waning relevance of the human physical form. Follow along [here](#), and listen [to our podcast on the topic below](#).

Contact the author by [email](#) or [Twitter](#).

You can reach us at [letters@motherboard.tv](mailto:letters@motherboard.tv). Want to see other people talking about Motherboard? Check out our [letters to the editor](#).