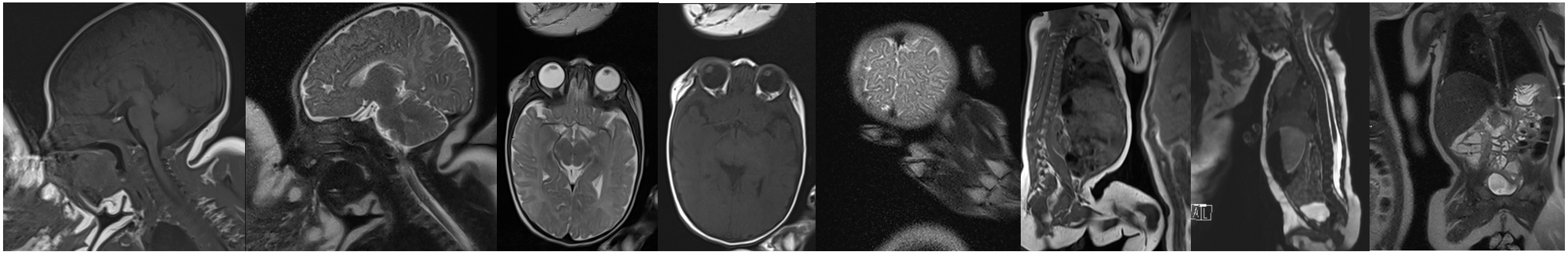
KANGAROO MOTHER CARE MRI:

A NOVEL APPROACH TO HIGH QUALITY IMAGING IN NEUROPEDIATRICS



Angel Sanchez-Montañez, MD
Pediatric Neuroradiology
Universitary Hospital Vall d'Hebron – Barcelona, Spain
angel.sanchez.idi@gencat.cat

Disclosure

I have no conflicts of interest to disclose

Index

Introduction / Material and methods / Results / Future perspectives / Conclusions

Background

The **Madre Canguro** / Kangaroo Mother Care (KMC) method was first introduced in 1978 by Dr. **Edgar Rey Sanabria**, a Colombian pediatrician in Bogotá. He developed KMC as a solution to the high mortality rates among preterm and low-birth-weight infants Dr. Rey's method involved placing premature infants in direct skin-to-skin contact on the mother's chest similar to kangaroos

MRI is the best imaging technique for most indications in pediatrics. MRI may be hostil for both infants and caregivers due to its noises and reduced spaces. In our clinical practice, the group of patients considered uncooperative for MRI represents about 50%, specially neonates and infants, and may require sedation depending on anesthesiologist's availability, among other factors

Material & methods

Kangaroo Mother Care MRI

Vall d'Hebron Barcelona Campus Hospitalari

Salut/ Institut de Diagnòstic per la Imatge

RSNA 2024 Building Intelligent Connections

Target population is **neonates and infants** requiring MRI scans who may not cooperate fully enough. This approach may also expand MRI access in hospitals and countries with limited **resources** and fewer options for sedating these children

Typically, we first attempt to study the infant alone in the MRI machine after feeding. If the infant remains awake, moving or crying, we then invite to the mother the previously explained option to enter the MRI machine with the infant

This involves positioning both the mother (or another caregiver) and the infant inside the MRI machine during the study. The infant breastfeeds or stays close to the caregiver, which is essential for the **skin-to-skin** contact, remaining relaxed and calm in a better atmosphere reducing distress, which helps minimize movement → **high quality images**

We implement this method in both **1.5** and **3 Tesla** pediatric MRI units within a child-friendly environment

Traditional sedation methods pose risks and requires monitoring. It may not be feasible for all patients. KMC offers a **non-invasive** alternative that **reduces motion artifacts and scan times**, promoting maternal-infant bonding and **comfort**

Patients with contraindications for sedation previously had to be studied with CT; now they benefit from MRI → **ALARA**

Material & methods

Kangaroo Mother Care MRI

Preparation Before Arrival: It is crucial that the infant arrives with a certain level of sleepiness. Parents or caregivers are advised to feed the infant shortly before the study, whether through breastfeeding or a bottle. This helps ensure that the infant is calm and relaxed upon arrival to their scheduled time, which is key for successful imaging

Initial Consultation: Upon arrival at the MRI facility, caregivers are met with a team member who explains the entire process, telling that the initial approach will be to place the infant alone in the MRI machine after they have been fed

