



Giving At-Risk Newborns the “Deep Chill” to Prevent Brain Injury

To visit the Hochleutner family now in their comfortable home, you’d never suspect that the birth of their second child was a medical emergency. Today Baby Nolan is cherubic and energetic, gurgling away.

Yet, only an hour after being born, he had begun to have seizures. His mother’s uterus had ruptured during birth. “It was like waking up to a nightmare,” remembers his mother, Nelya. “We had no idea what the future held for our son.”

Doctors rushed Nolan to UCSF Children’s Hospital’s new Neuro-Intensive Care Nursery where—contrary to all human instincts regarding keeping babies warm—for three days he was put into a “deep chill,” a specialized technique designed to prevent and minimize brain damage.

Attached to an array of monitors and tubes, Nolan lay on a raft-like pad with internal coils circulating water that can be cooled or heated; his body temperature was dropped to 92.3°F, inducing a state of hypothermia. Or as Nolan’s dad put it, his little son went into hibernation.

According to UCSF’s Neonatology clinical director, Yao Sun, MD, “By lowering the brain’s metabolism, we can change the cellular programming of the brain’s cells, so that they don’t die off after injury, which is what would otherwise occur.”

The treatment is believed to be effective only within six hours of birth for full-term babies. Young Nolan is now regularly monitored, both for his own health and to participate in the Newborn Brain Research Institute’s ongoing research. At seven months old, he weighs 18 pounds and is developing normally.

His parents haven’t seen any reason for concern although they know that evidence of any negative neurological or cognitive effects could take years to manifest, even as long as up to age six or beyond.

At home, Nolan’s parents and older sister are smitten with him. “We’re so lucky that this treatment was around,” says Nelya. “The doctors told me that a year ago they wouldn’t have had any treatment for him.”

While Nolan’s outcome is positive thanks to this new hypothermia treatment, the same, unfortunately, can’t be said for so many other babies, especially the growing numbers who are born prematurely.

Unlike Nolan, who was born full-term and went home in a matter of weeks, very premature babies weigh only about a pound at birth and fit into the palm of your hand. These fragile preterm infants remain in the intensive care nursery for an average of three months and receive the very best medical care and highly specialized nursing.

Yet, despite this care that takes advantage of the latest technology and findings, many of these premature babies will inevitably experience developmental delays and often serious, lifelong medical conditions. They face severe neurological disorders such as brain bleeding and injury to the brain’s information channels, or white matter tracks, that result in cerebral palsy.

The critical task at hand is to better comprehend the developing human brain’s ability to repair itself to avoid these abnormalities altogether and to better promote repair after injuries occur. The Newborn Brain Research Institute at UCSF is dedicated to making fundamental scientific discoveries and rapid clinical translation to test new treatments for infants with neurological injuries.

—The Hochleutner family story was adapted from reporting by the San Francisco Chronicle and KGO-TV San Francisco, Channel 7.