

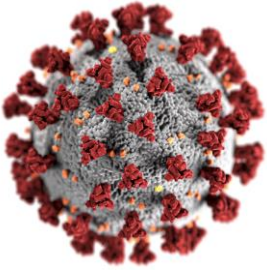
LA COHORTE COVID LONGUE DE LA BQC19

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OBJECTIVE IS:

To show how BQC19 can support research on long COVID

- Long COVID rate studies
- Immune response in long COVID patients

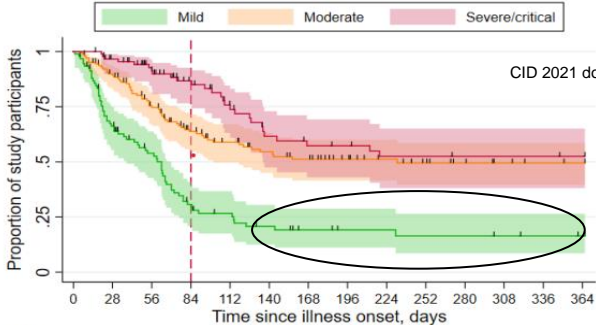


POST-COVID-19 CONDITION: WHO DEFINITION (10/2021)

- History of probable or confirmed SARS CoV-2 infection
- 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months
- Cannot be explained by an alternative diagnosis
- Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others (> 200 symptoms reported)
- Generally have an impact on everyday functioning
- Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness
- Symptoms may also fluctuate or relapse over time

Sensitivity and specificity remain to be determined

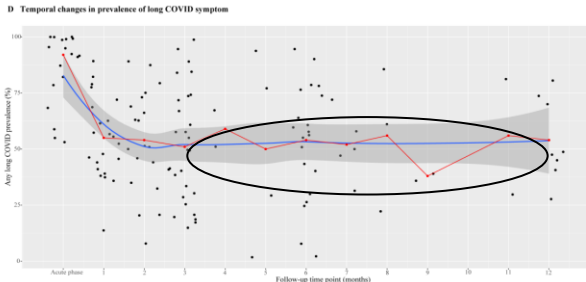
SYMPTOM EVOLUTION OVER TIME



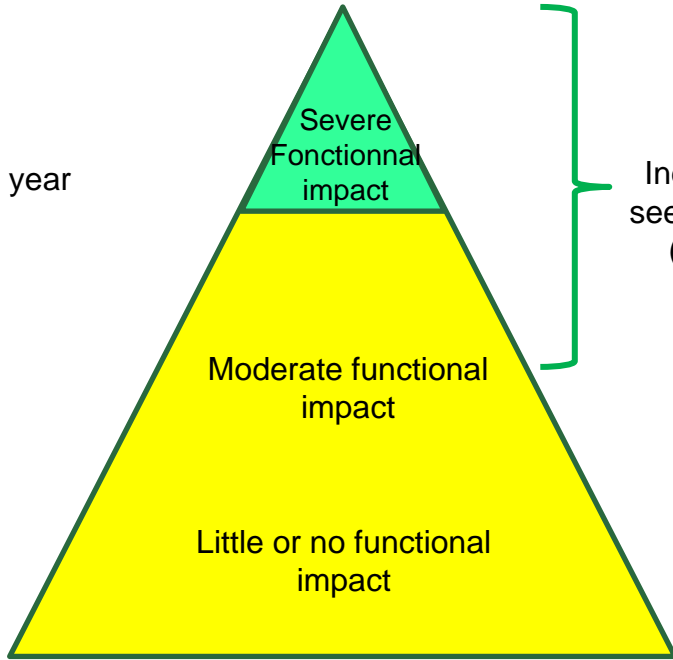
25% still have Sx at one year

Number at risk

Mild	93	58	42	23	18	13	9	7	7	6	6	5	4	2
Moderate	142	122	95	69	57	49	44	35	30	26	21	18	16	15
Severe/Critical	90	81	66	50	39	29	26	25	22	22	21	21	21	19



50% have persistent Sx



Individuals seeking care (45%?)

One-Year Temporal Change in Prevalence and Characteristic of Long COVID: A Systematic Review and Meta-Analysis
 24 Pages Posted: 31 Mar 2022 Lancet

POST-COVID CONDITION: AFTER TWO YEARS INTO THE PANDEMIC, WHERE DO WE STAND?

