

# Influence of timing of maternal pertussis immunization on the quality of transferred antibodies in term and preterm neonates

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# Maternal vaccination against pertussis

- Gold Standard in Switzerland since 2013
- Passive immunization of newborn against lethal or severe pertussis
- Active transfer of antibodies through the placental membrane to the fetus

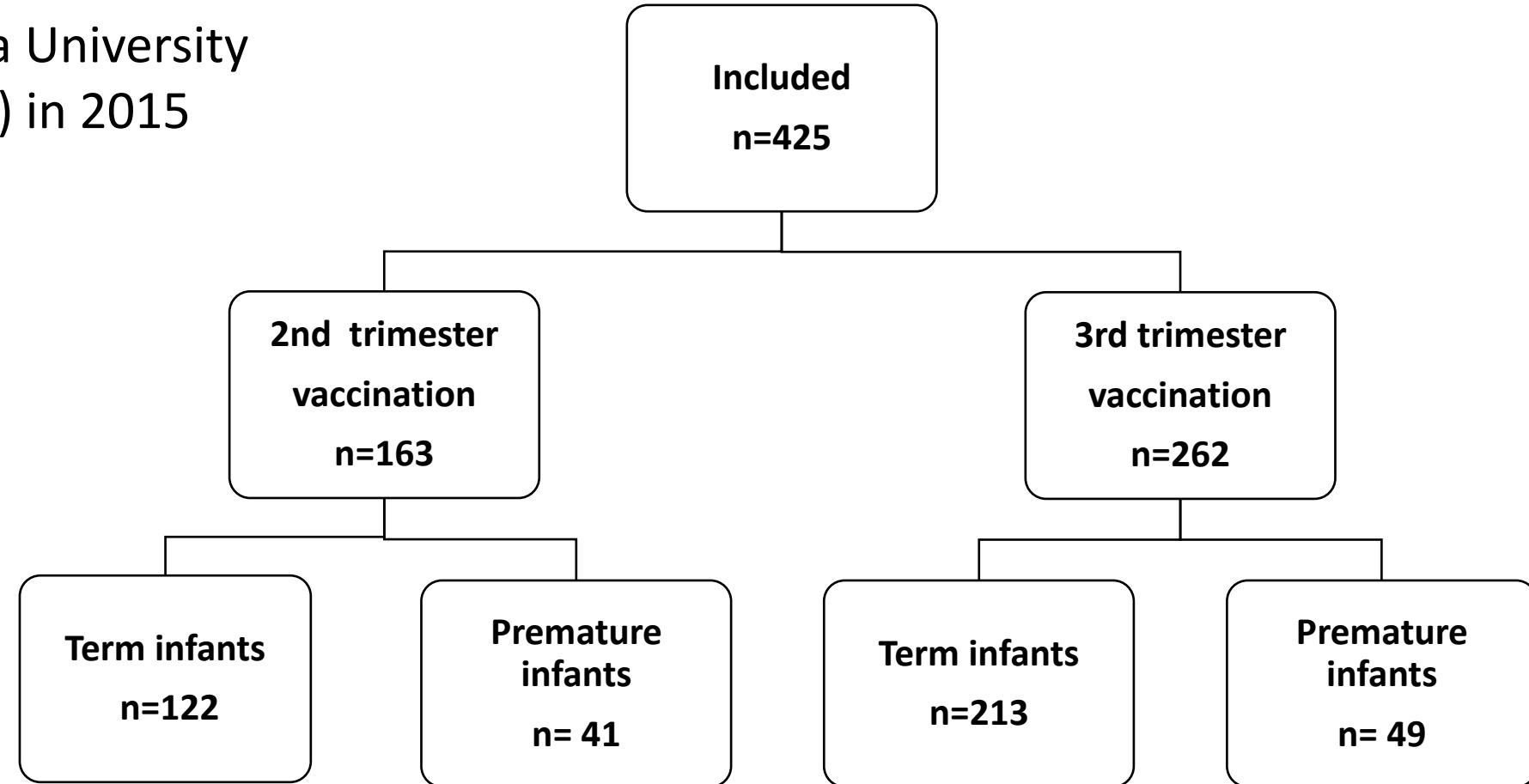
# Antibody transfer during pregnancy



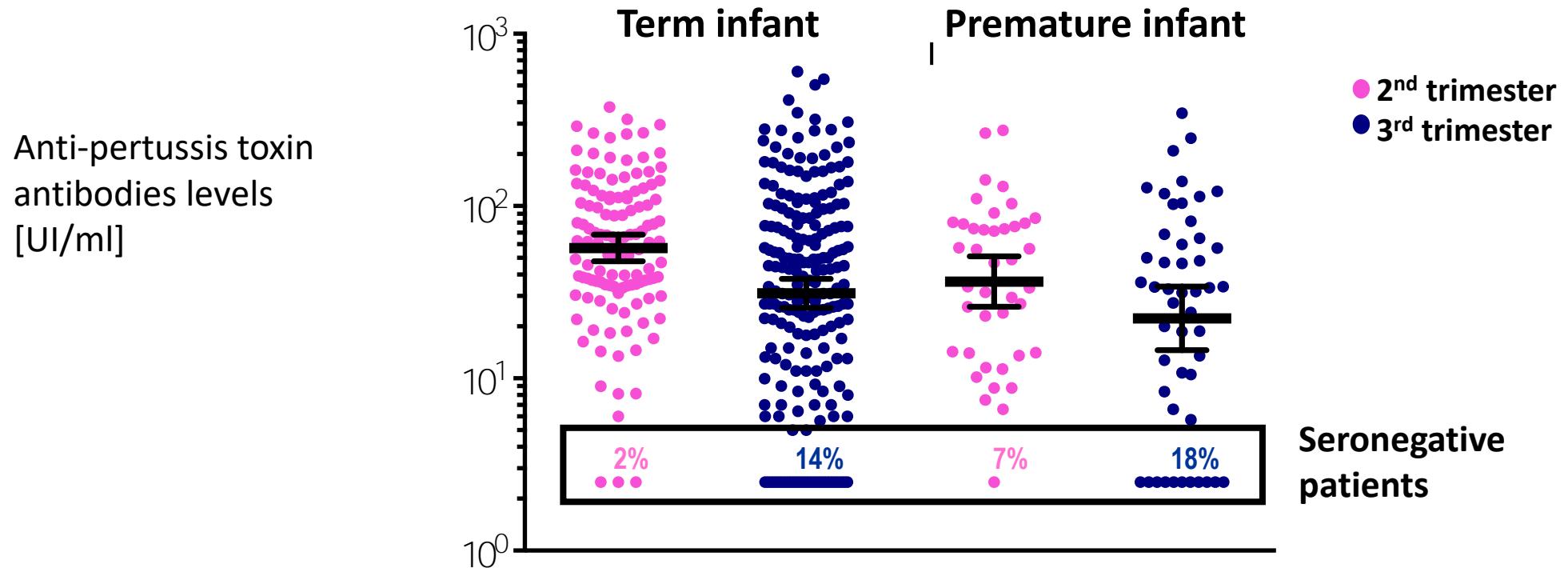
# On the quantity of transferred antibodies

