

COVID-19 and Cancer

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Disclosures

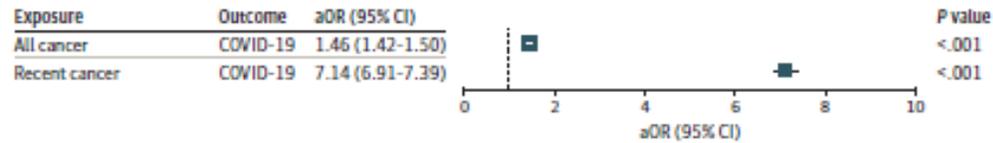
Disclosures:

- Contracted Research: Precigen Therapeutics - funding at UW, IMV Inc Survivin vaccine trial
- I will be discussing non-FDA approved indications during my presentation.

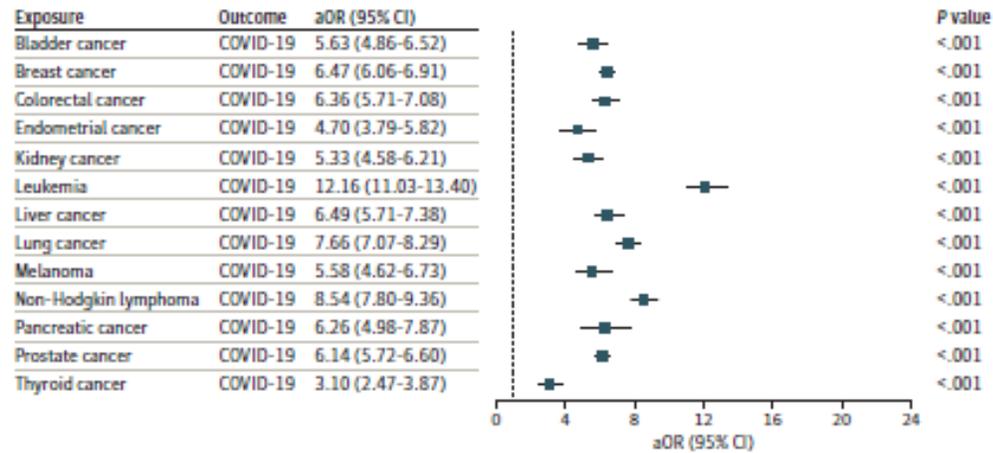
Patients with cancer higher risk of COVID

Figure 1. Associations of Coronavirus Disease 2019 (COVID-19) With Recent and All Cancer Diagnoses

A Comparison of COVID-19 risk associations with all vs recent cancer diagnosis



B Associations between recent diagnosis of cancer and COVID-19 infection



Risks cancer patients developing COVID

- In multiple studies, cancer increased risk of COVID infection
 - a. China OR 2.31 (95% CI 1.89-3.02) Yu et al JAMA Oncology 2020
 - b. Europe
Solids: OR 1.57 95% CI 1.15 to 2.15 $p < 0.0043$
Liquids: OR 2.09 95% CI 1.09 to 4.08 $p = 0.028$

Outcomes Cancer Patients with COVID

CCC 19: cohort study of patients ≥ 18 yo with invasive or hematological malignancy US, Canada, or Spain 928 patients

30 day mortality with COVID and active cancer OR 5.20 (95% CI 2.77 to 9.77)

- comparison 30 day mortality COVID and smoking OR 1.60 (95% CI 1.03 to 2.47)

Cancer Care Ontario: lymphopenia increased risk severe COVID in meta analysis OR 2.99 95% CI 1.31-8.82)