- At the beginning of the SARS-CoV-2 pandemic, no one could have predicted the magnitude of PCC and its tremendous impact on the health care system
- How many initially infected with SARS-CoV-2 will eventually develop PCC? Rate variant specific? Omicron prevalence? (given the large number of infection)
- What is the pathophysiology of PCC?
- Immune response of PCC patients?
- No diagnostic test
- No efficient treatment

DELTA VARIANT-ASSOCIATED PCC

SARS-CoV-2 infection outcomes associated with the Delta variant: A prospective cohort study

Maxime Gallant MD², Christine Rioux-Perreault BSc², Samuel Lemaire-Paquette MSc², Alain Piché MD, MSc^{1,2}

Official Journal of the Association of Medical Microbiology and Infectious Disease Canada
 advance access article doi:10.3138/jammi-2022-0022

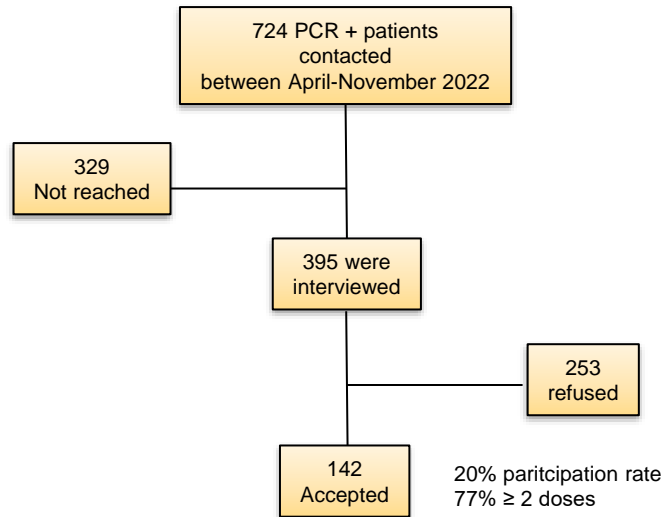


Table 1: Socio-demographic characteristics of participants infected with the Delta variant according to their vaccine status

Characteristics	Vaccinated (n = 66)	Unvaccinated (n = 39)	p-value	
COVID infections n (%)	66 (76.7)	39 (76.5)		
Mean age (SD) yrs	47.2 (17.1)	41.2 (14.6)	0.069	
Age group n (%)				% of Delta-associated infection
18–34	17 (25.8)	13 (33.3)		
35–49	22 (33.3)	16 (41)		
>50	27 (40.9)	10 (25.6)		
Female sex				
Female n (%)	42 (63.6)	23 (59.0)	0.147	
BMI mean (SD) (kg/m ³)	27.4 (7.2)	26.56 (3.6)	0.167	
Smoking status n (%)				
Active	6 (9.1)	3 (7.7)	0.276	
Health care worker				
Yes n (%)	8 (12.7)	5 (12.8)	0.238	
Comorbidities n (%)				
Hypertension	9 (13.6)	3 (7.7)	0.173	
Diabetes	5 (7.6)	1 (2.6)	0.217	
Cardiovascular disease	7 (10.6)	1 (2.6)	0.109	
Pulmonary disease	2 (3.0)	2 (5.1)	0.333	
Asthma	9 (13.6)	2 (5.1)	0.110	
Cancer	4 (6.1)	0 (0)	0.151	
Number comorbidities				
Median (IQR)	2 (0–2)	1 (0–1)	0.029	
Hospitalization n (%)	5 (7.6)	3 (7.7)	0.293	

PCC OUTCOME AND EFFECT OF VACCINATION

Table 2: Complications among Delta-associated infections in vaccinated and unvaccinated participants