First Attempt: After the infant is positioned in the MRI machine, we observe how well the infant cooperates. If he remains still or appears relaxed, we start the study. However, if the infant moves or cries, a different approach →

Kangaroo Mother Care Method: It may be used for brain, head&neck, spine, as well as for any body area

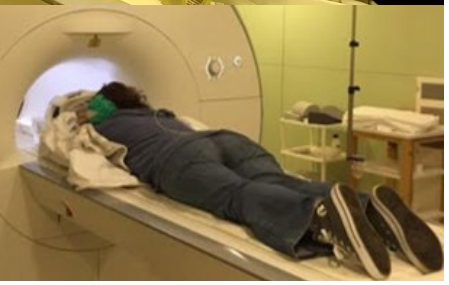
Post-Procedure Review: When the study we discuss any concerns with the caregivers for a continuous improvement

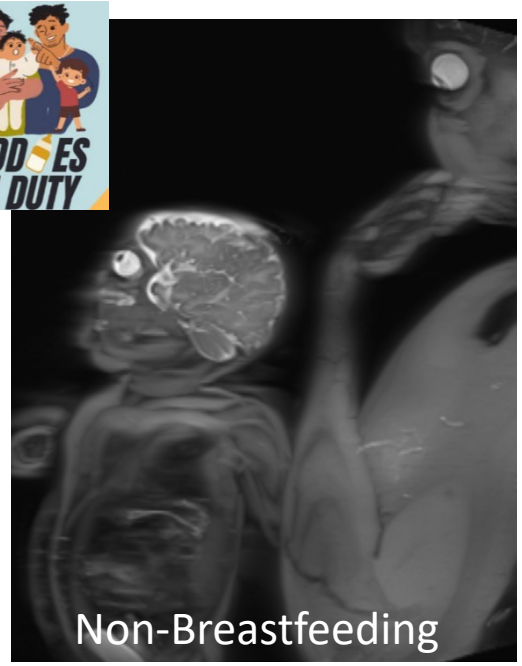
Material & methods

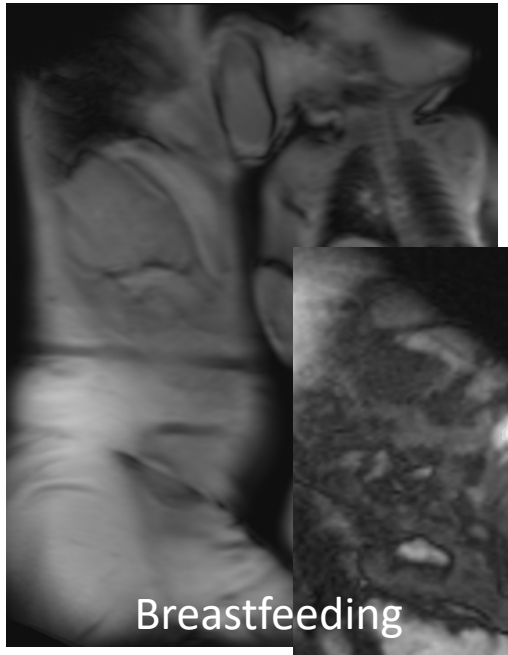
Kangaroo Mother Care MRI

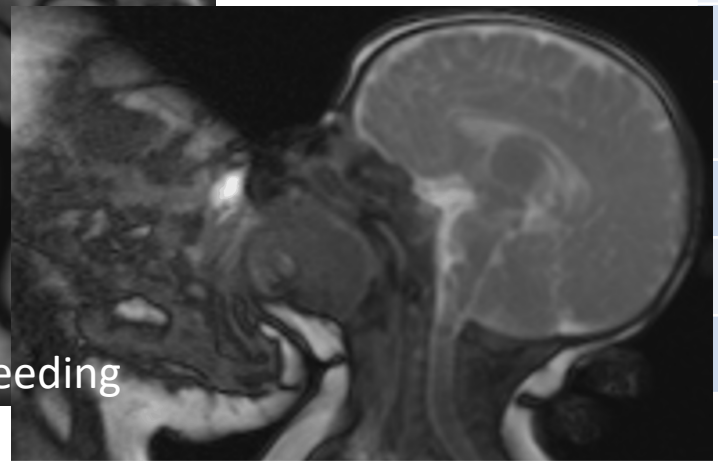
Vall d'Hebron Barcelona Campus Hospitalari | Salut/ Institut de Diagnòstic per la Imatge | RSNA 2024 Building Intelligent Connections

