Age-related global coagulation changes: From birth to old age

Vincent Lu [1,2,3], Paul Monagle [4,5,6], Chantal Attard [4,5,6], Vasiliki Karlaftis [4,5,6], Ilaria De Simone [7], Dana Huskens [7], Bas de Laat [7], Tengyi Cai [1,2], Prahlad Ho [1,2,3], Hui Yin Lim [1,2,3]

[1] Northern Clinical Diagnostics and Thrombovascular Research Group, Northern Health, Epping, Victoria, Australia
[2] Northern Pathology Victoria, Epping, Victoria, Australia
[3] School of Health and Biomedical Sciences, RMIT, Bundoora, Victoria, Australia
[4] Haematology, Murdoch Children's Research Institute, Parkville, Victoria, Australia
[5] Department of Paediatrics, The University of Melbourne Parkville, Victoria, Australia
[6] Clinical Haematology, The Royal Children's Hospital, Parkville, Victoria, Australia
[7] Synapse Research Institute, 6217 KD Maastricht, The Netherlands

Northern Health

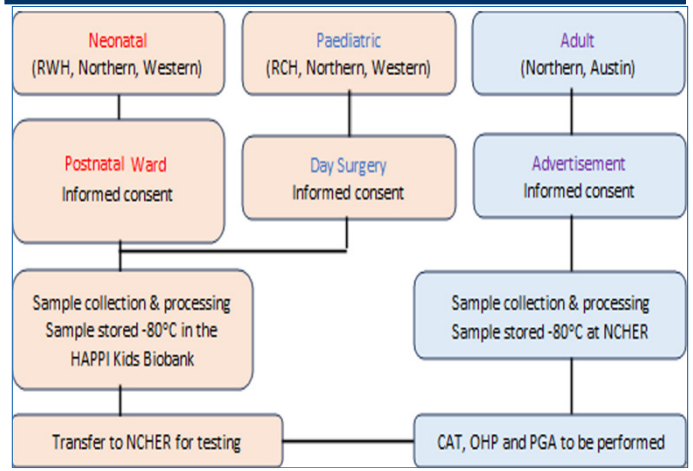
RESEARCH WEEK
20-24 OCTOBER 2025
INSPIRED RESEARCHERS
Northern Health

Background / Aims

Background:
Global coagulation assays (GCA) provide a comprehensive view of haemostasis and show potential in predicting bleeding and thrombosis risk. Adopting GCAs into clinical practice requires understanding normal age ranges.

Aims:
To evaluate the differences in GCAs (thrombin (TG) and plasmin generation (PGA) using calibrated automated thrombogram (CAT) and overall haemostatic potential (OHP)) in neonates through to older adults.

Recruitment Process



Methodology

Paediatric
(Newborn to 17 Y)
- N= 380
- ~20 samples/Per Age (Year)
- Healthy with no systemic abnormalities
- No anticoagulant, antiplatelet, hormonal therapy

Adult
(20 Y – 79 Y)
- N= 173
- No Cardiovascular disease
- No Malignancy
- No Anticoagulant, Antiplatelet, Hormonal Therapy

Thrombin Generation (CAT/TG)

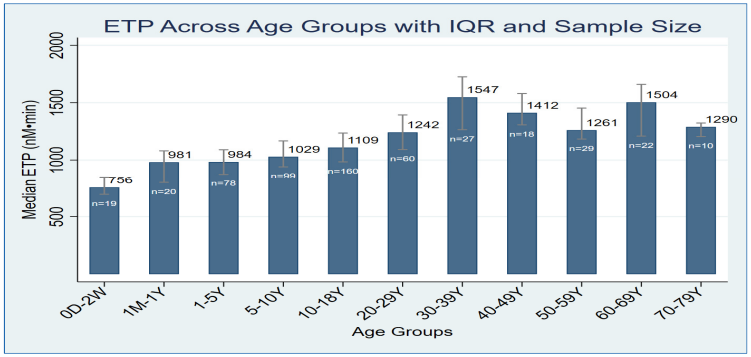


Figure 1: ETP: Endogenous Thrombin Potential expressed in median, IQR: interquartile range, n: sample size

Plasmin Generation (PGA)

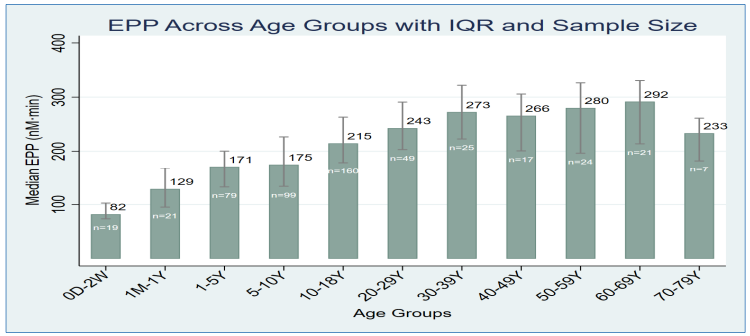


Figure 2: EPP: Endogenous Plasmin Potential expressed in median, IQR: interquartile range, n: sample sizes

Overall Haemostatic Potential (OHP)

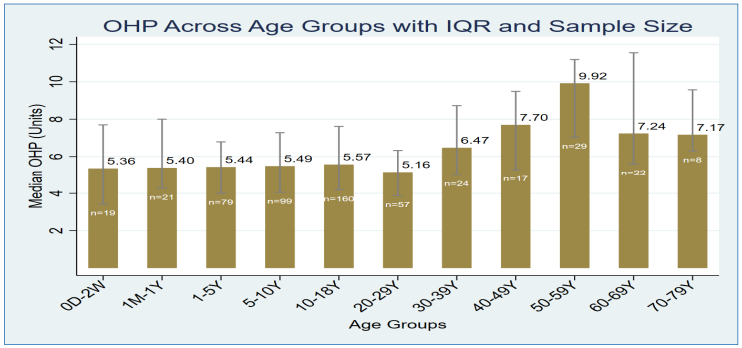


Figure 3: OHP: Overall Haemostatic Potential expressed in median, IQR: interquartile range, n: sample sizes

Results/Discussion

- Neonates exhibit lowest thrombin (ETP), plasmin (EPP) and fibrin (OHP) generation. These parameters continues to rise throughout developmental stages, with ETP and EPP reaching their peak in the third decade and OHP in the fifth decade.
- OHP (total fibrin generation after tPA-mediated fibrinolysis) maintained similar level in children indicating a balanced interplay between clot formation and breakdown, which likely a protective mechanism against excessive bleeding and clotting.
-OHP begins to shift after the third decade of life, which may reflect the start of rapid progression towards atherosclerosis

Conclusion

GCA demonstrated age-related changes of coagulation proteins. These findings emphasise the unique role of GCA in detecting subtle coagulation changes that are not detectable using routine coagulation assays.