Outcomes	Vaccinated (n = 66)	Unvaccinated (n = 39)	p-value
Symptoms >30 days n (%)	35 (61.4)	18 (51.4)	0,347
Total number of symptoms n	57	35	0,029
Persistent symptoms n (%)			
General			
Fatigue	23 (40.4)	4 (11.4)	0.003
Arthralgia	1 (1.8)	0 (0)	1.000
Myalgia	4 (7.1)	0 (0)	0.294
PEM	1 (1.8)	0 (0)	1.000
Cardiopulmonary			
Cough	6 (14.3)	6 (10.5)	0.742
Shortness of breath	11 (19.3)	4 (11.4)	0.321
Palpitation	4 (7.0)	0 (0)	0.294
Chest pain	0 (0)	2 (5.7)	0.142
ENT			
Anosmia	18 (31.6)	5 (14.3)	0.063
Sore throat	5 (8.8)	1 (2.9)	0.462
Otalgia	2 (3.5)	0 (0)	0.523
Rhinorrhea	4 (7.0)	2 (5.7)	1.000
Neurologic			
Memory loss	1 (1.8)	1 (2.9)	1.000
Brain fog	0 (0)	1 (2.9)	0.381
Headache	8 (8.8)	2 (5.7)	0.705
Paresthesia	1 (1.8)	1 (2.9)	1.000
Dizziness	4 (7.0)	0 (0)	0.294
Insomnia	1 (1.8)	0 (0)	1.000
Gastrointestinal			
Abdominal pain	3 (5.3)	0 (0)	0.285
Nausea	4 (7.0)	0 (0)	0.294
Diarrhea	2 (3.5)	0 (0)	0.523
Hospitalization n (%)	5 (7.6)	3 (7.7)	0,293

Overall PCC rate among participants: 57.6%

Rate of PCC-associated breakthrough infection
Similar to unvaccinated individual

Table 3: Univariate and multiple analysis of risk factor associated with persistent symptoms

Risk factors	Univariate		Adjusted multiple	
	RR (95% CI)	p-value	aRR (95% CI)	p-value
Female sex	1.42 (0.98% to 2.22%)	0.082	1.10 (0.90% to 1.18%)	0.167
Age	1.00 (0.99% to 1.01%)	0.584	1.00 (0.99% to 1.01%)	0.585
Vaccination status	1.19 (0.83% to 1.82%)	0.363	1.03 (0.90% to 1.18%)	0.666
Number of symptoms during acute COVID-19*	1.03 (1.01% to 1.04%)	<0.0001	1.02 (1.01% to 1.04%)	0.001
Number of comorbidities*	1.10 (0.25% to 1.22%)	0.166	1.01 (0.96% to 1.06%)	0.725

*Each one-unit increase
RR = Relative risk; aRR = adjusted relative risk

RATE OF OMICRON-ASSOCIATED PCC

Prevalence of persistent symptoms at least 1 month after SARS-CoV-2 Omicron infection in adults

Maxime Gallant MD², Cassandra Mercier BSc², Christine Rioux-Perreault BSc², Samuel Lemaire-Paquette MSc², Alain Piché MD, MSc¹²

Official Journal of the Association of Medical Microbiology and Infectious Disease Canada
 advance access article doi:10.3138/jammi-2022-0026

