Point of care ultrasound: a core competency for the neonatologist? Nick Evans: Newborn Care, RPA Hospital and University of Sydney, Sydney, Australia.

Introduction Protagonists of point of care clinician performed ultrasound (CPU) point to the value of 24/7 immediate diagnosis, antagonists point to limited formal accreditation and risk of misdiagnosis. Implementation of CPU should embrace the benefits while minimising the risk of harms.

Cardiac ultrasound Permits a window on haemodynamic pathophysiology where there are few alternatives. There is a range of acute care indication and with systematic use of ultrasound, the extent to which clinical and vital signs have misled us has become apparent.

Other organ ultrasound Beyond the heart, NPU extends to acute head ultrasound to exclude cerebral haemorrhage. Abdominal and thoracic ultrasound to diagnose abnormal fluid. Bladder ultrasound to confirm urine prior to supra-pubic aspiration. Screening of the entry points of the IVC and SVC into the heart can exclude an intra-cardiac tip position. Ultrasound allows real time localisation of UVC tip position during insertion. There is evolving use of lung ultrasound to diagnose a range of pulmonary conditions and gut ultrasound for NEC.

Training and accreditation It's hard to see that ultrasound skills are not going to become a core competency for neonatologists. There is a need for formal training and accreditation structures. We have such a structure in Australasia in the form of the Certificate of Clinician Performed Ultrasound (CCPU). The training needs in neonatology should be determined by neonatologists, not by other specialties.

The Kidney

IS-026 **NEW DIRECTIONS IN NEONATAL NEPHROLOGY RESEARCH**

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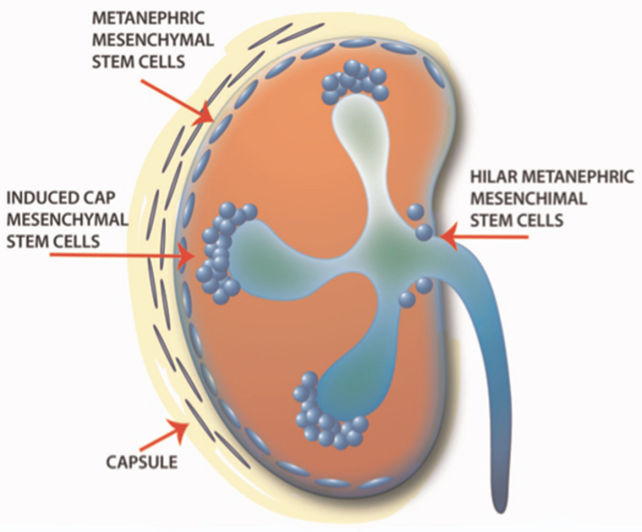
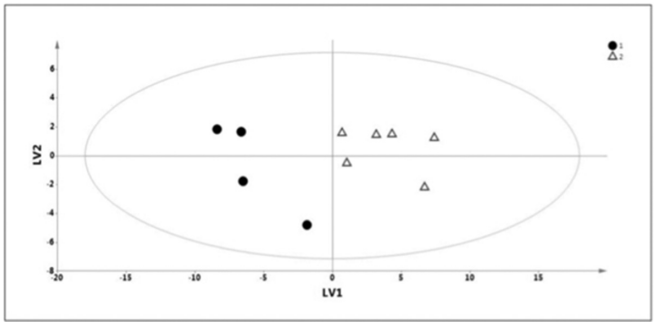
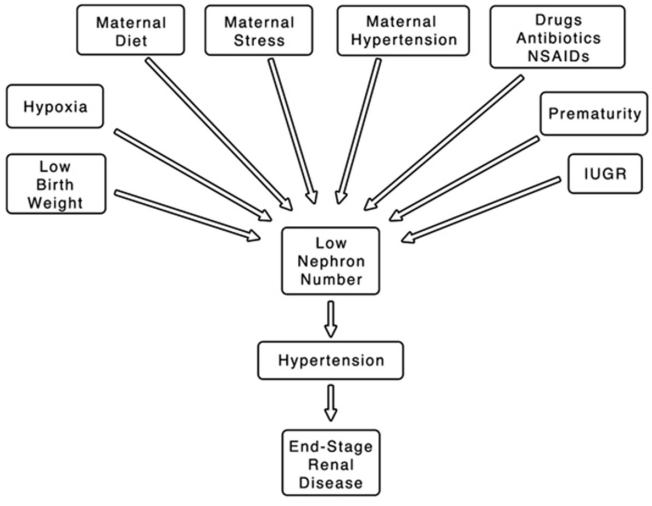