UK Experience COVID mortality and cancer

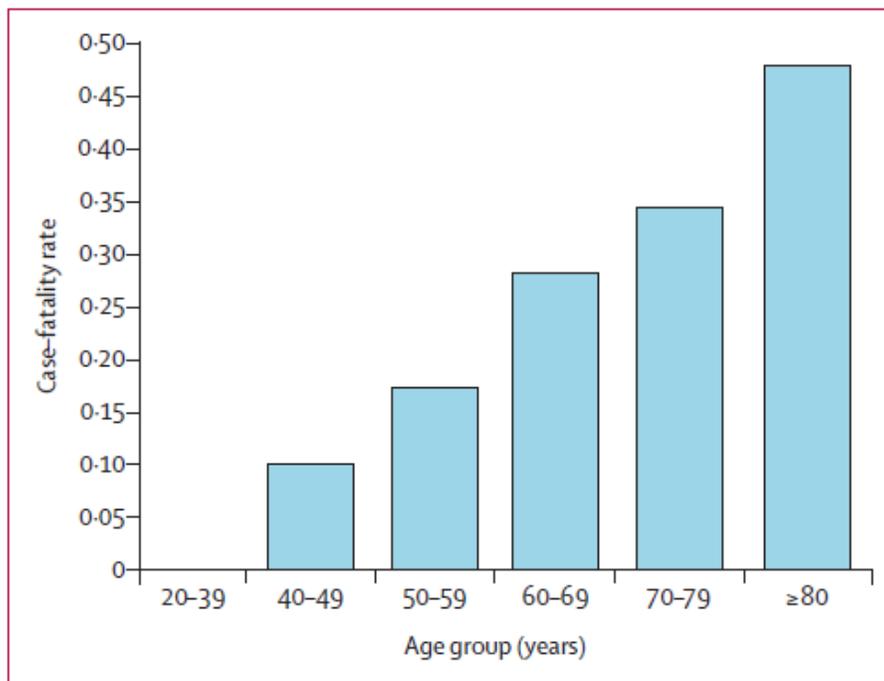


Figure 1: Age and all-cause case-fatality rate of patients with cancer after presenting with COVID-19 in the UK Coronavirus Cancer Monitoring Project cohort

Lee et al Lancet Oncol 2020 21:1309

	UKCCMP cohort (n=1044)	ONS cohort (n=282 878)	Odds ratio (95% CI)	p value
Sex	--	--	1.26 (1.12-1.43)	0.0002
Male	595 (56.9%)	145 034 (51.3%)	--	--
Female	445 (42.6%)	137 844 (48.7%)	--	--
Other	4 (0.4%)	0	--	--
Age, years	70 (60-77)	NA*	--	--
Cancer subtype (ICD-10 code)				
Breast (C50)	143 (13.7%)	46 109 (16.3%)	0.82 (0.68-0.98)	0.026
Colorectal (C18-C21)	124 (11.9%)	36 039 (12.7%)	0.93 (0.76-1.12)	0.46
Prostate (C61)	114 (10.9%)	41 200 (14.6%)	0.72 (0.59-0.88)	0.0008
Lung (C34)	111 (10.6%)	38 878 (13.7%)	0.75 (0.61-0.91)	0.0033
Digestive organs (non-colorectal) (C15-C17, C22-C26)	95 (9.1%)	30 096 (10.6%)	0.84 (0.68-1.04)	0.12
Urinary tract (C64-C68)	77 (7.4%)	19 333 (6.8%)	1.09 (0.85-1.38)	0.46
Female genital organs (C51-C58)	56 (5.4%)	17 969 (6.4%)	0.84 (0.63-1.10)	0.23
Lip, oral cavity, and pharynx (C00-C14)	33 (3.2%)	7 558 (2.7%)	1.19 (0.82-1.69)	0.33
CNS (C69-C72)	25 (2.4%)	5 038 (1.8%)	1.36 (0.87-2.02)	0.13
Mesothelial and soft tissue (C45-C49)	16 (1.5%)	4 682 (1.7%)	0.93 (0.53-1.52)	0.90
Respiratory and intrathoracic organs (not lung; C30-C39)	11 (1.1%)	2 780 (1.0%)	1.08 (0.53-1.94)	0.75
Bone and articular cartilage (C40-C41)	4 (0.4%)	376 (0.1%)	2.90 (0.78-7.50)	0.053
Male genital organs (C60-C63)	4 (0.4%)	2 435 (0.9%)	0.44 (0.12-1.14)	0.13
Endocrine glands (C73-C75)	4 (0.4%)	3 374 (1.2%)	0.32 (0.09-0.82)	0.0096
Lymphoma (C81-C85)	79 (7.6%)	13 537 (4.8%)	1.63 (1.28-2.06)	<0.0001
Leukaemia (C91-C95)	79 (7.6%)	8 018 (2.8%)	2.82 (2.21-3.55)	<0.0001
Myeloma (C90)	37 (3.5%)	5 033 (1.8%)	2.03 (1.42-2.83)	0.0001
Other haematological (C86, C88, C96)	29 (2.8%)	423 (0.1%)	19.14 (12.59-28.05)	<0.0001