KMC method: The caregiver, usually the mother, enters the MRI machine with the infant, and are positioned comfortably in skin-to-skin contact. The mother can either breastfeed the infant or simply hold them close, providing emotional and physical support, which is essential for obtaining **high-quality images, repeating less sequences & reducing scan times**





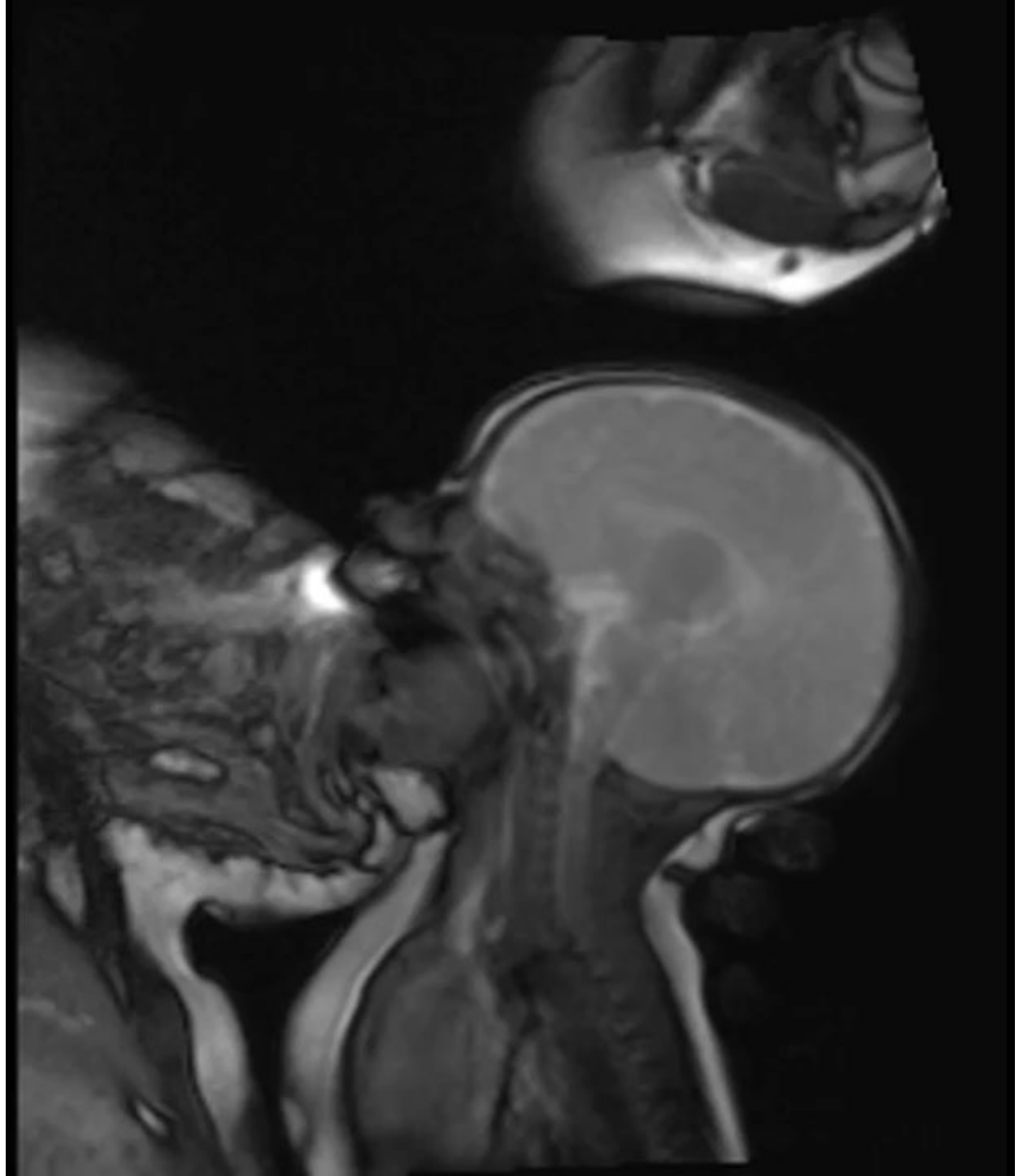




Daddies are welcome!

