



# OPENING A WINDOW TO THE MOST DELICATE OF CARE

MRI-compatible incubator will allow doctors to predict brain damage in infants

By Andrew Kaszowski

Pre-term infants are fragile miracles, but a generous gift from two young businessmen is about to make a profound difference in the care and treatment Mount Sinai can provide for its youngest patients.

These days, babies born as early as 23 weeks and as small as 500 grams (1.1 pounds) have a fighting chance despite measuring not much longer than an adult's hand, with sensitive organs the size of strawberries.

The care preemies receive in Mount Sinai Hospital's Neonatal Intensive Care Unit (NICU) is able to keep their delicate bodies alive. Under the watchful care of nurses, doctors, respiratory technologists, pharmacists and nutritionists and a multitude of monitors, these fragile infants cling to life in the protected environment of an incubator.

The tiny organs of a pre-term newborn are incredibly delicate. Often, they are not fully formed or have defects. Up until now, neonatal doctors have not been able to look with precise detail at one of the most sensitive organs of all: the brain. The most powerful imaging tool currently available is the huge, cold and noisy magnetic resonance imaging (MRI) scanner – a machine much too stressful for these most delicate of patients.

Now, Mount Sinai Hospital's doctors are about to receive their own miracle, thanks to two young philanthropists.

Through a generous donation by Toronto businessmen and brothers Daniel and Leonard Drimmer, the Hospital will receive an MRI-compatible neonatal incubator. Soon, even the smallest of pre-term newborns will be able to pass through the MRI's magnets with the same level of monitoring and comfort they have in the womb-like environment of the NICU incubator. Doctors will have an unequalled ability to take images of the babies' brains, enabling enhanced levels of diagnosis and understanding. "MRI

scanning produces a much more detailed image than the ultrasounds we are currently limited to, says "Dr. Edmond Kelly, the staff neonatologist who is leading the initiative to study MRI scanning for preemies. "Collectively, we will be able to do research to learn more about the newborn brain and improve outcomes for premature infants."

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Every year at Mount Sinai Hospital, nearly 300 babies are born weighing less than 1,500 grams (3.3 pounds) and of that, about half weigh less than 1,000 grams (2.2 pounds) – they can fit in the palm of your hand. Although doctors are very skilled at keeping these babies alive, a staggering number grow up to have severe physical and mental disabilities because of brain damage. When babies are born before their organs are fully developed, they can suffer from a wide range of defects that affect them throughout life. As well, during the care many preemies need to stay alive, they undergo intense stress that can further damage their already-fragile organs. Such stress can precipitate oxygen deprivation that can cause or worsen brain damage.

"With MRI for newborns, we will be able to identify brain damage immediately after birth," says Kelly. "We want to work towards being able to effectively predict outcomes to guide parents and potentially develop early intervention to prevent or minimize the effects of being born too small or too early."

"The earlier you can correct or prevent further brain damage to infants, the

better their outcomes in life will be. Every parent hopes their baby will grow up and go to school. We hope to be able to increase the likelihood that premature babies will be able to go to school and excel at life."

The MRI-compatible neonatal incubator allows newborns to tolerate the clanking of the machine because it eliminates the stresses involved in the procedure and in transport to the MRI suite. Nurses and respiratory technologists place the baby in the new incubator and connect the machines and monitors, all within the safe environment of the NICU, where there are many resources available if the infant destabilizes. The MRI incubator maintains the same healing environment of the infant's regular incubator, with all its warmth and protection. When the baby is ready, nurses simply wheel the incubator to the elevator and right up to the MRI machine. The entire unit is non-magnetic, so the infant can stay in comfortable surroundings throughout the scans, and a video camera allows doctors and nurses to constantly monitor events. Infants are even given tiny earmuffs to block the noise of the loud magnets.

Dr. Kelly and his team will conduct a three-year trial with the new MRI-compatible incubator. "We will continuously work to improve the imaging we can do on infants to get as clear a picture as possible," he says. "The hope is to prove that early scanning can accurately predict the outcomes of babies, that we will be able to detect as soon as possible whether a baby will have consequences from brain damage. This will help to guide parents with regards to their child's care. The ultimate goal is to be able to prevent or even reverse the damage as early as possible by newer drugs."

The generosity of donors like the Drimmer brothers allows Mount Sinai Hospital to push the potential of care. As Dr. Kelly says, "The research we will now be able to perform will help all babies in the future."