Data are n (%) or median (IQR). Univariable analysis was done. p values were determined by Fisher's exact test and unadjusted for age and sex. NA=not available. ONS=Office for National Statistics. UKCCMP=UK Coronavirus Cancer Monitoring Project. ICD-10=International Classification of Diseases, 10th Revision. *Individual ages not available in the ONS dataset.

Table 1: Demographics and tumour subtype representation in the UKCCMP COVID-19 cohort compared with the ONS cancer control population

Breakdown of cancers and mortality with COVID

	Deaths (n)	Case-fatality rate	Univariable OR (95% CI)	p value	Multivariable adjusted OR (95% CI)	p value
Prostate (C61)	49	0.43	2.14 (1.17–3.96)	0.014	1.09 (0.51–2.33)	0.82
Lung (C34)	43	0.387	1.62 (0.89–3.00)	0.118	1.41 (0.75–2.67)	0.29
Mesothelial and soft tissue (C45–C49)	6	0.375	1.18 (0.37–3.51)	0.772	1.52 (0.43–5.30)	0.51
Urinary tract (C64–C68)	23	0.299	1.08 (0.54–2.13)	0.834	0.87 (0.41–1.81)	0.72
Colorectal (C18–C21)	35	0.282	1.03 (0.56–1.90)	0.934	0.85 (0.44–1.64)	0.63
CNS (C69–C72)	7	0.28	1.15 (0.39–3.18)	0.797	1.87 (0.57–6.05)	0.29
Respiratory organs and intrathoracic organs (not lung; C30–C39)	3	0.273	0.84 (0.17–3.29)	0.813	0.96 (0.18–4.10)	0.95
Lip, oral cavity, and pharynx (C00–C14)	8	0.242	0.75 (0.28–1.85)	0.542	0.77 (0.25–2.27)	0.64
Breast (C50)	26	0.182	0.53 (0.28–1.00)	0.049	0.97 (0.40–2.52)	0.94
Female genital organs (C51–C58)	7	0.125	0.36 (0.13–0.87)	0.031	0.79 (0.24–2.63)	0.70
Myeloma (C90)	16	0.432	1.85 (0.81–4.22)	0.142	1.65 (0.71–3.85)	0.24
Leukaemia (C91–C95)	33	0.418	2.03 (1.04–3.97)	0.038	2.25 (1.13–4.57)	0.023
Lymphoma (C81–C85)	25	0.316	1.60 (0.80–3.19)	0.184	1.72 (0.81–3.68)	0.16
Other haematological (C86, C88, C96)	7	0.241	0.81 (0.28–2.12)	0.675	0.81 (0.26–2.33)	0.70
Digestive organs, non-colorectal (C15–C17, C22–C26)	28	0.295	1 (ref)	..	1 (ref)	..

OR=odds ratio. ICD-10=International Classification of Diseases, 10th Revision. OR was calculated with digestive organs (non-colorectal; ICD-10 codes C15–C17, C22–C26) as a reference. Multivariable corrections were done, correcting for patient age and sex.