Abstract IS-026 Figure 1 Renal stem cells in preterm kidney. From Faa G. *et al*. Renal stem cells in preterm kidney. J Pediatr Neonat Individual Med. 2014, in press; with permission



Abstract IS-026 Figure 2 Urinary metabolomics in newborn piglet model of asphyxia. PLS-DA model between piglets with Recovery Time (RT) after asphyxia < 15′ (black circles) and piglets with RT > 68′ (open triangles). Model parameters for the explained variation (R2X and R2Y), and the predictive capability, Q2, were: R2X = 0.789; R2Y = 0.869; Q2 = 0.689. From: Murgia F, *et al*. Is the quickness of resuscitation after hypoxia influenced by the oxygen concentration? Metabolomics in piglets resuscitated with different oxygen concentrations. J Pediatr Neonat Individual Med. 2013;2(2):e020233, with permission

Our experience is presented in neonatal nephrology research: embryology, regenerative medicine, metabolomics, perinatal programming (Figures 1–3, with permission). We studied kidney embryology with conventional histology, immunoistochemistry (WT1, MUC1, CD10, CD44, mTOR protein, BCL2, Kim1, Thymosins beta 4 and 10, hCTR1, Glypican 3, Galectin, Nestin, etc.) (Faa G. J Cell Physiol 2012), electron microscopy, embryonic kidney cell line to study the effect of drugs in the normal rate of cell proliferation. We hypothesised the concept of physiological renal regenerative medicine, using the stem cell naturally present in the kidney (Fanni D. JMFNM 2012). Metabolomics (Fanos V. SFNM 2013) is performed by us in studying experimental models of renal damage (i.e. asphyxia, drugs), in the early diagnosis of infection and sepsis induced AKI in the newborn, and in monitoring the patient renal function (Fanos V. Molecules 2013, Clin Biochem 2014). Big data analysis is performed connecting immunoistochemistry and metabolomics in experimental models. Finally we studied the long term cardio-renal effects of extreme prematurity on a cohort of apparently healthy adults born ELBW (Bassareo PP. JPNIM 2013). The life



Abstract IS-026 Figure 3 Epigenetic modulation of kidney developemet. From Faa G. *et al*. Kidney embryogenesis: how to look at old things with new eyes. In: Fanos V., Chevaller R.L., Faa G., Cataldi L. Quartu S. Elena, Hygela Press, 2011, with permission

of every individual is a continuum from prenatal life to adult (see 2 books: Fanos V. *et al*. Hygeia Press 2012, Faa G and Fanos V. Humana Press 2014). According with T. S. Eliot: "In my beginning is my end".

The Parents View on NICU Care

IS-027 FAMILY NEEDS IN THE NICU

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Especially parents of former preterm infants know exactly what it means to get a preterm baby. The pregnancy can end before the pregnant woman has had a belly or even felt the movements of the baby. Many couples did not yet decide on the baby's name when it is born. Psychologists often speak about a stolen pregnancy and a stolen normal delivery. Everything turns upside-down from one day to the other, the feelings are extremely mixed and ambiguous; and not all hospitals have psychologists specialised to look after preterm parents.