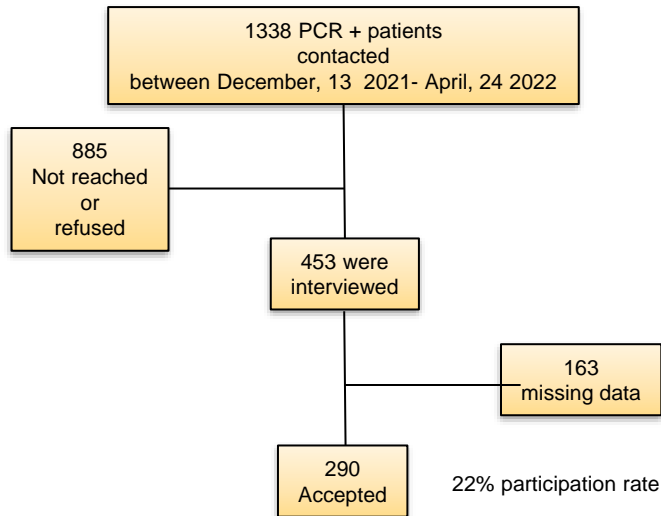


Table 1: Characteristics of study population according to 30 days symptoms

Characteristics	No persistent symptoms	Persistent symptoms	p-value
COVID-19 infections, n (%)	153 (52.8)	137 (47.2)	
Mean age (SD) yrs	40.3 (11.7)	42.8 (12.0)	0.071
Female sex			
Female, n (%)	111 (72.5)	104 (75.9)	0.514
BMI median (IQR) (kg/m ³)	25.2 (22.2–29.6)	26.6 (23.5–30.9)	0.012
Smoking status, n (%)			
Active	8 (5.2)	7 (5.1)	0.936
Health care worker			
Yes, n (%)	113 (73.9)	95 (69.3)	0.394
Comorbidities, n (%)			
Hypertension	15 (9.8)	14 (10.2)	0.934
Diabetes	5 (3.3)	10 (7.3)	0.122
Cardiovascular disease	9 (5.9)	2 (1.5)	0.490
Pulmonary disease	0 (0.0)	0 (0.0)	0
Asthma	13 (8.5)	22 (16.1)	0.048
Cancer	4 (2.6)	4 (2.9)	0.874
Comorbidities median (IQR)	0 (0–1)	0 (0–1)	0.660
Hospitalization	2 (1.3)	2 (1.5)	0.911
Vaccination, n (%)			
≥2 doses	148 (96.7)	132 (96.4)	0.821

RISK FACTOR FOROMICRON-ASSOCIATED PCC

Table 2: Univariate and multiple analysis of risk factor associated with persistent symptoms

Risk factors	RR (95% CI)	p-value	aRR (95% CI)	p-value
Sex	1.10 (0.82% to 1.47%)	0.635	1.01 (0.75% to 1.37%)	0.947
Age	1.01 (1.01% to 1.04%)	0.190	1.01 (1.00% to 1.02%)	0.300
Vaccination (dose number)	0.89 (0.76% to 1.04%)	0.314	0.92 (0.79% to 1.98%)	0.489
BMI	1.03 (1.01% to 1.04%)	0.046	1.02 (0.99% to 1.04%)	0.162
Number of symptoms during acute COVID*	1.08 (1.05% to 1.11%)	0.001	1.07 (1.03% to 1.10%)	0.009
Number of comorbidities*	1.05 (0.93% to 1.20%)	0.581	0.98 (0.86% to 1.12%)	0.838

*Each one unit increase

RR = Relative risk; aRR = adjusted Relative risk

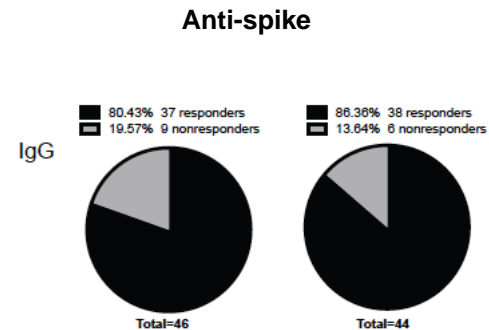
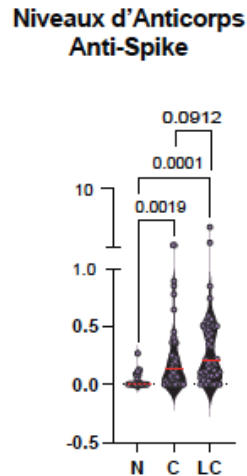
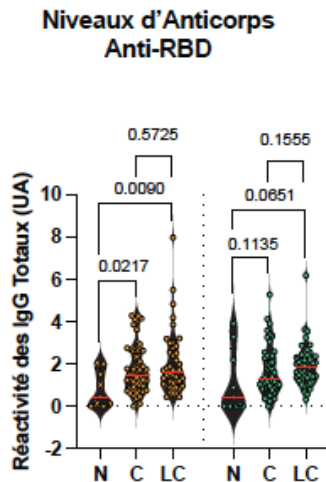
IMMUNE RESPONSE IN PCC PATIENTS (PRE-VACCINATION ERA) (WORK DONE BY SHEELA RAMANATHAN AND MC LIMOGES)

3 months humoral response

Table 1. Baseline clinical characteristics of study participants.