Table 2: All-cause case fatality following COVID-19 by tumour subtype (ICD-10 codes), before and after age and sex correction

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Case fatality by cancer type

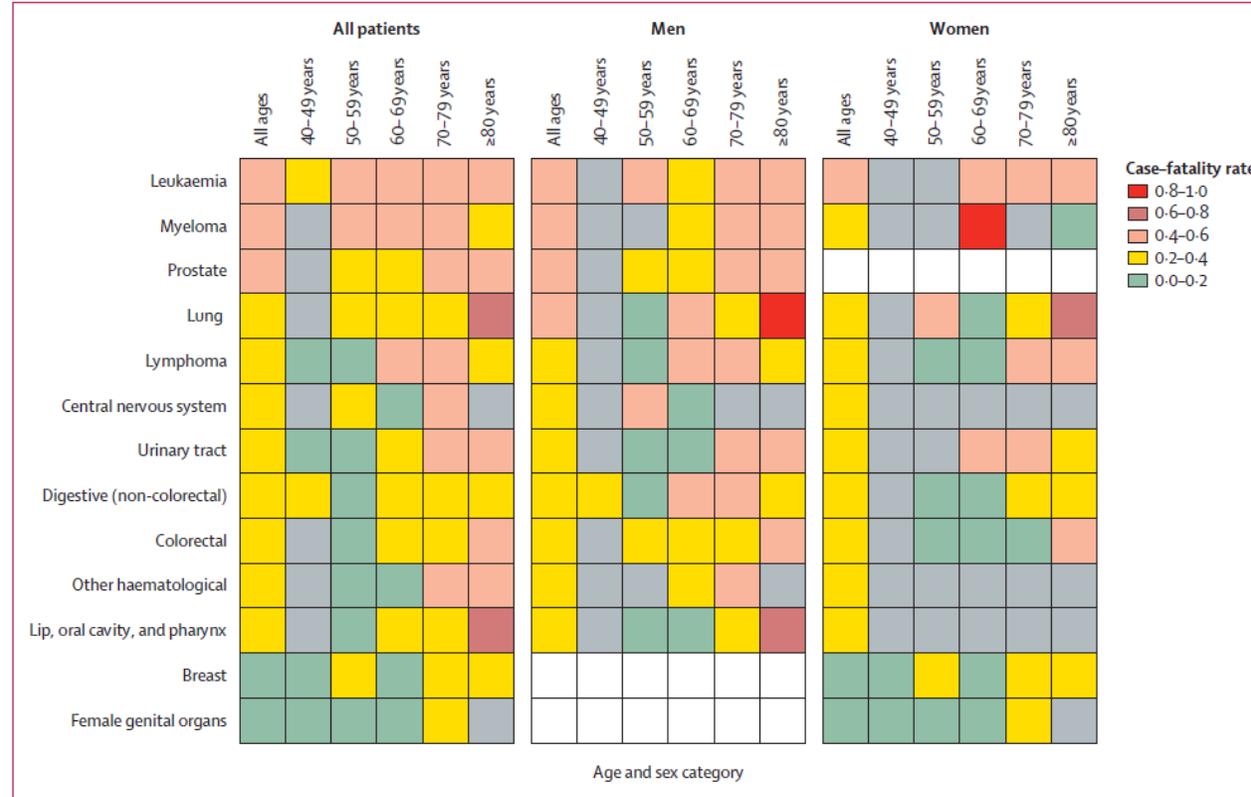
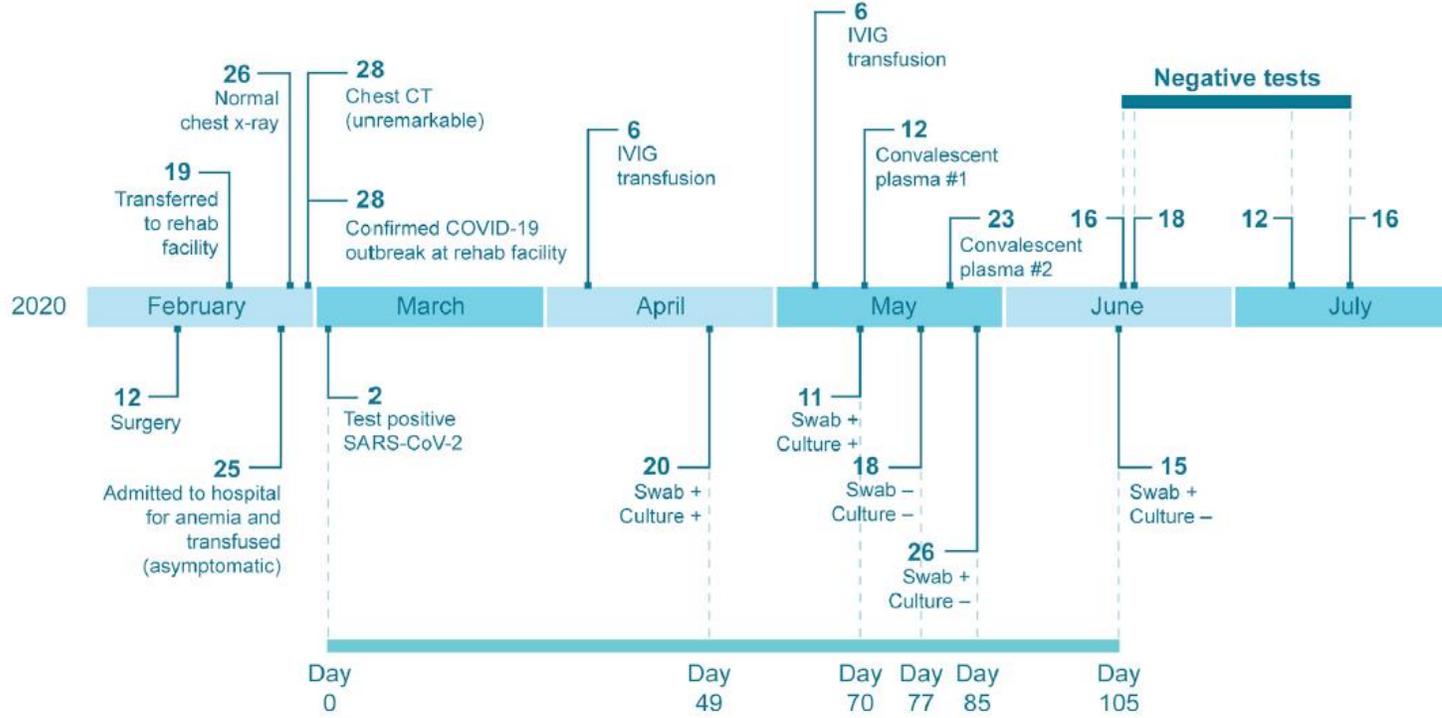


