

# Moving forward with MRI

Queen Charlotte's and Chelsea Hospital (QCCH) is the oldest maternity hospital in the country. In November 2000 the new QCCH was opened on the campus of the Hammersmith Hospital and the two hospital's neonatal units merged.

This prestigious purpose-built unit is adjacent to a dedicated research institute and state-of-the-art facilities have accommodation for high and low risk maternity care and fetal medicine together with one of the largest neonatal units in the country, providing a wide range of tertiary services and unparalleled research facilities. It is one of two perinatal centres within the North West London Perinatal Network and has 550-600 admissions a year.

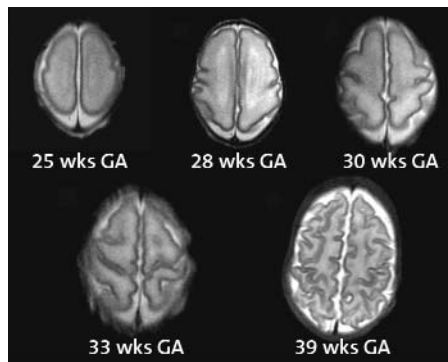
The neonatal unit has a strong history of education and research with Imperial College London. One of the strategic goals is to reduce the numbers of infants who grow up with neurological handicaps after neonatal intensive care. Major investment in a 3-Tesla magnetic resonance imaging (MRI) scanner on the neonatal unit has been pivotal in this ground-breaking work.

MRI is non-invasive and non-ionising and provides excellent soft tissue differentiation of the immature brain, making it the modality of choice for investigating numerous pathologies of the brain. Recently quantitative MR techniques have been used to assess the developing preterm brain (FIGURE 1). These techniques include 3D volumetric MR and measurements of cortical folding, which have been used to determine the increase in brain tissue volume, cortical grey matter volume and cortical folding with increasing gestational age.

MR scans are also now being used to assess heart function. Detailed images can show how much blood is filling the heart, how well the muscle is contracting and how much blood is pumped with each contraction. The effectiveness of interventions such as fluid bolus and inotropes can be assessed.

The scanning facilities within the neonatal unit impact enormously on the work and daily routine for babies, families,

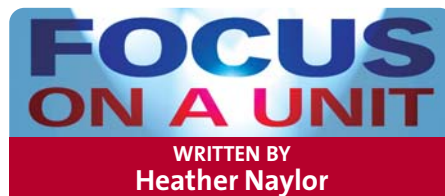
nursing and medical staff. Rapid unit-based access to the MRI scanner for the sickest and most vulnerable babies facilitates clinical decision making at the most critical times in confirming diagnosis, assisting with prognosis or deciding appropriate



**FIGURE 1** Development of sulcation and gyration with increasing GA.

treatment plans. Agonising waits for families for further information about their critically sick baby can be reduced.

Parents are invited to view the MR scanner so they know what to expect. Most scans are carried out without sedation. Babies are brought to the scanning room before a feed, monitoring equipment is applied and they are carefully swaddled. Babies are allowed to fall asleep after a feed and placed in the scanner for up to an hour, with monitoring by a neonatologist throughout. Babies are fitted with moulded ear plugs and wear earmuffs to protect them from the noise of the scanner.



Training regarding MRI safety is undertaken by all nursing and medical staff. Parents are advised if the scan is being performed for clinical reasons or are invited to take part in a research study involving their baby by the MRI research team. Written information is available for parents explaining the procedure, and if for research purposes, the study they have been invited to participate in.

Studies being undertaken include:

- Improving the quality of MR images in newborns.
- Computational analysis of MR images to understand more about brain structure and development in relation to the developmental problems faced by premature babies.
- Serial MRI in newborns with perinatal brain injury, to understand better the causes and timing of an injury and the response of the brain to injury.
- MR assessment of cardiac function in newborns to improve heart and circulation monitoring and support.
- Clinical trials of promising interventions to reduce brain injury and promote brain development including the TOBY trial of whole body cooling in full term infants suffering birth asphyxia.

Nurses on the unit play a pivotal role in the support of infants examined by MR, helping parents with their decisions and addressing any concerns. Nurses must also ensure the baby is appropriately prepared, wearing non-metallic clothes and ensure the use of MRI-compatible lines and equipment. In liaison with the MRI team, the baby's care needs are assessed to ensure these can be safely met during the procedure.

Although the development of neonatal services has greatly improved the survival of preterm and sick newborn babies, investment must continue to ensure the integration of research with medical and nursing care to improve the effectiveness of care and long-term outcomes for this vulnerable population and their families.

## Is your unit special?

Why not contribute to our focus on a unit feature?  
Contact [kate@infantgrapevine.co.uk](mailto:kate@infantgrapevine.co.uk)