Recruitment at the Geneva University Hospitals' Maternity (HUG) in 2015

Ombilical cord samples

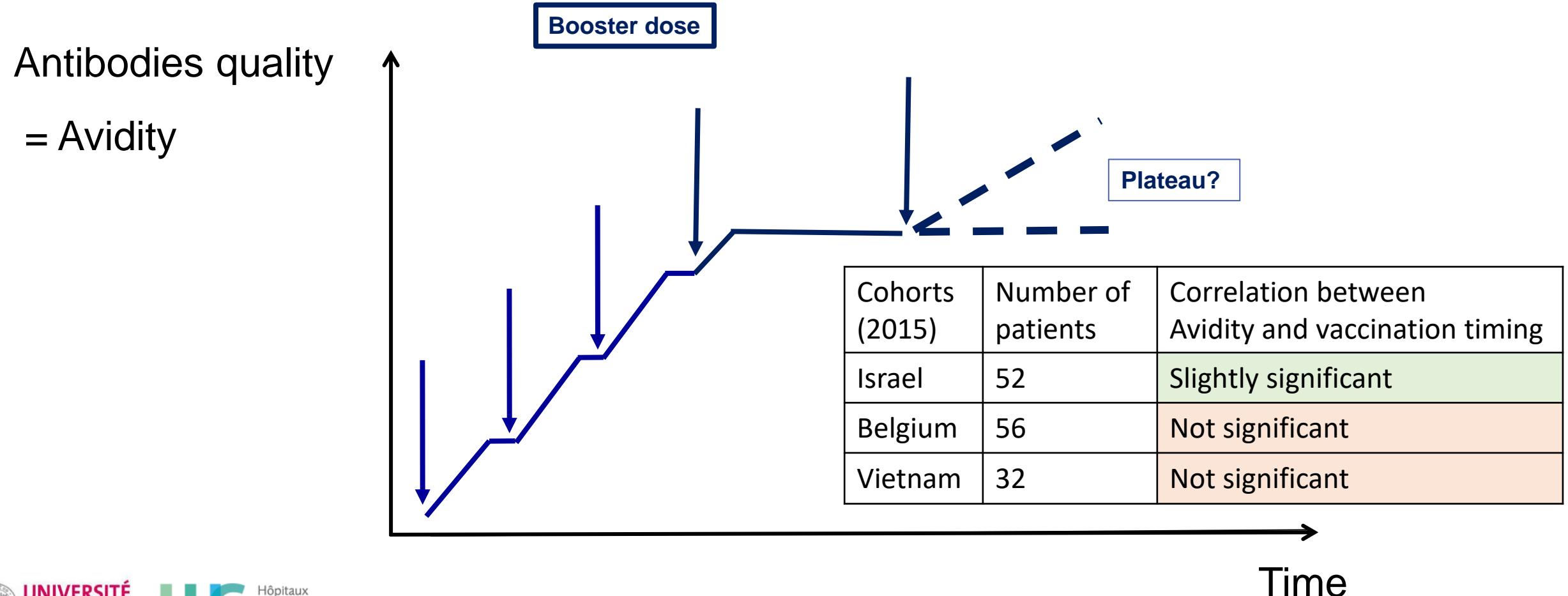


# Antibodies quantity are higher after 2<sup>nd</sup> trimester vaccination



\*Eberhardt et al, CID 2015 et 2016

# Quality maturation of antibodies against pertussis



# Our study

## Hypothesis

The timing of vaccination does not influence maternal antibodies avidity levels

- Avidity levels are already high in adults after numerous vaccination booster during childhood against pertussis
- Avidity will probably not be modified by an additional booster dose

## Objective

Compare avidity levels in relation with time between vaccination and birth



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# Population

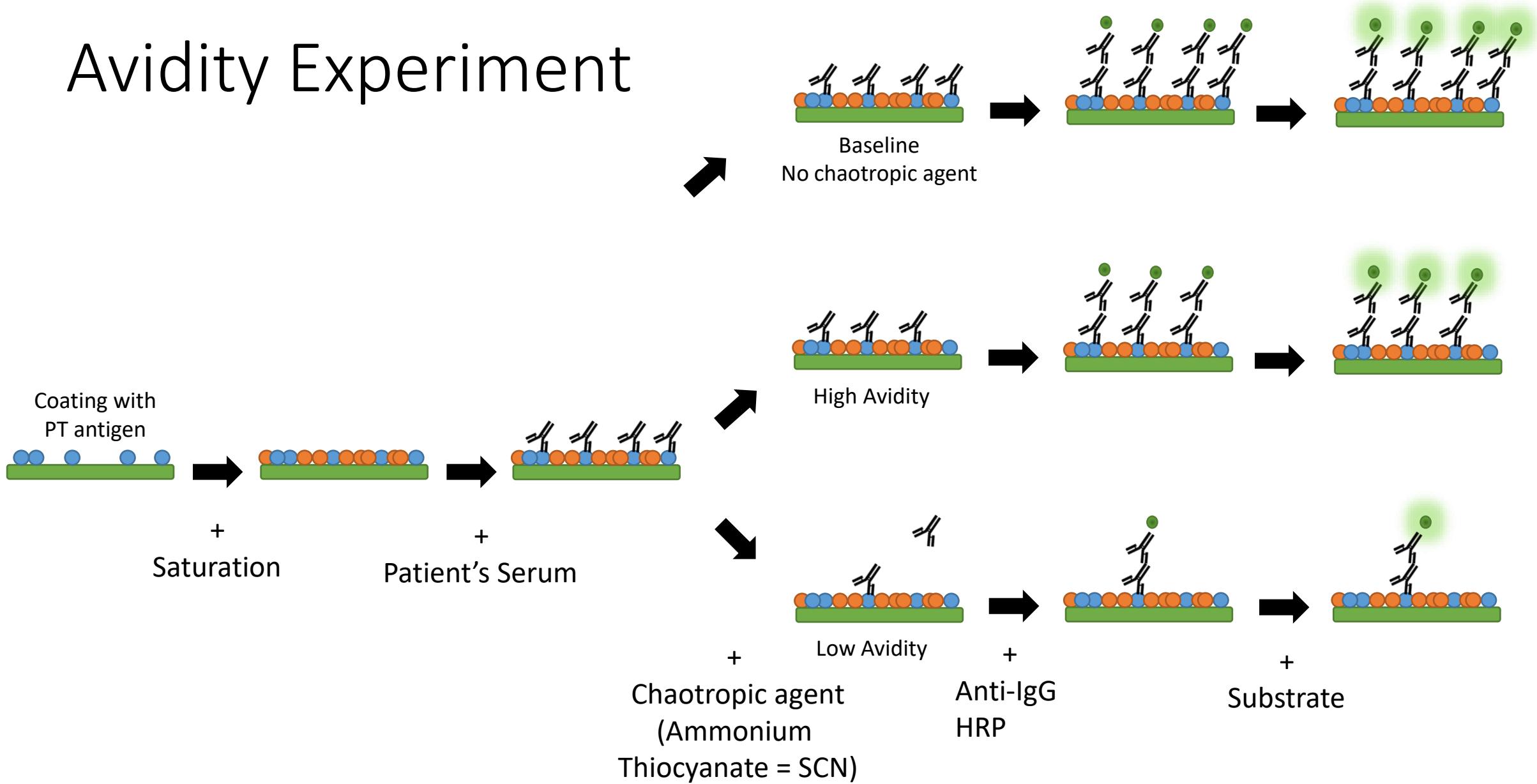
Umbilical cord samples  
Recruitment at HUG  
Maternity in 2015

Antibody levels titration  
n= 422  
(premature infants, n=87)

Avidity testing (quality)  
n= 370  
(premature infants, n=72)

Seronegative patients (< 5 U/ml)  
n= 52 (premature infants, n=15)

