

## Curriculum Vitae

Koert A. de Waal

Born 26th of June 1967 in Eindhoven, the Netherlands

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Department of Neonatology  
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### BIOGRAPHY

Dr Koert de Waal was born in the Netherlands. His training as a pediatrician and neonatologist was in his home country and the Dutch Caribbean with a post doc training in the Royal Prince Alfred Hospital in Sydney to master functional echocardiography. His interest is in neonatal hemodynamics and cardiac ultrasound. He completed a PhD in central blood flow measurements at the University of Amsterdam, the Netherlands, and he currently works as a consultant in the John Hunter Children's Hospital in Newcastle Australia where he continues his research in neonatal hemodynamics and novel echocardiography techniques.

### CLINICAL LEADERSHIP

I have been a member of the John Hunter NICU team since 2008, and dedicated to deliver up-to-date evidence based clinical thinking and be part of a multidisciplinary team. Components of delivering high quality compassionate medical care include critical appraised thinking, education and open communication.

### CONTRIBUTIONS TO NEONATAL RESEARCH

I am an enthusiastic clinical researcher who has established a growing national and international reputation due to my expertise in neonatal hemodynamics, septic shock, diastolic heart failure, patent ductus arteriosus, pulmonary hypertension, point of care ultrasound and novel echocardiography techniques. I have received over 50 national and international speaking invitations in the past 5 years, presented 60 abstracts and provided 25 educational hands-on ultrasound sessions around the world. We were able to publish 52 articles with over 800 citations to date, and have received local and national competitive grants from the Hunter Children's Research Foundation, the John Hunter Hospital Charitable Trust Fund, Heartkids, and the Australian Society for Ultrasound in Medicine. I review 10-15 articles per year for multiple journals since 2005, including all of the high ranking neonatology and echocardiography journals.

### ECHOCARDIOGRAPHY TEACHING COURSES

Clinician performed ultrasound (CPU) course, introduction and advanced modules, John Hunter Children's Hospital, Newcastle, Australia, 2008 – current

Bi-annual Monash cardiovascular symposium, Melbourne, Australia, 2012-current

Pulmonary hypertension simulation day, Sydney NSW 2015, 2017, 2018, 2019

Speckle tracking echocardiography teaching session, Philips headquarters, Andover Mass 2016  
Blood speckle imaging, Australia, Philippines 2021  
CPU courses: Amsterdam, The Netherlands 2010 and 2011, Jakarta, Indonesia 2011, Oslo, Norway 2012, Lima, Peru 2015, Brisbane QLD 2016, USANA, Johannesburg, South Africa 2017, KLINC, Kuala Lumpur 2017, JHCH, Newcastle NSW 2018, Dubai 2018, Hong Kong 2018, Ipoh, Malaysia 2018, Shijiazhuang, China 2019, Malaysia 2019, Bangkok 2024

#### SELECTED PRESENTATIONS LAST 5 YEARS

*Hypovolemic shock in newborns.* Sydney 2024, Australia  
*Left ventricular function, systolic and diastolic.* BINS 2024, Bangkok, Thailand  
*Newborn Septic shock.* BINS 2024, Bangkok, Thailand  
*Non-invasive use of iNO.* SIMday 2023, Sydney, Australia  
*Blood Speckle Imaging, current role in clinical practice and research.* ASUM 2023, Sydney, Australia  
*Emerging new concepts in neonatal septic shock.* RHW webinar 2023, Sydney, Australia  
*Do fluids, sodium or the PDA have anything to do with BPD?* RHW webinar 2023, Sydney, Australia  
*Echocardiography in neonatal sepsis,* PanAmerican webinar 2022, Iowa, US  
*What inotrope, when and why?* USANA 2022, Johannesburg, South Africa  
*How to get the best out of your iNO.* ANZNN CPI 2022, Sydney, Australia  
*Oxygenie, new machine learning technology.* SLE webinar 2022, Sydney, Australia  
*Diastolic heart failure,* neoHeart, Los Angeles USA 2022  
*Hypovolemia in the newborn,* FAOPS, Kuala Lumpur, Malaysia 2022  
*PDA, and the drift towards therapeutic nihilism,* IAP Neocon, India 2022  
*What can we learn from iNO non-responders?* Mallinckrodt webinar 2022  
*How intracardiac blood flow patterns determine the development of the heart,* ASUM, Sydney 2022  
*LV diastolic dysfunction in preterm infants,* Pan-American webinar 2021  
*Blood Speckle Imaging, current applications in research and clinical practice,* ASEAN Philippines 2021  
*Deconstructing hypoxia and defining PPHN,* PSANZ 2021, Sydney, Australia  
*The ultimate PDA trial,* UNC Neonatal-Perinatal Medicine Symposium 2021  
*iNO use and indications,* Lee Pharm meeting 2021, Shanghai, China  
*Cardiac development after preterm birth,* RHW session 2021, Sydney, Australia  
*Ultrasound assessment of preload,* NeoPearls 2021, Dubai, UAE  
*Cardiovascular support after birth asphyxia,* IAP 2021, Kerala, India  
*Neonatal sepsis and guided treatment,* Learn from the legends 2021, Kerala, India  
*Should we treat the PDA,* RHW session 2020, Sydney, Australia  
*Preventing IVH,* KLINC 2019, Kuala Lumpur, Malaysia  
*Clinician performed cardiac ultrasound,* ASUM 2020, Melbourne, Australia  
*PPHN in sepsis,* Mallinckrodt 2019, Toronto, Canada  
*Training in hemodynamic evaluation: from Europe to Down Under,* PAS 2018, Toronto, Canada