Figure 2: Case-fatality rate after presentation with COVID-19, by tumour subtype, age, and sex
 Grey boxes represent where the number of cases was less than four, and case-fatality rate was not estimable. White boxes mean not applicable.

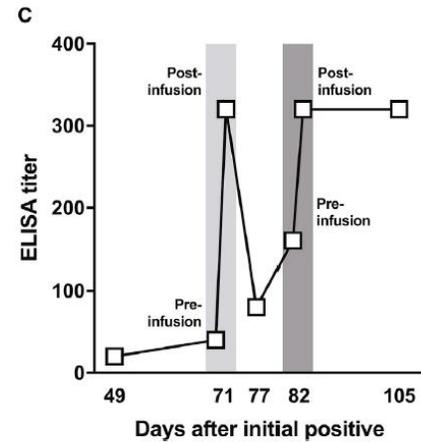
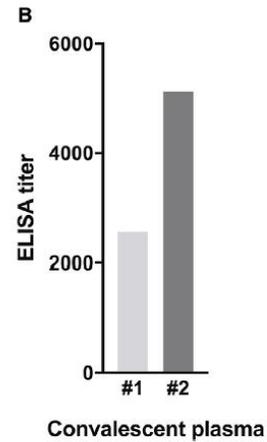
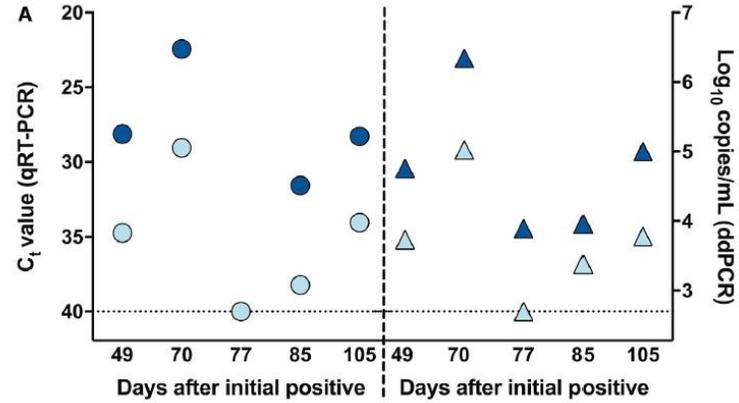
Clearance of COVID in cancer patients?