# Avidity Experiment



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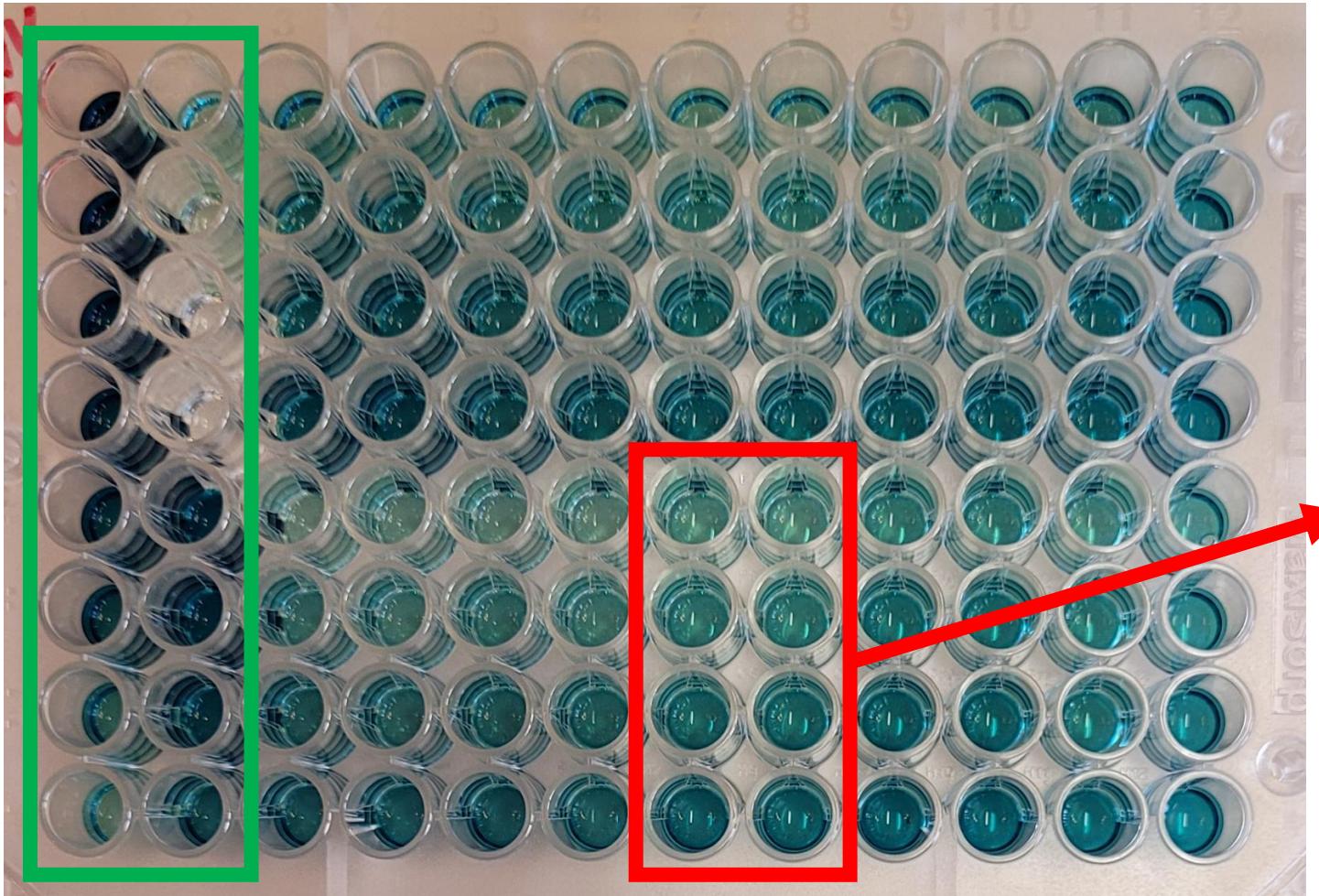
HUG

