Immunogenicity of SARS-CoV-2 vaccine in pediatric inflammatory bowel disease patients

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CITF Scientific Meeting March 2023

UBC BC Children's Hospital Research Institute COVID-19 IMMUNITY TASK FORCE

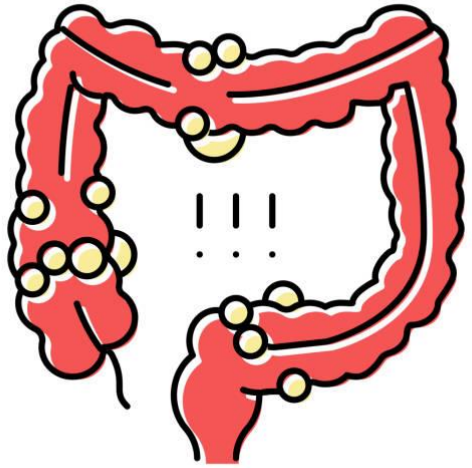
Pediatric Inflammatory Bowel Disease

>600 children diagnosed with Inflammatory Bowel Disease (IBD) every year in Canada

Currently **2,500+ children** under 16y.o. live with IBD in Canada

Maintenance therapy with immunosuppressive therapies:

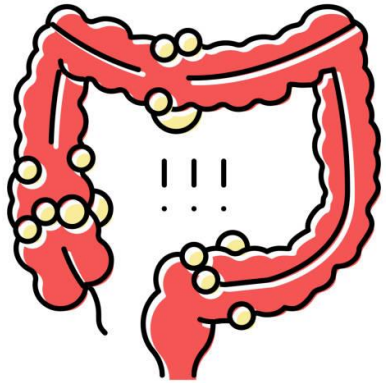
- Corticosteroids
- Immunomodulators (thiopurine drugs, methotrexate)
- Biologics (Anti-TNF-α, Vedolizumab)



Benchimol, E.I. et al. (2017); Rosen M.J. et al. (2015)

Pediatric Inflammatory Bowel Disease

What will the immune response to SARS-CoV-2 vaccines be in immunosuppressed IBD patients?

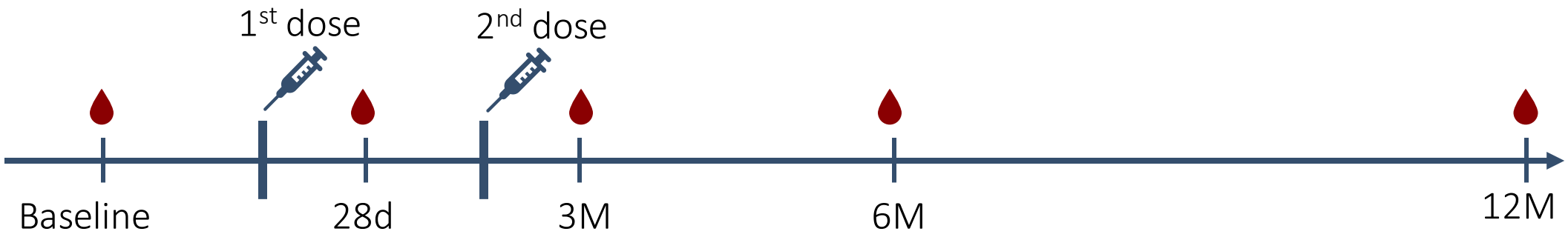


2 Aim

To evaluate the long-term immunogenicity of COVID-19 vaccine in pediatric IBD patients treated with anti-TNF-α therapy in monotherapy OR anti-TNF-α in combination with immunomodulators compared to vedolizumab therapy

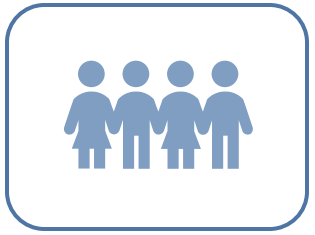
3 Study design

- Prospective study of 5-18 y.o. IBD patients followed at BC Children's Hospital
- Vaccination plan for SARS-CoV-2 vaccine