Variables	No COVID n = 10	COVID, no PCC n = 30	COVID, PCC n = 60
Mean age (SD) yrs	45 (20)	44 (20)	48 (17)
Age group n (%)			
18-34	3 (30.0)	12 (40.0)	14 (23.3)
35-49	3 (30.0)	5 (16.7)	12 (20)
>50	4 (40.0)	13 (43.3)	34 (56.7)
Female Sex			
Female n (%)	6 (60.0)	14 (46.7)	34 (56.7)
BMI mean (SD) (kg/m ³)	26.6 (4.2)	26.7 (5.5)	28.1 (6.0)
Smoking status n (%)			
Active	0 (0.0)	2 (6.9)	2 (3.5)
Health care worker			
Yes n (%)	3 (37.5)	2 (6.9)	15 (25.4)
Comorbidities n (%)			
Hypertension	1 (10.0)	5 (16.7)	11 (18.3)
Diabetes	0 (0)	3 (10.0)	4 (6.7)
Cardiovascular disease	1 (10.0)	0 (0)	2 (3.3)
Pulmonary disease	0 (0)	1 (3.3)	1 (1.7)
Asthma	1 (10.0)	0 (0)	5 (8.3)
Cancer	2 (20.0)	1 (3.3)	2 (3.3)
Other	7 (70)	14 (46.7)	28 (46.7)
Disease severity# n (%)			
Mild		30 (100)	60 (100)
Moderate		0 (0)	0 (0)
Severe		0 (0)	0 (0)
Median of symptoms during acute COVID n (SD)		4 (3)	6 (5)

According to WHO disease severity classification

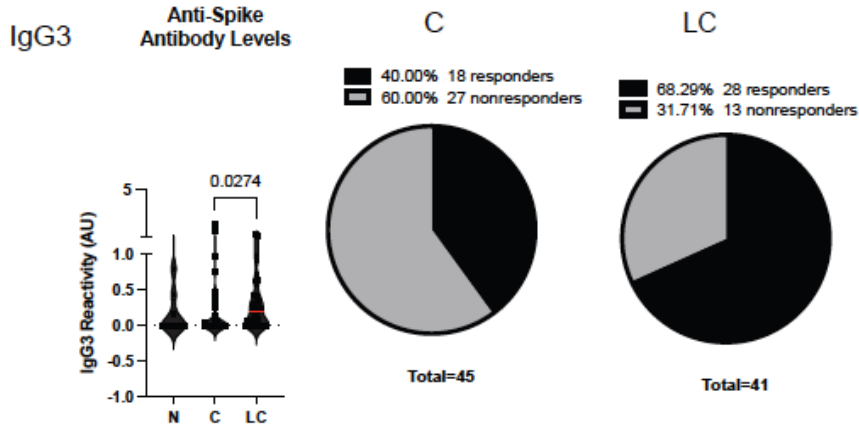


Total anti-spike IgG levels are higher in LC vs C

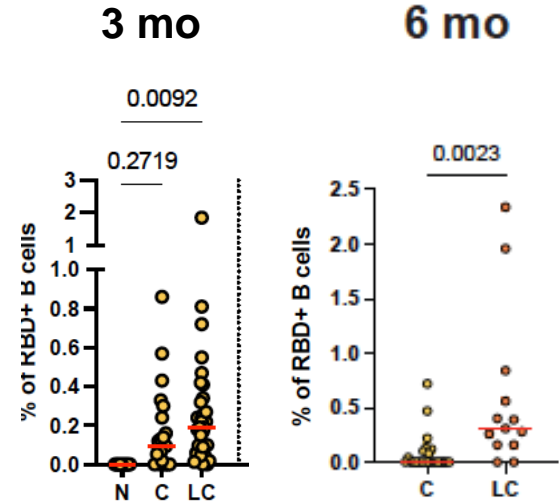
IMMUNE RESPONSE IN PCC PATIENTS

IgG3 subclass has the most important role in binding to SARS-CoV-2 antigens and neutralization

Spike specific memory B cells



IgG3 subclass antibody levels are higher in LC vs C



CONCLUSIONS

- Rate of Delta- and Omicron-associated PCC around to 50% meaning than 1/2 COVID cases may develop PCC – major implications for public health and service care organization
- Patients with PCC have higher levels of anti-spike IgG at 3 months. Preliminary data – to be confirmed at 6 and 12 months.
- Pourcentage of anti-spike specific memory B cells higher in PCC patients compared to COVID without PCC at 3 and 6 months
- Meaning of these preliminary data?

CLINIQUE POST-COVID CIUSSSE-CHUS

- Fonctionne depuis mai 2020, > 600 patients évalués
- > 400 patients en suivi actifs
- 321 patients en attente d'une consultation (doubler en moins d'un an)
- Environ 60% participe à la recherche

MERCI