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# In real life

- Standard
- Calibrator
- Whites

Used for transformation of optic density (OD) in units/ml



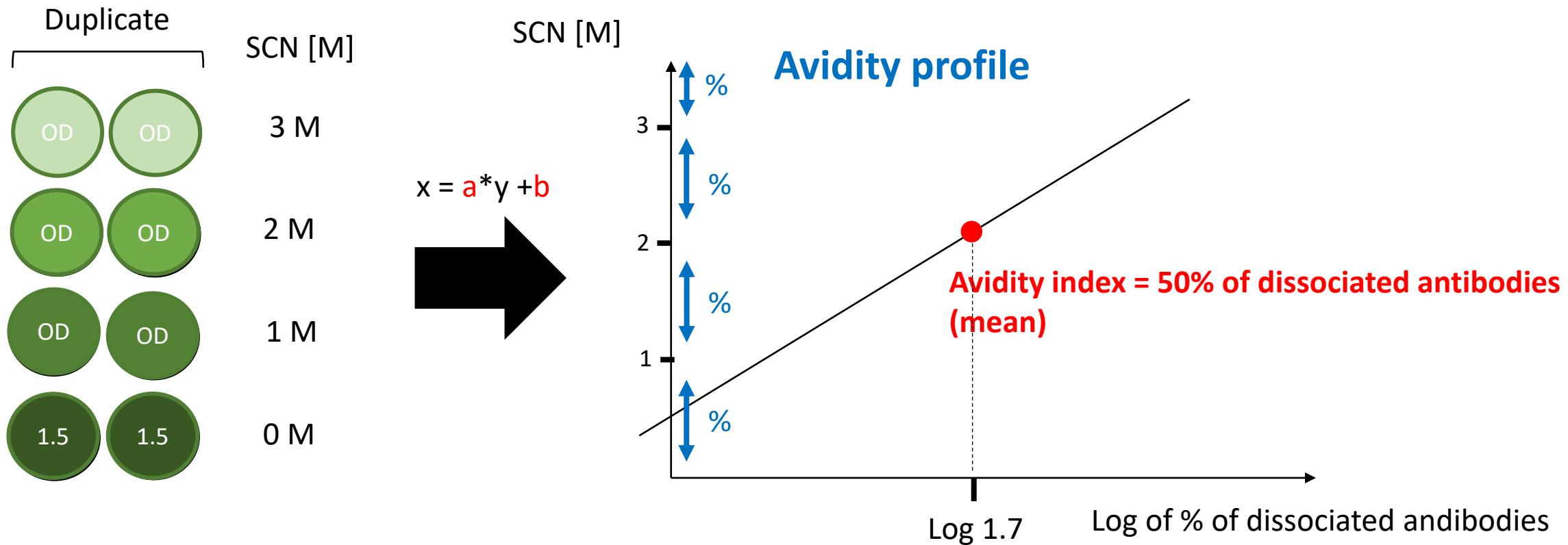
Patient's serum

Duplicate

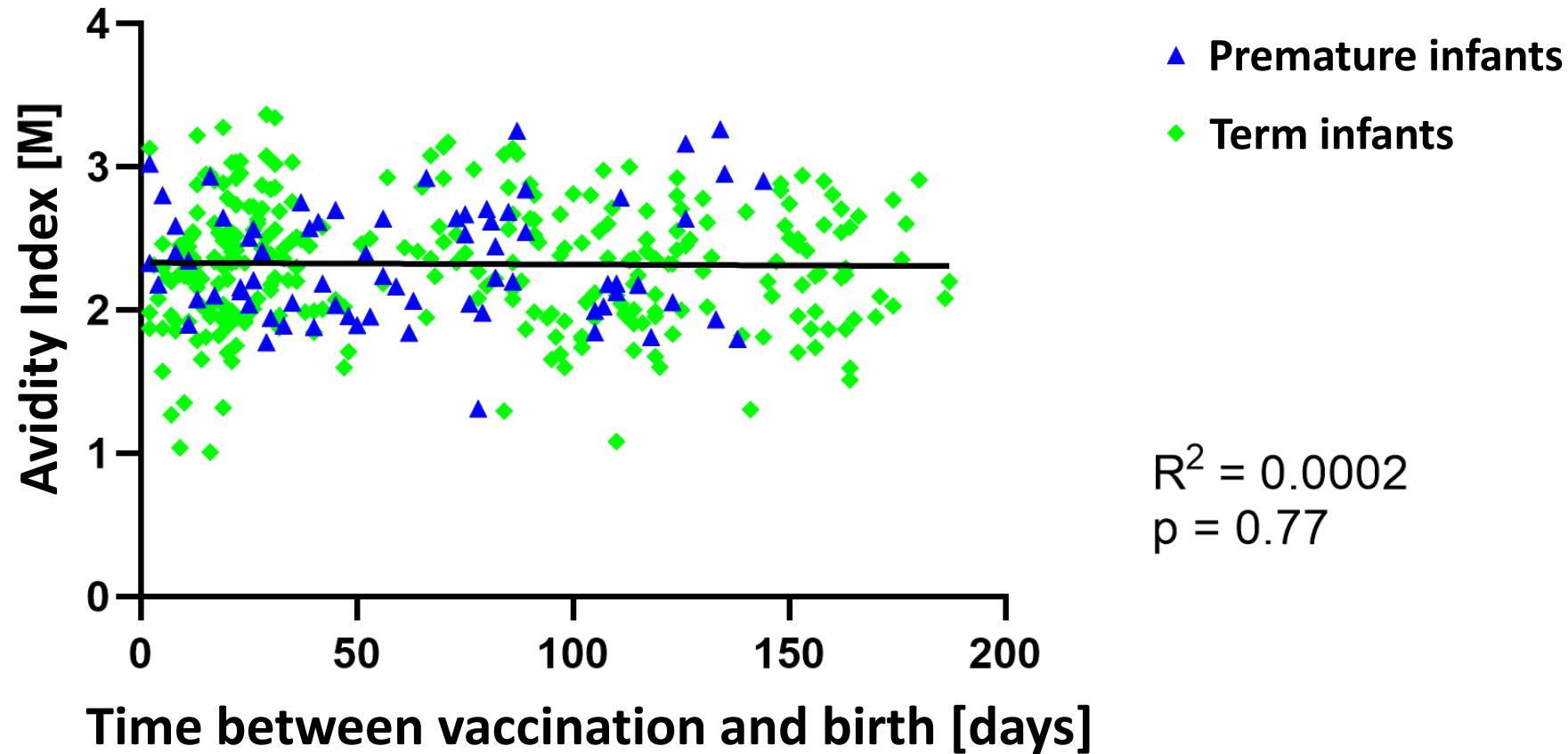
SCN [M]
3 M
2 M
1 M
0 M

The table shows the corresponding SCN values for each row of patient serum samples. The values decrease from 3 M down to 0 M. The first two columns of wells are labeled 'OD' and the last two columns are labeled '1.5'. A bracket above the first two columns is labeled 'Duplicate'.

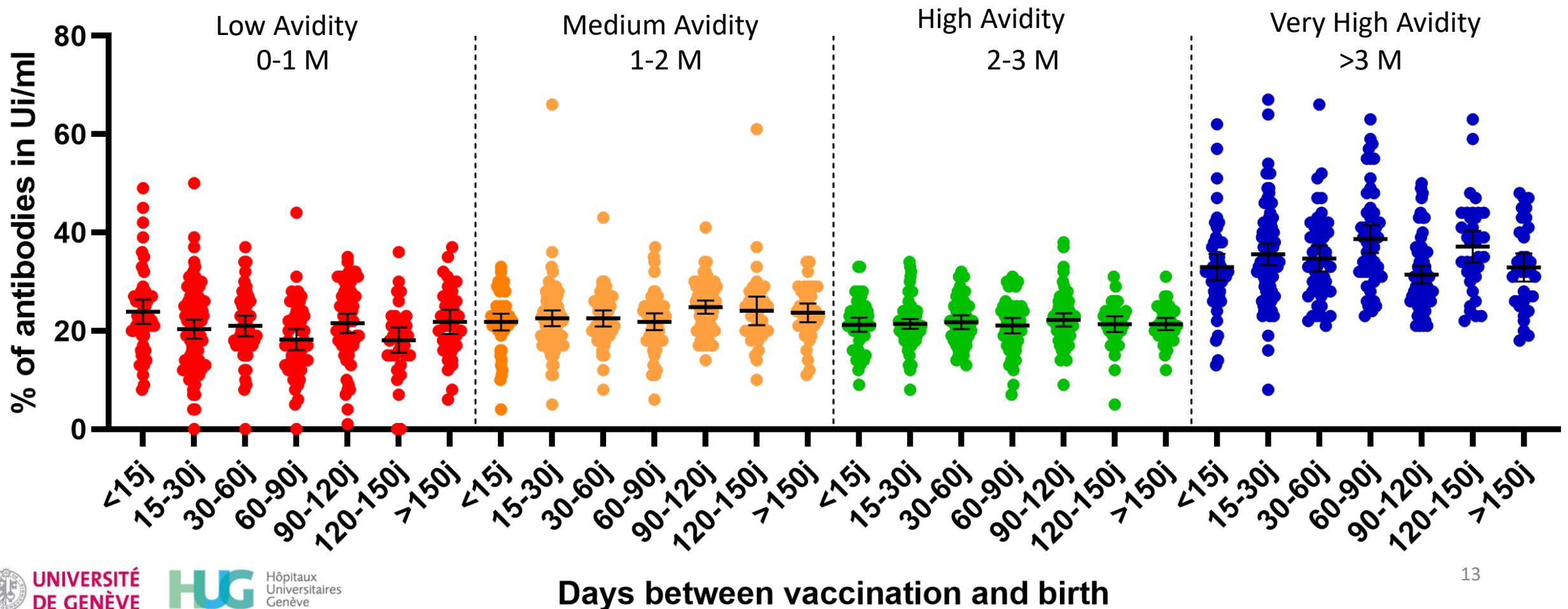
# Avidity index and avidity profile calculation



# There is no link between avidity and time between vaccination and birth



# There is no link between avidity profile and time between vaccination and birth





# Take Home Message

- **There is no correlation** between avidity and maternal pertussis vaccination timing during pregnancy
- The best pertussis vaccination schedule remains the **2<sup>nd</sup> trimester** (quantity and quality)



# Acknowledgments

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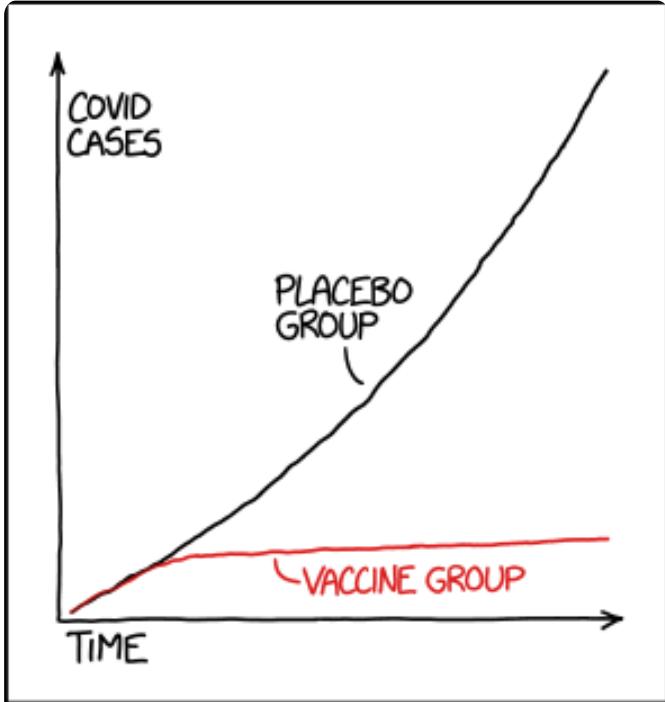
Antonina Chilin