#### RELEVANT PUBLICATIONS

##### *Diastolic function*

de Waal K, Crendal E, Poon AC, Latheef MS, Sachawars E, MacDougall T, Phad N. The association between patterns of early respiratory disease and diastolic dysfunction in preterm infants. *J Perinatol.* 2023 Oct;43(10):1268-1273  
de Waal K, Costley N, Phad N, Crendal E. Left Ventricular Diastolic Dysfunction and Diastolic Heart Failure in Preterm Infants. *Pediatr Cardiol.* 2019;40(8):1709-1715.  
de Waal K, Crendal E, Boyle A. Left ventricular vortex formation in preterm infants assessed by blood speckle imaging. *Echocardiography.* 2019;36(7):1364-1371  
de Waal K, Phad N, Boyle A. Left atrium function and deformation in very preterm infants with and without volume load. *Echocardiography.* 2018;35(11):1818-1826

### *Sepsis*

- de Waal K, Petoello E. Assessing fluid responsiveness with ultrasound in the neonatal intensive care setting: the mini-fluid challenge. *Eur J Pediatr.* 2024 Apr;183(4):1947-1951
- Johnston N, de Waal K. Clinical and haemodynamic characteristics of preterm infants with early onset sepsis. *J Paediatr Child Health.* 2022 Dec;58(12):2267-2272. doi: 10.1111/jpc.16218
- Gorantiwar S, de Waal K. Progression from sepsis to septic shock and time to treatments in preterm infants with late-onset sepsis. *J Paediatr Child Health.* 2021;57(12):1905-1911
- Rowcliff K, de Waal K, Mohamed AL, Chaudhari T. Noradrenaline in preterm infants with cardiovascular compromise. *Eur J Pediatr.* 2016;175(12):1967-1973
- de Waal K, Evans N. Hemodynamics in preterm infants with late-onset sepsis. *J Pediatr.* 2010;156(6):918

### *Cardiac development after preterm birth*

- Le N, Phad N, de Waal K. Cardiac remodeling during the neonatal intensive care period; a window of opportunity for early prevention of heart failure? *Early Hum Dev.* 2020;151:105168
- Phad NS, de Waal K, Holder C, Oldmeadow C. Dilated hypertrophy: a distinct pattern of cardiac remodeling in preterm infants. *Pediatr Res.* 2020;87(1):146-152