KMC MRI
Expands access to MRI
Reduces need for sedation
Enhances patient comfort
Diminishes scan times
Improves image quality
Maximizes ALARA concept
Saves money $

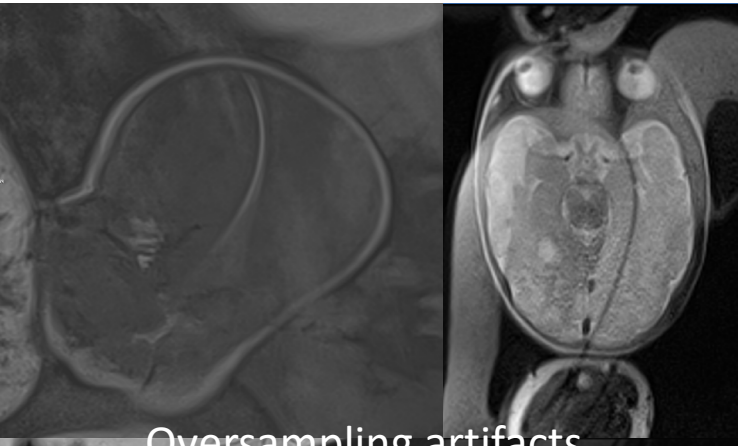
Both mother and infant need to fit within the bore. The neonate or infant is positioned in a **lateral decubitus position** to ensure contact with the **spine coil** on the MRI table, in addition to **body and surface coils** covering the region of interest. We input the **mother's weight** into the machine to avoid issues with the Specific Absorption Rate (SAR), and **patient positioning**
Standard protocols are used, adapted to **prevent oversampling**. If the patient moves, we utilize shorter or fast sequences (HASTE)



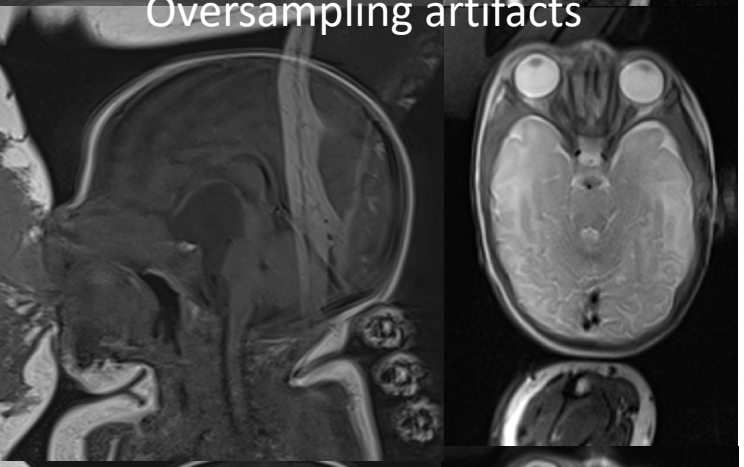
Results

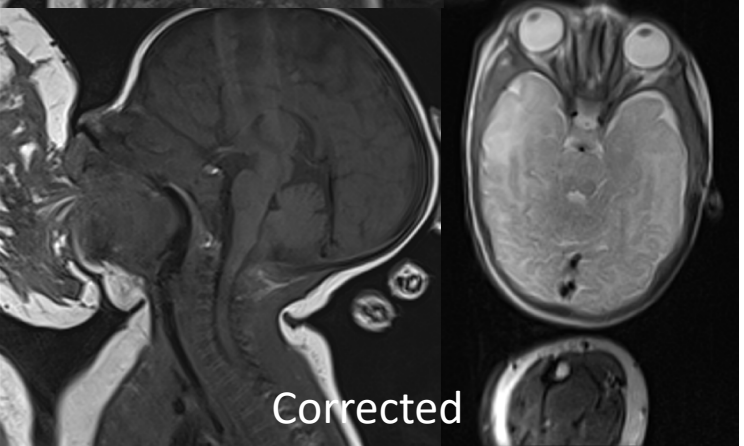
Kangaroo Mother Care MRI

Vall d'Hebron Barcelona Campus Hospitalari | Salut/ Institut de Diagnòstic per la Imatge | RSNA 2024 Building Intelligent Connections