Plateforme pédiatrique de recherche

Suzanne Duperret-Vonlanthen



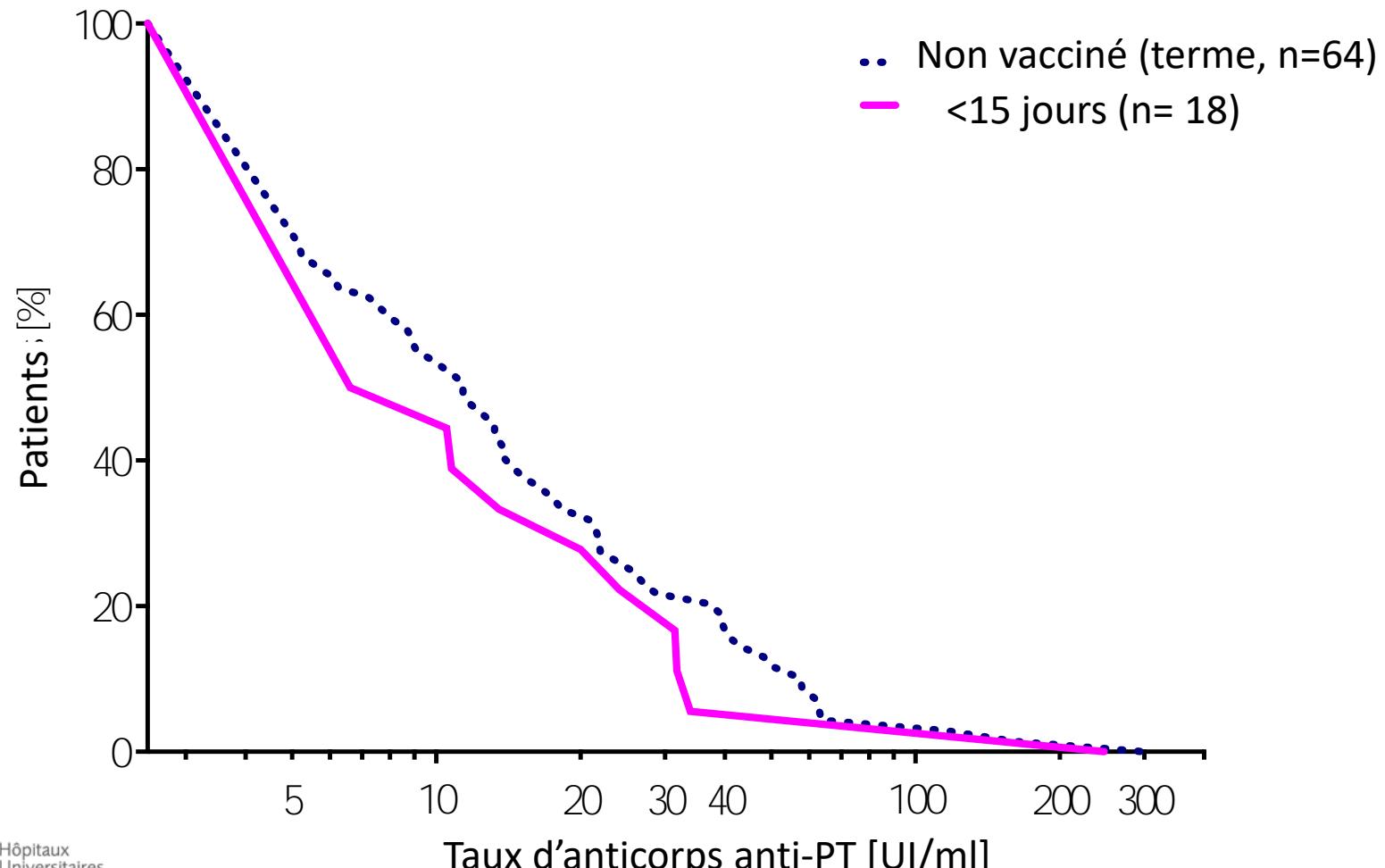
Funding : Bourse d'encouragement à la recherche clinique