Silke Mader, Co-founder and chairwoman of the European Foundation for the Care of Newborn Infants knows from her own experiences that a family needs much more than medical care and support – the entire family needs to be in the centre of interest. Parents need to be empowered in their parental role from their first day in the NICU. The most important point from the beginning is communication with parents in a respectful and understandable way, accepting their autonomy, helping them with education and guidance to find their parental role. For sure, not all parents are easy to handle, but these parents are in a traumatic situation and some of them stay in the unit for months. Family centred care also means to provide support and help for the many times neglected needs of the siblings. Preterm birth has many side effects and often traumatises the whole family.

IS-028 NICU DESIGN

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The physical environment of the NICU has an important impact on the growth and development of the newborn infants who live there, as well as their families and caregivers. Optimising the infant's environment requires first an understanding of its sensory and caregiving needs, then designing an environment that will best support those needs. It is now clear that newborns benefit from extended intimate human contact, especially with their mothers, and that this can be facilitated by providing sufficient space, privacy, and empowerment for parents. Benefits and hazards of the trend towards use of single-family rooms to achieve this goal will be discussed, as well as a brief reflection on the impact of this design strategy on families and caregivers.

Master Class XI – Neonatal Stroke

IS-029 NEONATAL STROKE

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Neonatal stroke may be **defined** as cerebrovascular injury, which occurs around birth. Neonatal stroke is most often referred to as perinatal cerebral injury of ischaemic origin. Two common subtypes are perinatal arterial ischaemic stroke (PAIS, 70%) and cerebral sinovenous thrombosis (CSVT, 30%).

PAIS has an **incidence** between 1/1600 and 1/5000. PAIS may affect both full-term and preterm born infants. Several studies have reported a male predominance of approximately 60%, and PAIS is known to more often involve the left hemisphere. Seizures are the most common first clinical sign of PAIS, occurring in 70–90% of all infants with PAIS and are often focal (hemiconvulsions).

The **diagnosis** is made with neuro-imaging techniques. MRI is the most sensitive imaging modality for detection of PAIS. Diffusion weighted imaging (DWI) plays the most important role in the diagnosis of PAIS due to its high sensitivity for detecting ischaemic lesions in the acute phase.

MRI and especially DWI (restricted diffusion on DWI at the level of the corticospinal tracts) play an important role in the **prediction** of motor outcome, especially for development of unilateral spastic cerebral palsy (USCP).

During the acute phase, **therapeutic** options are limited and mainly involve supportive. Beyond the neonatal period, therapy is aimed at treatment of sequelae. Constraint induced movement therapy (CIMT), which addresses the non-use of the affected hand has shown positive results in children with USCP and can already be applied at a young age.

Adverse Drug Events in Children

IS-030 DRUG ADDITIVES – MORE DANGEROUS IN THE CRITICALLY ILL NEONATE?

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Medicines given to neonates need to be adapted for this age-group. This includes both dosage and pharmaceutical form. Dosage, because clearance is lower in neonates, but also because there is extensive between-individual variability in clearance in the first months of life. Pharmaceutical forms, because formulations need to account for dosage variability, but also to the clinical characteristics of neonates.

The need for an appropriate balance between dose, volume, drug manipulations and dose flexibility in neonates calls for dedicated, tailored formulations.

Besides the active compound (s), drug formulations contain solvents and additives, usually referred as 'excipients', needed as co-solvents, surfactants (general term for compounds that improve absorption, unrelated to the lung surfactant administered for hyaline membrane disease), preservatives, colourants and/or sweeteners. These excipients are added e.g. to ensure stability over a given shelf life, to improve palatability or to facilitate solubility or to bulk up formulations that otherwise contain highly potent active ingredients and are referred to as preservatives, sweeteners, fillers and solvents, coating materials or colouring agents. Consequently, during the development of these formulations, there is a need to quantify and limit excipient exposure based on the currently available knowledge on their safety or toxicity. Furthermore, focused studies on the clinical pharmacology of excipients in neonates should be conducted, and its feasibility will be illustrated by the propylene glycol research project. Finally, until tailored vials and formulations