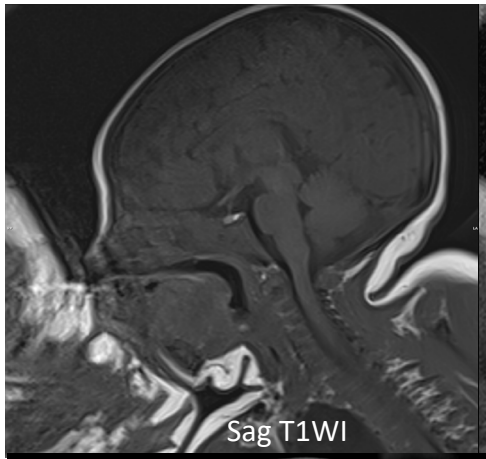
Oversampling artifacts



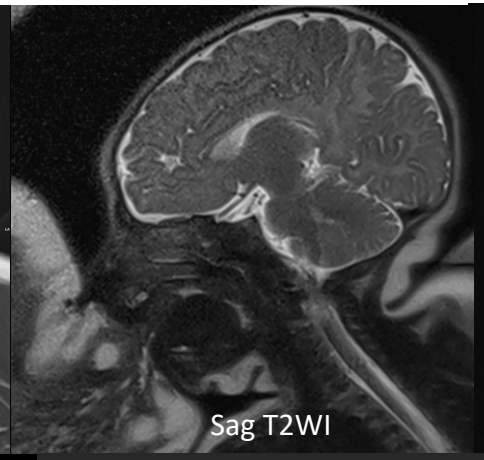


Corrected

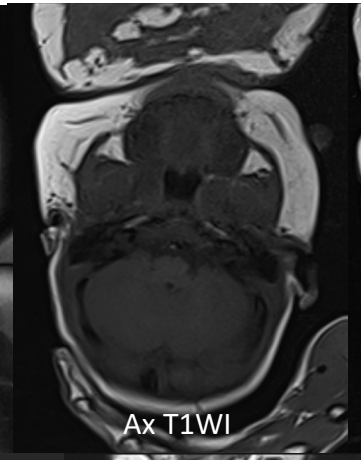
STANDARD BRAIN PROTOCOL



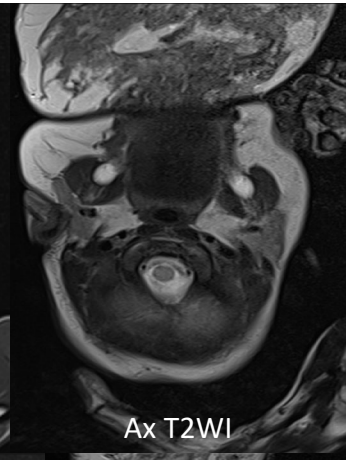
Sag T1WI



Sag T2WI

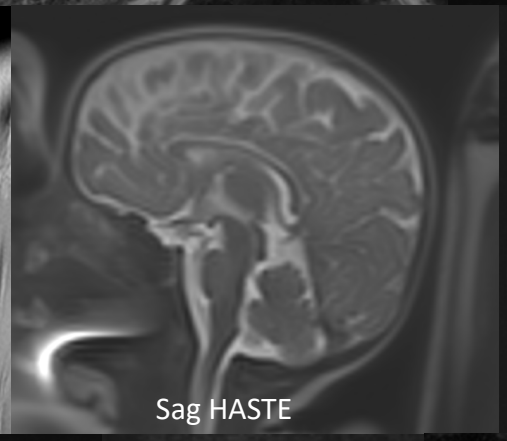


Ax T1WI

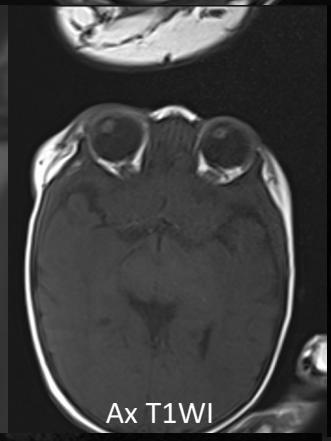


Ax T2WI

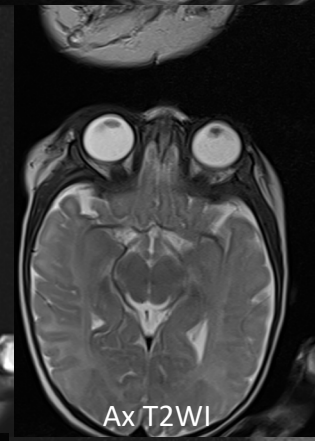
Sag T1WI



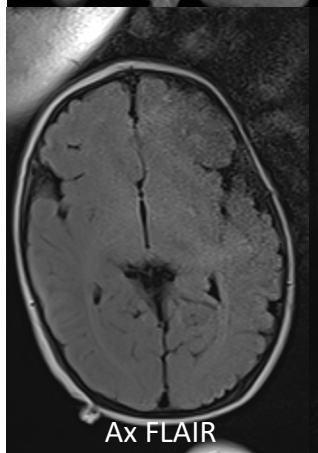
Sag HASTE



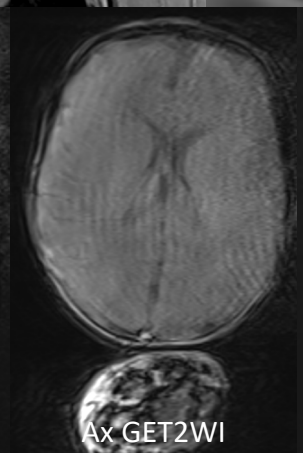
Ax T1WI



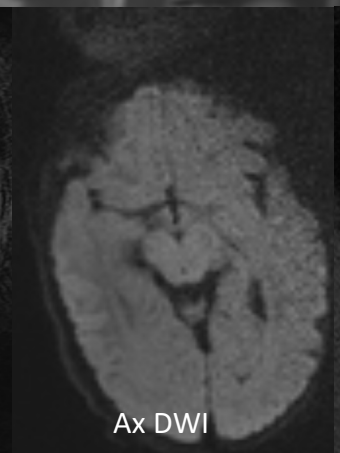
Ax T2WI



Ax FLAIR

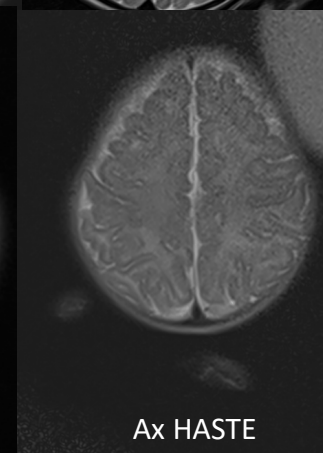


Ax GET2WI



Ax DWI

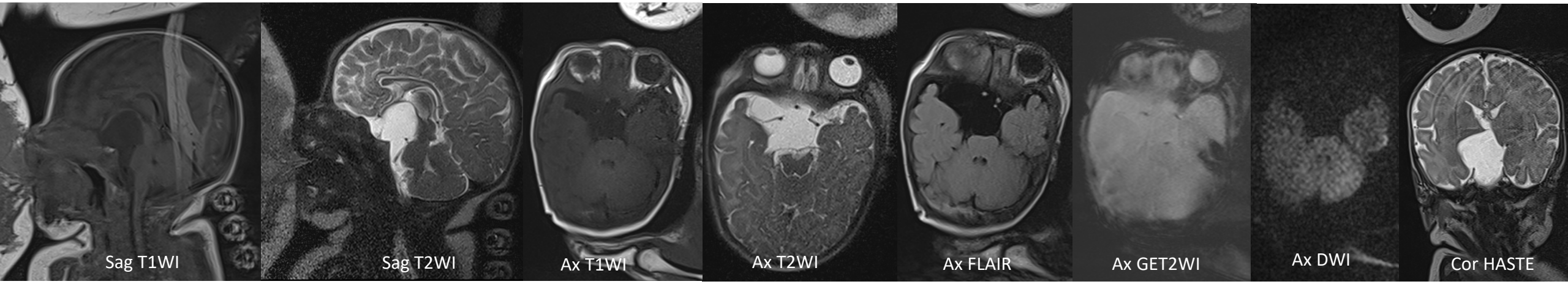
Cor T2WI



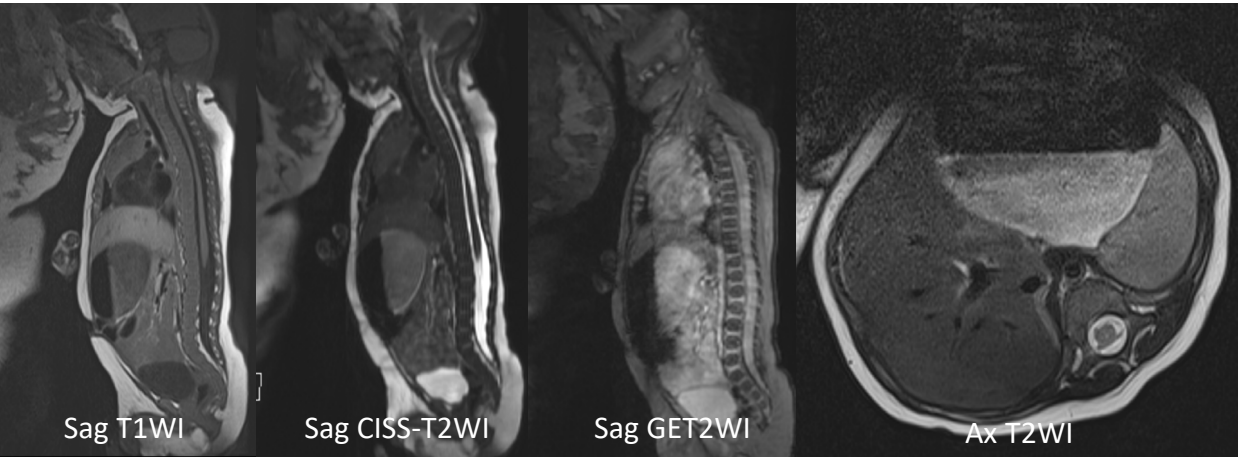
Ax HASTE

Results

Kangaroo Mother Care MRI

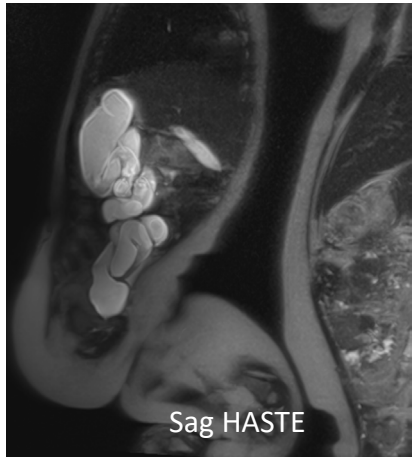


Right parasellar arachnoid cyst



Normal whole spine MRI

Intestinal transit



Hydronephrosis

KMC MRI
Sucking-swallowing
Intestinal transit
Diaphragmatic movement
Respiratory function & Breathing coordination
Urinary system diuresis
Vesicoureteral reflux
Joint & extremity mobility

We also evaluate the mother's included body areas, particularly the breast and chest, to identify any **incidental findings**

Future perspectives