### *Patent Ductus Arteriosus*

- Liguori MB, Ali SKM, Bussman N, Colaizy T, Hundscheid T, Phad N, Clyman R, de Boode WP, de Waal K, El-Khuffash A, Gupta S, Laughon M. Patent Ductus Arteriosus in Premature Infants: Clinical Trials and Equipose. *J Pediatr.* 2023 Oct;261:113532
- de Waal K, Prasad R, Kluckow M. Patent ductus arteriosus management and the drift towards therapeutic nihilism - What is the evidence? *Semin Fetal Neonatal Med.* 2021;26(2):101219
- de Waal K, Phad N, Stubbs M, Chen Y, Kluckow M. A Randomized Placebo-Controlled Pilot Trial of Early Targeted Nonsteroidal Anti-Inflammatory Drugs in Preterm Infants with a Patent Ductus Arteriosus. *J Pediatr.* 2021;228:82-86.e2
- de Waal K, Phad N, Collins N, Boyle A. Cardiac remodeling in preterm infants with prolonged exposure to a patent ductus arteriosus. *Congenit Heart Dis.* 2017;12(3):364-372
- Zonnenberg I, de Waal K. The definition of a haemodynamic significant duct in randomized controlled trials: a systematic literature review. *Acta Paediatr.* 2012;101(3):247-51

### *Echocardiography, methodology*

- Petoello E, Kerkow E, Phad N, Ficial B, de Waal K. Which left atrial volume measurement should we use in the neonatal intensive care? *Early Hum Dev.* 2024 Apr;191:105985. Epub 2024 Mar 10
- Crendal E, De Waal K, Vitiello D. Assessing Intracardiac Vortices with High Frame-Rate Echocardiography-Derived Blood Speckle Imaging in Newborns. *J Vis Exp.* 2023 Dec 22;(202). doi: 10.3791/65189
- Petoello E, Flore AI, Nogara S, Bonafiglia E, Lenzi MB, Arnone OC, Benfari G, Ciarcia M, Corsini I, De Waal K, Gottin L, Ficial B. Global longitudinal strain is an informative index of left ventricular performance in neonates receiving intensive care. *Sci Rep.* 2024 Apr 17;14(1):8881
- de Waal K, Kluckow M. Superior vena cava flow: Role, assessment and controversies in the management of perinatal perfusion. *Semin Fetal Neonatal Med.* 2020;25(5):101122
- Phad N, de Waal K. Left ventricular ejection fraction using manual and semi-automated biplane method of discs in very preterm infants. *Echocardiography.* 2020;37(8):1265-1271
- Popat H, Robledo KP, Kirby A, Sebastian L, Evans N, Gill A, Kluckow M, Sinhal S, de Waal K, Tarnow-Mordi W, Osborn D. Associations of measures of systemic blood flow used in a randomized trial of delayed cord clamping in preterm infants. *Pediatr Res.* 2019;86(1):71-76
- Phad N, de Waal K, Jones M. Agreement and reliability of the velocity time integral method and the method of disks to determine stroke volume in preterm infants. *Early Hum Dev.* 2018;125:31-34
- de Waal K, Phad N. A comparison between Philips and Tomtec for left ventricular deformation and volume measurements in neonatal intensive care patients. *Echocardiography.* 2018;35(3):375-379

de Waal K, Phad N, Lakkundi A, Tan P. Cardiac Function After the Immediate Transitional Period in Very Preterm Infants Using Speckle Tracking Analysis. *Pediatr Cardiol.* 2016;37(2):295-303

Phillips S, de Waal KA. Assessment and feasibility of the four landmarks of the aortic root in a cohort of very preterm infants. *Ann Pediatr Cardiol.* 2015;8(3):184-8

de Waal K, Lakkundi A, Othman F. Speckle tracking echocardiography in very preterm infants: feasibility and reference values. *Early Hum Dev.* 2014;90(6):275-9

de Waal K, Kluckow M, Evans N. Weight corrected percentiles for blood vessel diameters used in flow measurements in preterm infants. *Early Hum Dev.* 2013;89(12):939-42

de Waal KA. The methodology of Doppler-derived central blood flow measurements in newborn infants. *Int J Pediatr.* 2012;2012:680162

Sloot SC, de Waal K, van der Lee JH, van Kaam AH. Central blood flow measurements in stable preterm infants after the transitional period. *Arch Dis Child Fetal Neonatal Ed.* 2010;95(5):F369-72

#### *Heart-lung interactions*

Lakkundi A, Wright I, de Waal K. Transitional hemodynamics in preterm infants with a respiratory management strategy directed at avoidance of mechanical ventilation. *Early Hum Dev.* 2014;90(8):409

de Waal K, Evans N, van der Lee J, van Kaam A. Effect of lung recruitment on pulmonary, systemic, and ductal blood flow in preterm infants. *J Pediatr.* 2009;154(5):651-5

de Waal KA, Evans N, Osborn DA, Kluckow M. Cardiorespiratory effects of changes in end expiratory pressure in ventilated newborns. *Arch Dis Child Fetal Neonatal Ed.* 2007;92(6):F444-8