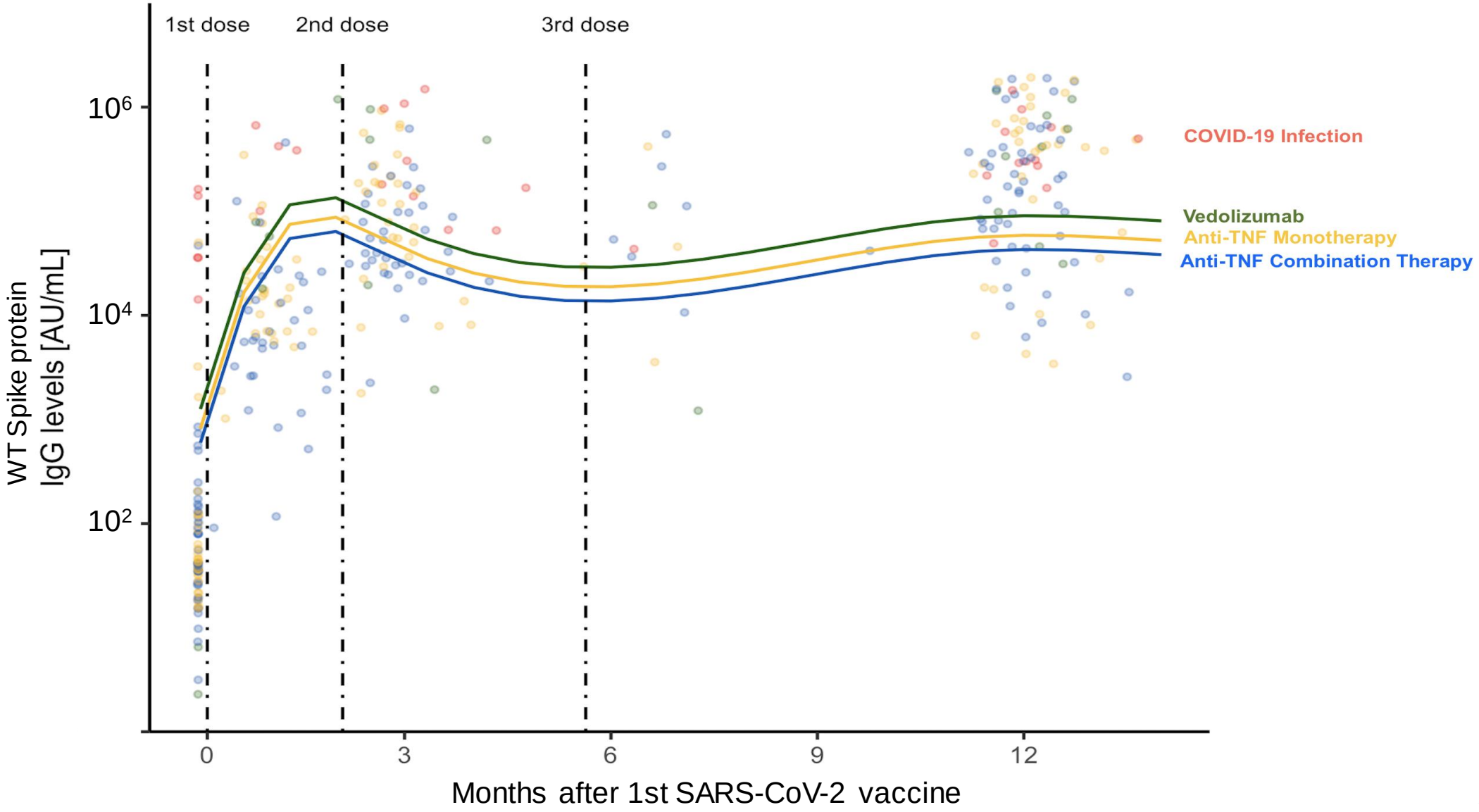
- Anti-spike and RBD S1 IgG levels (MSD assay)
- SARS-CoV-2 infection documented by:
  - History (+ viral tests)
  - N antibody (Anti-SARS-CoV-2 anti-nucleocapsid assay [Roche, USA]).

3 Cohort



	Anti-TNF Combination therapy (N = 93)	Anti-TNF Monotherapy (N = 72)	Vedolizumab (N = 10)
Age (years), median (IQR)	14 (12-15)	15 (12-16)	14 (12-14)
Female, n (%)	35 (38)	37 (51)	2 (20)
IBD Subtype			
Crohn's disease, **n (%)**	73 (78)	39 (54)	1 (10)
Ulcerative colitis, **n (%)**	18 (19)	33 (46)	8 (80)
IBD unclassified, **n (%)**	2 (3)	0 (0)	1 (10)
Type of COVID-19 vaccine received			
2 doses Pfizer, **n (%)**	88 (95)	54 (75)	10 (100)
1 dose Pfizer/1 dose moderna, n (%)	5 (5)	18 (25)	0 (0)
Days between 1st - 2nd vaccine doses, median (IQR)	57 (50 - 70)	58 (53 - 69)	52 (49 - 56)