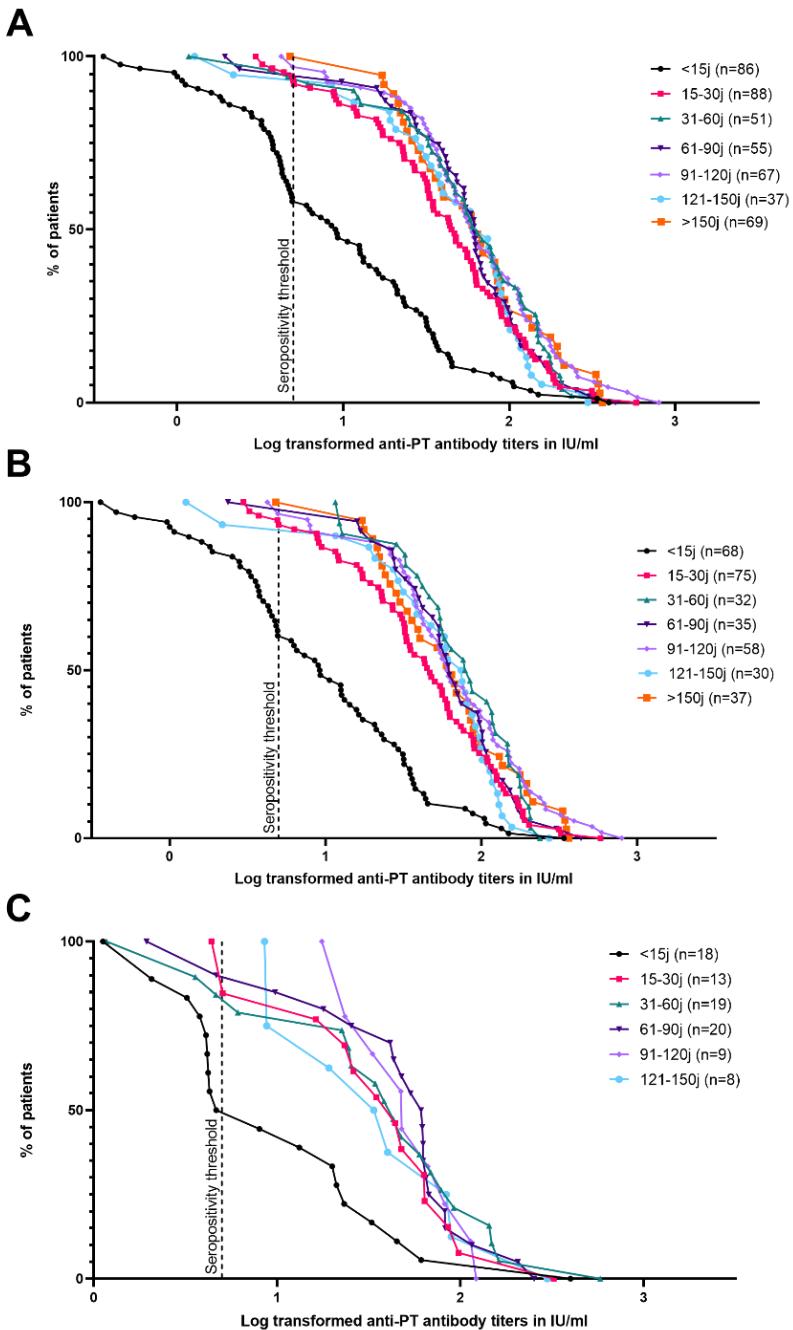


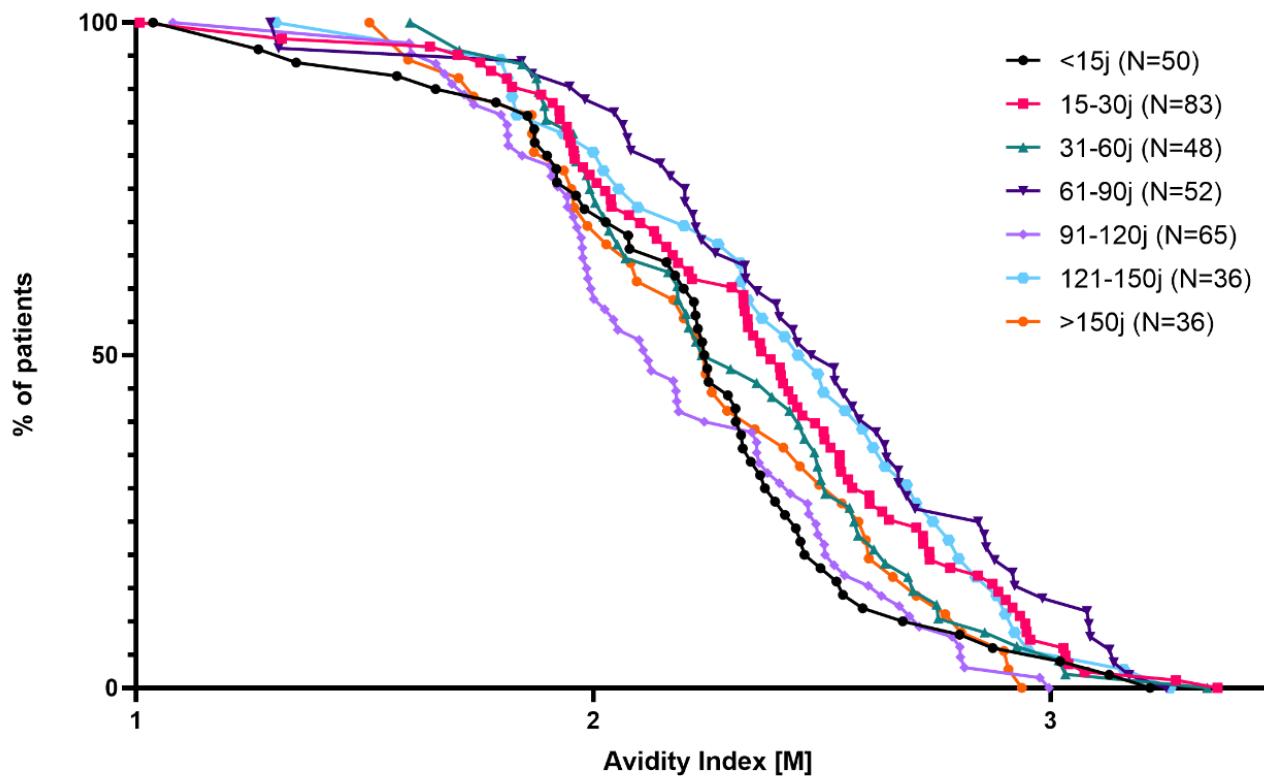
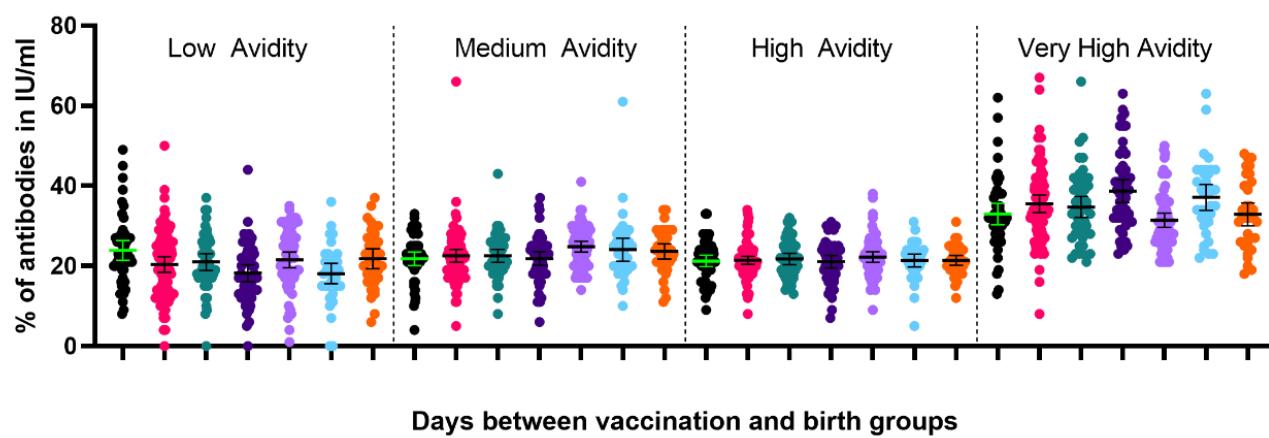
STATISTICS TIP: ALWAYS TRY TO GET  
DATA THAT'S GOOD ENOUGH THAT YOU  
DON'T NEED TO DO STATISTICS ON IT