Issue of prolonged viral shedding in hematological malignancies

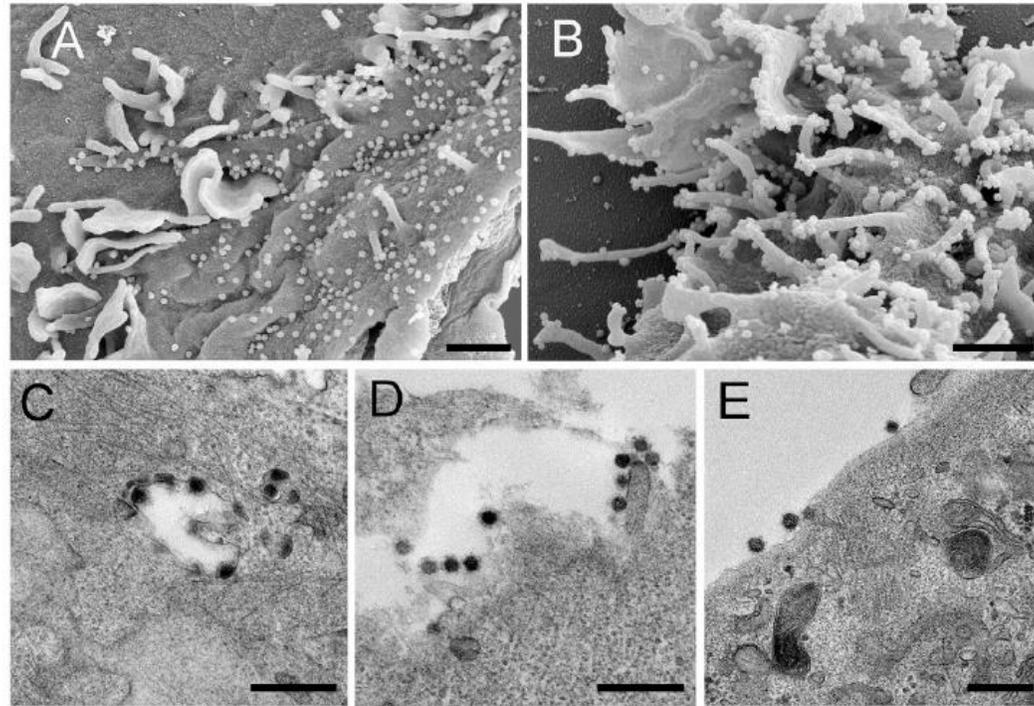
1. 20 patients (18 HSCT including CAR-T and 2 Lymphoma), 11 had SEVERE COVID and 5 had prolonged (viable virus detected) for >20 days
2. Case study: CLL patient with hypogammaglobinemia with 105 days of asymptomatic viral shedding