#### *Transitional, other*

Tarnow-Mordi W, Morris J, et al; Australian Placental Transfusion Study Collaborative Group. Delayed versus Immediate Cord Clamping in Preterm Infants. *N Engl J Med.* 2017;377(25):2445-2455

de Waal K, Phad N, Lakkundi A, Tan P. Post-transitional adaptation of the left heart in uncomplicated, very preterm infants. *Cardiol Young.* 2017;27(6):1167-1173

Popat H, Robledo KP, Sebastian L, Evans N, Gill A, Kluckow M, Sinhal S, de Waal K, Tarnow-Mordi W, Osborn D. Effect of Delayed Cord Clamping on Systemic Blood Flow: A Randomized Controlled Trial. *J Pediatr.* 2016;178:81-86.e2

de Waal K, Phad N, Collins N, Boyle A. Myocardial function during bradycardia events in preterm infants. *Early Hum Dev.* 2016;98:17-21

Phad N, de Waal K. What Inotrope and Why? *Clin Perinatol.* 2020;47(3):529-547

de Waal K, Kluckow M. Prolonged rupture of membranes and pulmonary hypoplasia in very preterm infants: pathophysiology and guided treatment. *J Pediatr.* 2015;166(5):1113-20

de Waal K, Kluckow M. Functional echocardiography; from physiology to treatment. *Early Hum Dev.* 2010;86(3):149-54

## EDUCATION AND WORK

1980-1986 Secondary School, Veendam, the Netherlands  
1986-1995 Faculty of Medicine, University of Groningen, the Netherlands  
1995-1996 Pediatric resident, Ziekenhuis Hengelo, the Netherlands  
1996-1997 Neonatology resident, Emma Children's Hospital AMC, Amsterdam, the Netherlands  
1997-2002 Pediatric training program, University of Amsterdam, the Netherlands:  
Emma Children's Hospital AMC, Amsterdam, the Netherlands, St Elizabeth Hospital, Willemstad,  
Curacao, Dutch Antilles and Hospital of Amstelveen, Amstelveen, the Netherlands  
2002-2004 Neonatal Fellowship Program, University of Amsterdam, the Netherlands:  
Emma Children's Hospital AMC, Amsterdam, the Netherlands and Isala Clinics, Zwolle, the Netherlands  
2004-2005 Consultant Neonatology, Isala Clinics, Zwolle, the Netherlands  
2005-2006 Post Graduate Fellow Royal Prince Alfred Hospital, Sydney NSW, Australia  
2006-2008 Consultant Neonatology/Perinatology, Emma Children's Hospital AMC, Amsterdam,  
the Netherlands  
2008-current Consultant Neonatology/Perinatology, John Hunter Children's Hospital, dept of  
Neonatology, Newcastle NSW, Australia

## DEGREES

Jun 1995 Medical doctor  
Dec 2001 Diploma of tropical Paediatrics  
Apr 2002 Paediatrician (NVK, the Netherlands)  
Oct 2004 Neonatologist (NVK, the Netherlands)  
Sept 2008 Certificate in Clinician Performed Ultrasound (CCPU)  
Neonatal full recognition, with training capabilities  
Australasian Society for Ultrasound in Medicine  
July 2010 FRACP neonatology and perinatology (Australia)  
June 2011 PhD Central blood flow measurements in newborn infants. University of Amsterdam, the  
Netherlands. Supervisors Anton van Kaam, the Netherlands and Nick Evans, Australia

## APPOINTMENTS

2008 Senior Staff Specialist in Neonatology, John Hunter Children's Hospital, Newcastle NSW  
2016 Honorary conjoint lecturer, University of Sydney NSW  
2017 Conjoint Associate Professor, University of Newcastle NSW

## ACADEMIC/PROFESSIONAL LEADERSHIP POSITIONS

2012 Australian and New Zealand Neonatal Network (ANZNN), executive committee member  
2014 Children Young People & Families network, research advisory committee member  
2016 Paediatric trials network Australia (PTNA), steering committee member  
2016 Healthcare Variation Australian Commission on Safety and Quality in Health, advisor  
2022 ASE cardiac ultrasound, advisor neonatal SIG group