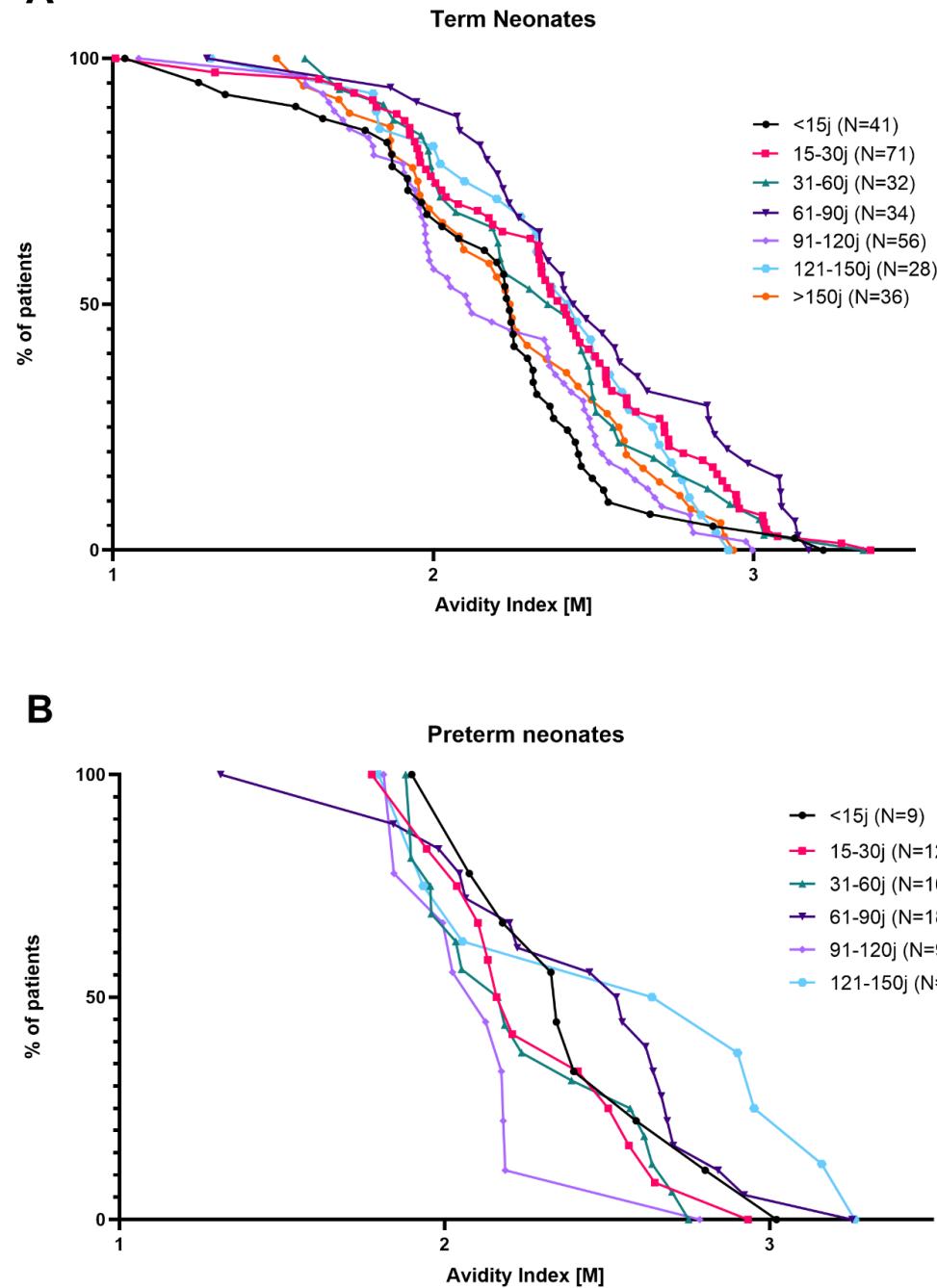
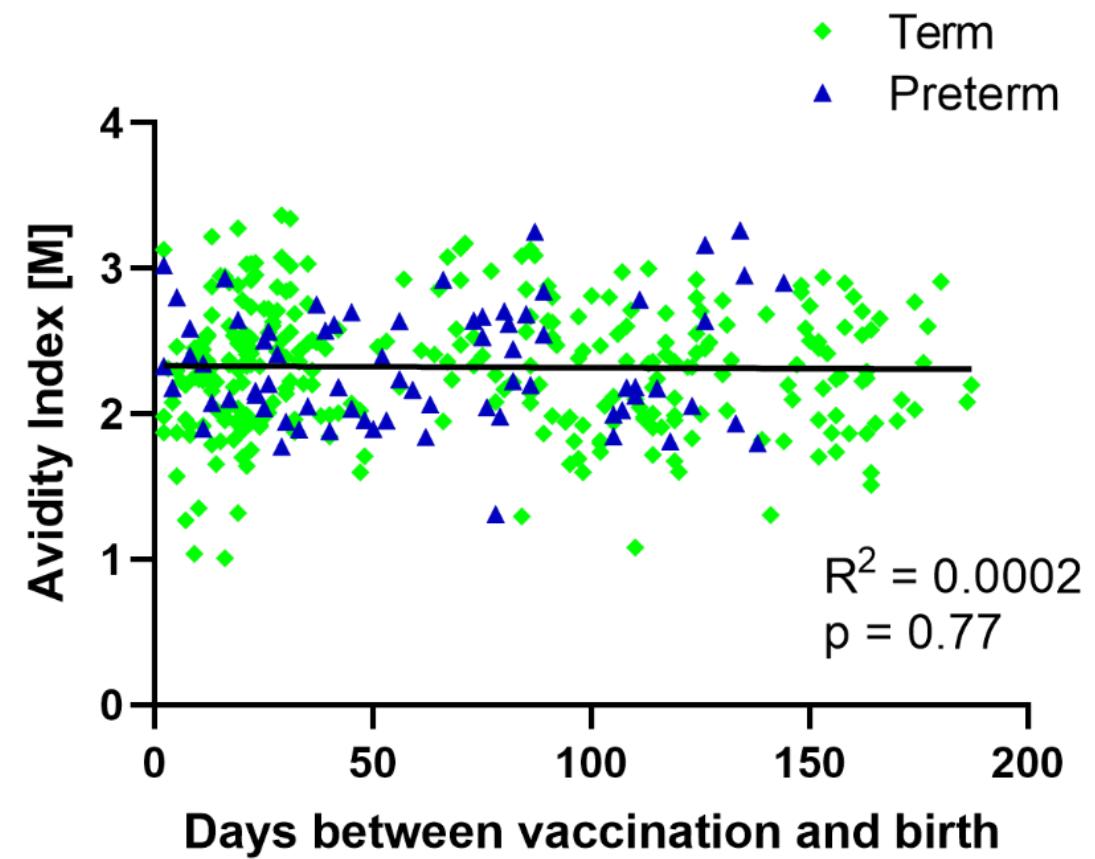
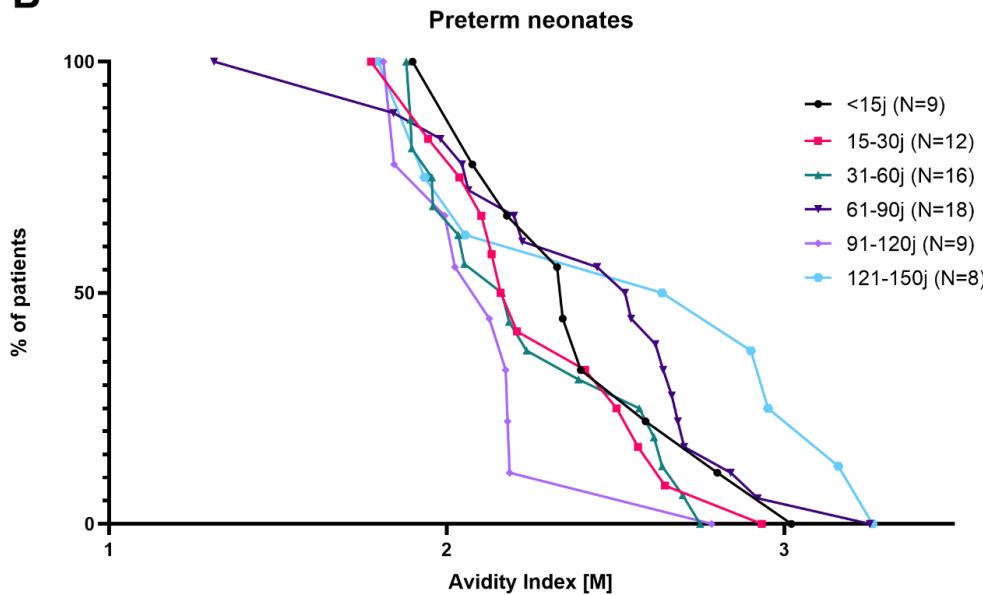
# Questions ?