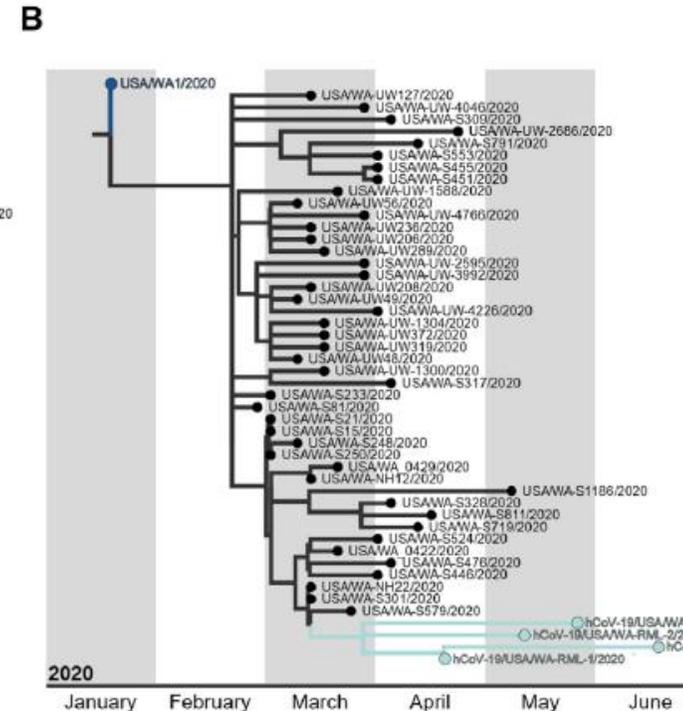
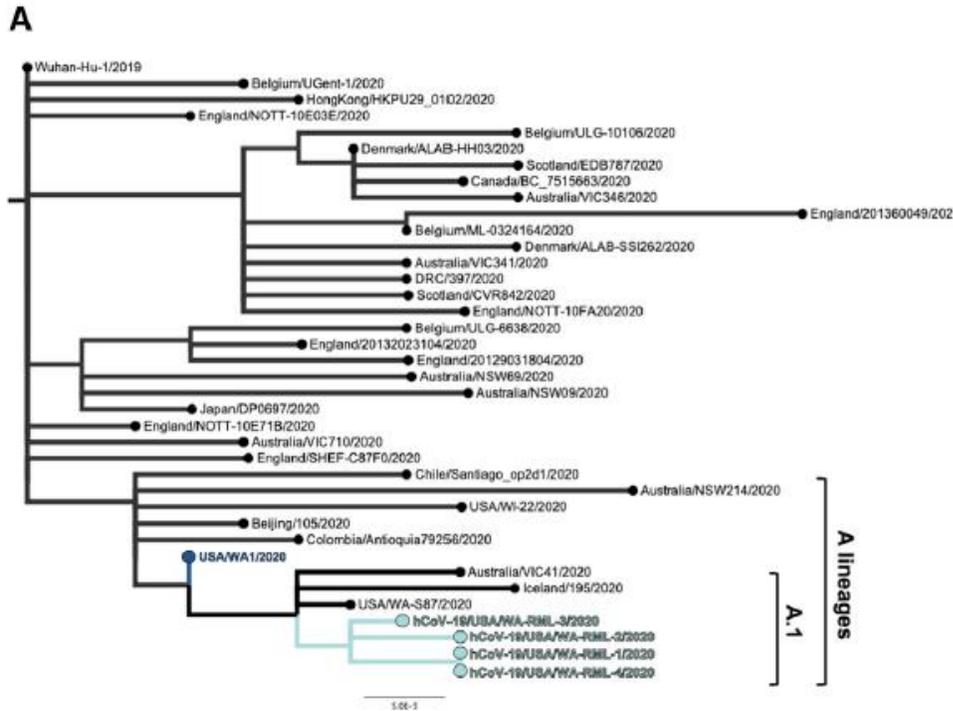
Viral titer of patient