Kangaroo Mother Care MRI

To **standardize** the KMC MRI method by **collaborating** with pediatricians, nurses, midwives, breastfeeding specialists, and parents

To train radiology staff and technicians in this new method, when the child is either breastfeeding or lying close to the parent

To consider using MRI equipment tailored to this technique, maximizing comfort with specific earplugs and quieter sequences

To emphasize the importance of **communication** with the parent by requesting **feedback** after they experience this technique

To do comparative studies and collect data on success rates, potential complications, and differences in outcomes between breastfeeding and non-breastfeeding situations. To **divulge results** in pediatric radiology journals, sharing the benefits of this method with the medical community & highlighting differences in **image quality, acquisition time**, or even the need for **sedation**

To evaluate developmental processes and dynamic conditions in infants through **real-time** observation, such as sucking-swallowing, intestinal transit, diaphragmatic movement, breathing coordination, diuresis, reflux, and joint and extremity mobility

Conclusions

KMC is a worldwide recognized, powerful, low-cost method with expanding applications in neonatal care across different settings

Pediatric MRI studies are challenging, and we continually imagine how to improve their quality minimizing the need for sedation

The KMC MRI Method represents a significant advancement in pediatric imaging, emphasizing the importance of comfort for our youngest patients. The caregiver's presence and the skin-to-skin contact creates an optimal and positive imaging environment

KMC reflects our commitment to continuous pediatric care improvement through this innovative, non-invasive and child-friendly approach. It reduces movement and artifacts for better images improving their quality and shortens scan times to lower costs

It may be present in any hospital or country thanks to its low or zero cost. Future studies should focus on standardizing the technique across institutions further refining protocols, sequences and the method itself

Kangaroo Mother Care MRI

Acknowledgements: Gemma, Pilar, Laura, Cristina, Iris, Cynthia, Anna, Dolors, Enric, Sara, Susana, Javi, Ivan, Juanfra, Carlos, Paco, Pedro

Thank you for your attention!

Angel Sanchez-Montañez, MD
Pediatric Neuroradiology
Universitary Hospital Vall d'Hebron – Barcelona, Spain
angel.sanchez.idi@gencat.cat