# Intervalle entre vaccination et naissance

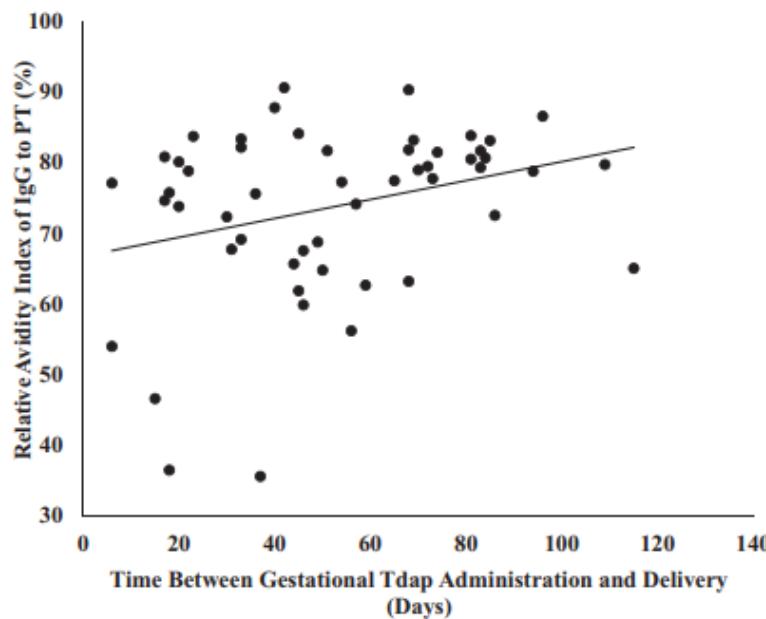




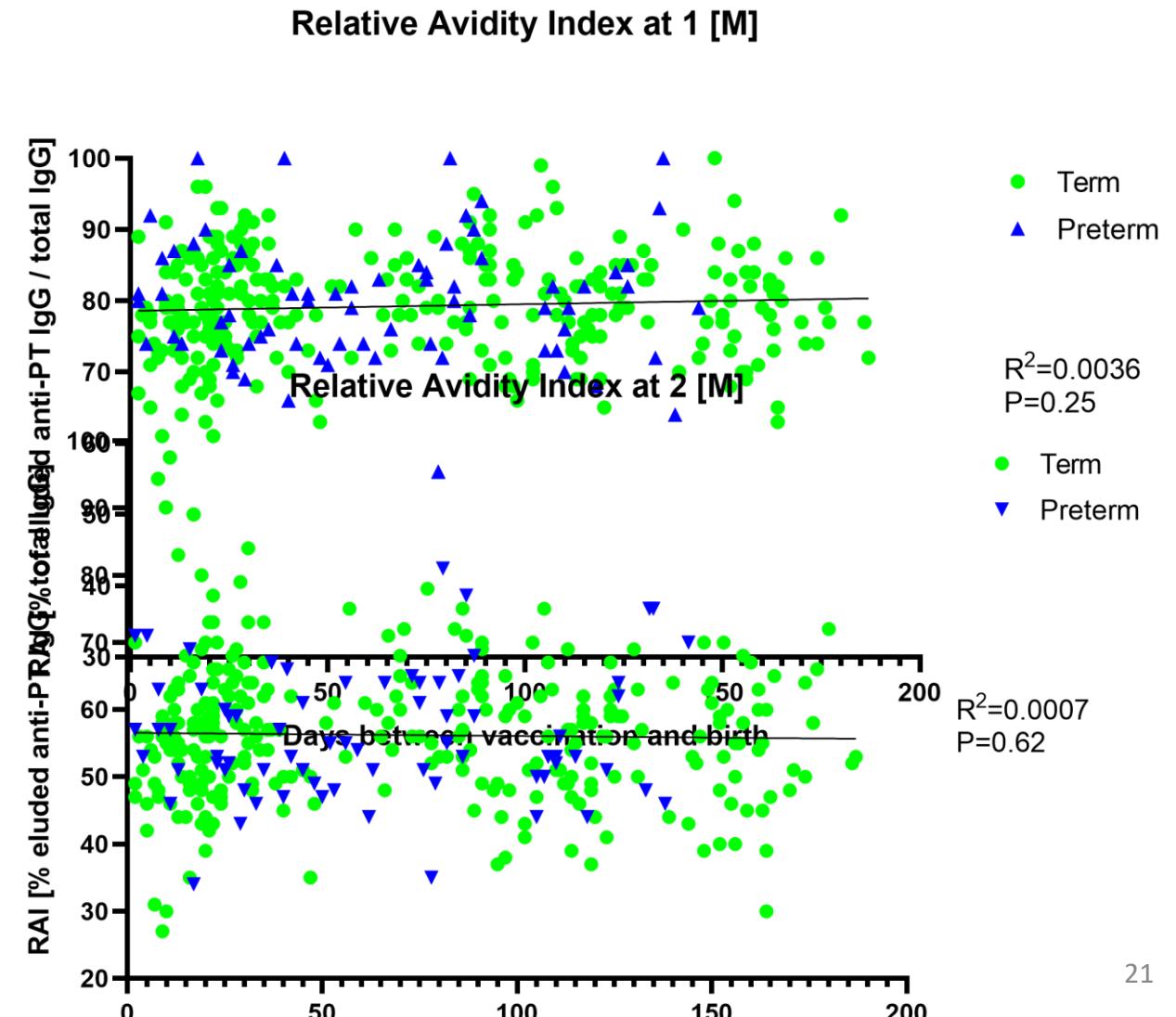
**A****B**

**A****B**

# Comparison with Abu Raya's results



**Fig. 2.** Immunoglobulin G to pertussis toxin relative avidity index of newborns' cord sera as a function of time elapsed between tetanus–diphtheria–acellular pertussis administration during pregnancy and delivery. Abbreviations: Tdap, tetanus, diphtheria and acellular pertussis; PT, pertussis toxin; IgG, immunoglobulin G. The line represents the correlation coefficient.



# Multivariate analysis by days between vaccination and birth

Determinants	All		Term		Preterm	
	Ratio (95% CI)	P Value	Ratio (95% CI)	P Value	Ratio (95% CI)	P Value
Days bw vacc and birth	-0.001 - 0.0006	0.599	-0.001 – 0.0006	0.432	-0.002 – 0.003	0.896
Antibody titers (GMC)	0.018 – 0.232	<b>0.022</b>	0.012 – 0.254	<b>0.032</b>	-0.185 – 0.331	0.573
Smoking before pregnancy	-0.042 – 0.183	0.220	0.002 – 0.261	<b>0.046</b>	-0.374 – 0.112	0.286
Maternal Age	-0.010 – 0.007	0.748	-0.015 – 0.006	0.399	-0.012 – 0.024	0.488
Gestational age at birth (per week)	-0.021 – 0.017	0.817	-0.049 – 0.033	0.714	-0.047 – 0.055	0.867
Maternal employment with child contact	0.016 – 0.294	<b>0.029</b>	-0.045 - 0.286	0.152	-0.027 – 0.532	0.075
SES score	-0.015 – 0.015	0.987	-0.024 – 0.011	0.468	-0.014 – 0.056	0.235

# Multivariate analysis by trimester of vaccination

Determinants	All		Term		Preterm	
	Ratio (95% CI)	P Value	Ratio (95% CI)	P Value	Ratio (95% CI)	P Value
Trimester of vaccination	-0.305 – 0.056	0.175	-0.354 – 0.071	0.190	-0.460 – 0.293	0.659
Antibody titers (GMC)	0.017 – 0.230	<b>0.023</b>	0.008 – 0.250	<b>0.037</b>	-0.192 – 0.333	0.594
	-0.001 – 0.002	0.418	-0.001 – 0.003	0.519	-0.004 – 0.006	0.660
Smoking before pregnancy	-0.051 – 0.175	0.281	-0.002 – 0.257	0.054	-0.378 – 0.124	0.316
Maternal Age	-0.013 – 0.006	0.461	-0.018 – 0.004	0.211	-0.013 – 0.027	0.487
Gestational age at birth (per week)	-0.027 – 0.014	0.526	-0.050 – 0.033	0.695	-0.058 – 0.057	0.992
Parity	-0.015 – 0.084	0.176	-0.009 – 0.009	0.099	-0.013 – 0.106	0.839
Maternal employment with child contact	0.012 – 0.289	<b>0.033</b>	-0.051 – 0.279	0.175	-0.039 – 0.532	0.089
SES score	-0.019 – 0.013	0.750	-0.027 – 0.009	0.332	-0.018 – 0.065	0.267