Continued live virus in CLL patient



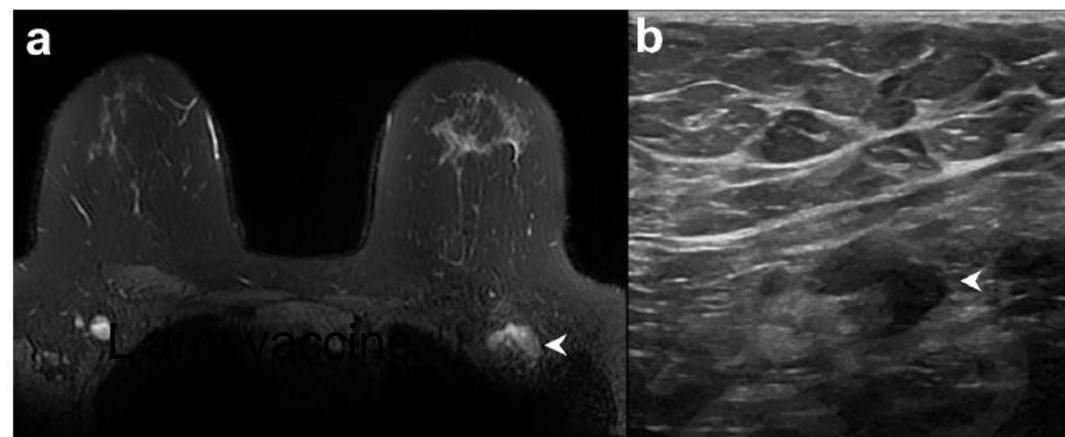
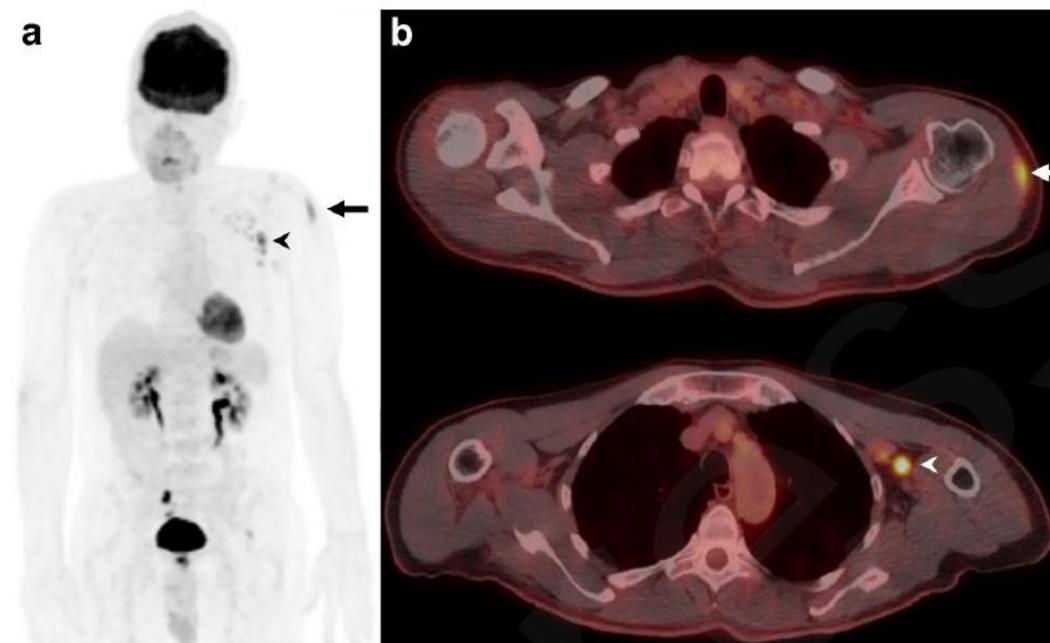
Yet continued viral mutation



- **ASCO Guidelines:** At this time, patients with cancer may be offered vaccination against COVID-19 as long as components of that vaccine are not contraindicated.
- **Centers for Disease Control and Prevention (CDC) interim clinical guidance** “Immunocompromised individuals may still receive COVID-19 vaccination if they have no contraindications to vaccination. However, they should be counseled about the unknown vaccine safety profile and effectiveness in immunocompromised populations, as well as the potential for reduced immune responses and the need to continue to follow all current guidance to protect themselves against COVID-19.”
- MSKCC Guidance (<https://www.asco.org/sites/new-www.asco.org/files/content-files/covid-19/2021-MSK-COVID19-VACCINE-GUIDELINES.pdf>)
- NCCN Guidance (<https://www.nccn.org/covid-19/>)

Vaccine imaging recommendations

1. Society for breast Imaging: Postpone SCREENING breast imaging 4-6 weeks
2. Administer vaccine on contralateral site of local cancers and give both vaccines on same side
3. Vaccination information should be included in pre-imaging questionnaires
4. Consider US follow up for asymmetrical LAD 6 weeks after complete vaccine series and delay biopsy unless high concern for mets.



5 days after vaccine L arm

6 wk f/u US

Becker et al Radiology 2021

Thank You!



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