4 Vaccine response over time



4 Contributors to vaccine response

LINEAR MIXED EFFECTS MODEL

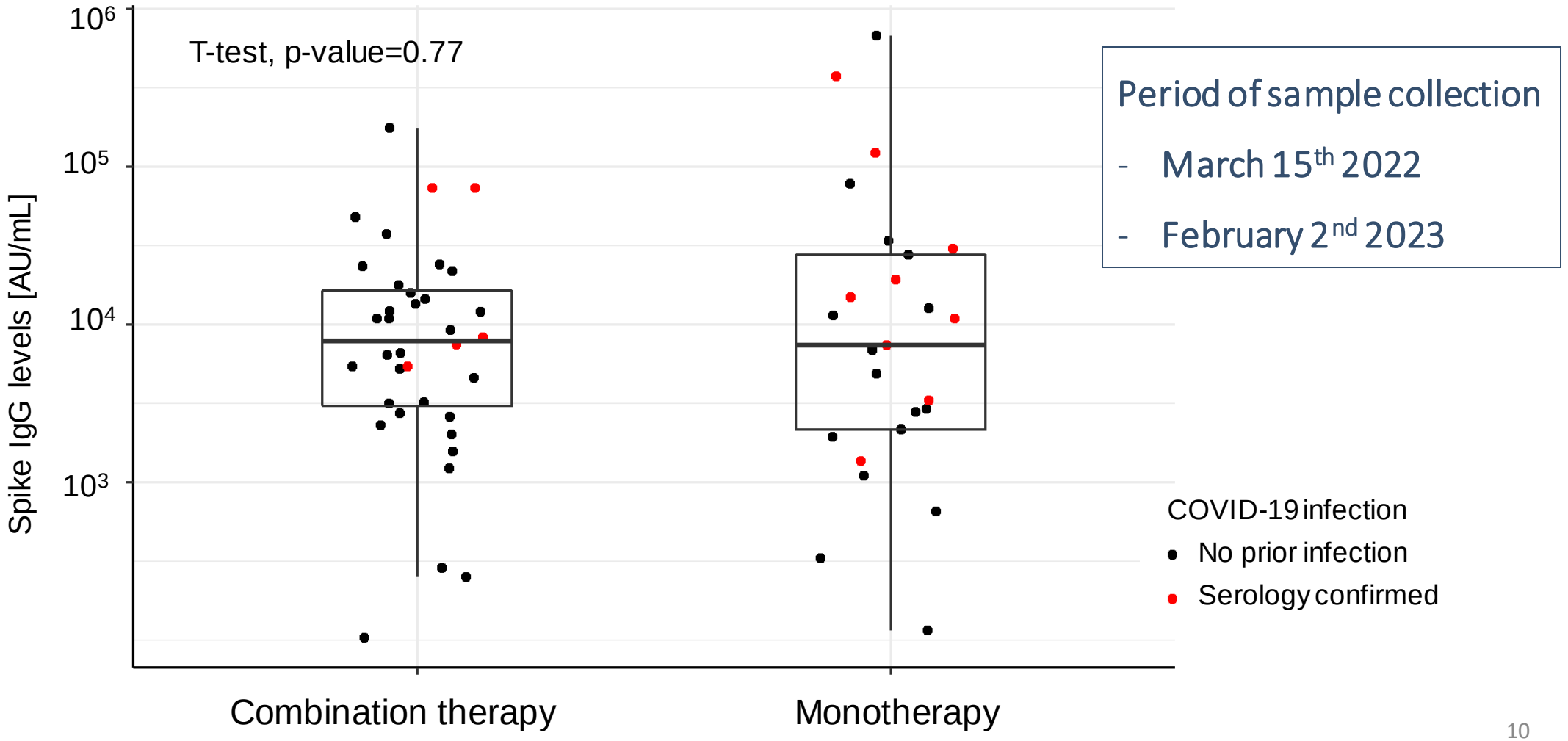
Predictors	Estimates	Confidence Interval 95%	P-value
Confirmed COVID-19 infection	1.06	0.74 – 1.39	<0.001
Number of vaccine doses received	1.25	1.09 – 1.40	<0.001
Younger age (5 to 11 years old)	-0.08	-0.36 – 0.20	0.563
TNF-α combined therapy	-0.45	-0.80 – -0.09	0.014
TNF-α monotherapy	-0.28	-0.64 – 0.08	0.131

4 COVID-19 outcomes after vaccination

	Anti-TNF Combo therapy (N = 93)	Anti-TNF Monotherapy (N = 72)	Vedolizumab (N = 10)
Serology confirmed	15 (16.1%)	12 (16.7%)	5 (50.0%)
Self-reported (serology -)	19 (10.7%)	20 (27.8%)	4 (40.0%)
Total	**34 (36.6%)**	**32 (44.0%)**	**9 (90.0%)**

No hospitalizations related to COVID-19 infection

4 Antibodies to Omicron BA.4-BA.5 12 months after vaccination



5 Conclusions

- Pediatric IBD patients generated a **strong response to SARS-CoV-2 vaccines** regardless of the type of immunosuppressive therapy they received
- **Booster doses** promoted increase in antibody levels.
- Quantitatively lower response for anti-TNF + immunomodulator therapy at early timepoints is **unlikely to have major effect on protection**, and may be explained by a **heterogenous group** with different degrees of immunosuppression

5 Clinical implications

Despite initial concerns for poor SARS-CoV-2 responses in context of immunosuppression, children with IBD under biologics responded well to complete SARS-CoV-2 vaccination, and non needed hospitalization due to COVID-19.

5 Limitations

- No control group - healthy infants, limited sample size
- Further analysis of cross-reactivity with new variants of concern
- No immune functional analysis (= quality of immune response)

Acknowledgements

Dr. Sally Lawrence, Dr. Zahra Jama Shire, Dr. Kevan Jacobson,

Dr. Pascal M. Lavoie, Dr. Frederic Reicherz, Liam Golding , Bethany Poon, Alexanne Lavoie

The IBD-CVS study group, the Lavoie Lab

Jeffrey bone

All the participants for the study

Thank you!

Immunogenicity of BNT162b2 SARS-CoV-2 vaccine in pediatric inflammatory bowel disease patients treated with biologic therapy

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