

1 **Cardiac abnormalities in Long Covid 1-year post-SARS-CoV-2 infection.**2 **Supplementary materials**

3

Page Number	Contents
2	Supplementary methods
4	Supplementary results
6	Table S1: Reference Ranges for imaging metrics across organs
9	Table S2: Demographics of HC compared to the Long COVID cohort, with and without CMR abnormalities
11	Table S3: Differences in CMR abnormalities and symptoms by COVID-19 diagnosis method
12	Table S4: Blood investigations by abnormalities on CMR
20	Figure S5: T1 topographical abnormalities in patients classified with CMR abnormalities
21	Table S6. Detailed CMR findings in new onset cardiac abnormalities at 12 months
22	Supplementary References

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12 **Supplementary methods**

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14 1. **Study recruitment:** The study website (coverscan.com) was advertised by Perspectum or by iWGC  
 15 (an independent platform and service provider for patient experience data collection and analysis)  
 16 via online posting (social media, website banners) and by global invitation emails to applicable  
 17 charities and consented patient networks. Participants interested in the study registered their  
 18 interest by responding to a link located in the study's webpage. Participant response overwhelmed  
 19 capacity so we randomly selected participants to be contacted for phone screening interview,  
 20 without a formal algorithm. Participation was voluntary (no remuneration).

21

22 2. **Classification of Severity:** Long COVID disease severity categories are described below (a, b).

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a. **Definition Long COVID, based on validated questionnaires (1–3):**

	Dyspnoea 12 score (1)		EQ-5D-5L usual activity score*(4)
<b>Severe Long COVID</b>	≥10	or	≥3
<b>Mild Long COVID</b>	Not fulfilling neither of the conditions above		

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\* EQ-5D-5L score is based on the scoring in the following question:

28

*“Please tick the ONE box that best describes your health TODAY”*

29

*USUAL ACTIVITIES (e.g., work, study, housework, family, or leisure activities)*

30

- *I have no problems doing my usual activities (score 1)*

31

- *I have slight problems doing my usual activities (score 2)*

32

- *I have moderate problems doing my usual activities (score 3)*

33

- *I have severe problems doing my usual activities (score 4)*

34

- *I am unable to do my usual activities (score 5)*

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b. **Definition of symptom severity, based on self-reported perceived severity:**

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<b>Patient asked to select one of the following options:</b>
Critical acute respiratory distress syndrome (ARDS)
Severe disease
Moderate disease
Mild disease
Asymptomatic disease

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c. **Severe breathlessness**

40

Score of ≥10 in the Dyspnoea-12 validated questionnaire

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42

**3. List of blood biomarkers assessed in this study:**

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Haemoglobin, HCT, red cell count, MCV, MCH, MCHC, RDW, platelet count, MPV, white cell

44

count, neutrophils, lymphocytes, monocytes, eosinophils, basophils, ESR, sodium,

45

potassium, chloride, bicarbonate, urea, creatinine, bilirubin, alkaline phosphatase, aspartate

46

transferase, alanine transferase, LDH, CK, gamma, total protein, albumin, globulin, calcium,

47

magnesium, phosphate, uric acid, triglycerides, fasting triglycerides, cholesterol, fasting

48

cholesterol, HDL cholesterol, LDL cholesterol, iron, TIBC, transferrin saturation, CRP high

49 sensitivity, troponin I high sensitivity, amylase, ferritin, lipase, thyroid stimulating hormone,  
50 testosterone, insulin, C-peptide, NTpro-BNP.

51

52

#### 53 4. Imaging acquisitions:

- 54 • Cardiac imaging involved a combination of several gated cine series, two long axis cines  
55 (horizontal long axis – HLA and vertical long axis – VLA), and a complete short axis stack  
56 covering the left ventricle (LV) and right ventricle (RV). This acquisition mirrors the one  
57 used at the UK Biobank and is a standardized approach (5). Three short-axis were  
58 acquired at the basal, mid, and apical levels of the left ventricle, for T1 mapping using  
59 MOLLI, and for T2 mapping using a T2 preparation pulse applied with different T2  
60 preparation times, to impart T2 signal contrast, and a subsequent readout is performed  
61 by using a steady-state free precession (SSFP) or a fast low angle shot (FLASH). Cardiac  
62 T2 was only collected at the tail end of recruitment and therefore there was insufficient  
63 sample size (27/534 at baseline) for inclusion in manuscript results. In line with recent  
64 research in amyloidosis and published consensus on myocardial inflammation (6)(7),  
65 late gadolinium enhancement was not undertaken in this study where a combination  
66 of speed, cost, convenience, and hepatotoxicity avoidance were required to deliver  
67 CMR at scale.

68

<u>Cardiac mapping</u>	
<u>T1</u>	
<u>1.5T Siemens</u>	Modified Look-Locker inversion recovery sequence (MOLLI): For HR >700 ms/beat, TR= ~312.64 ms, TE= ~1.33 or Min ms, Flip angle= 35°, FOV= 384 mm, SL= 8mm, Ny*Nx= 256x256 matrix, Inversion Scheme= 5(3)3, parallel imaging technique/factor= GRAPPA2, BW= 1085 Hz/pixel. For HR <700 ms/beat, TR= ~312.64 ms, TE= ~1.33 or Min ms, Flip angle= 35°, FOV= 384 mm, SL= 8mm, Ny*Nx= 192 x 192 matrix, Inversion Scheme= 5(3)3, parallel imaging technique/factor= GRAPPA2, BW= 1085 Hz/pixel.
<u>3T Siemens</u>	MOLLI: For HR >700 ms/beat, TR= ~ 280.56 ms, TE= ~ 1.12 or Min ms, Flip angle= 35°, FOV= 360 mm, SL= 8mm, Ny*Nx= 256x256 matrix, Inversion Scheme= 5(3)3, parallel imaging technique/factor= GRAPPA2, BW= 1085 Hz/pixel. For HR <700 ms/beat, TR= ~ 272.13ms, TE= ~ 1.2 or Min ms, Flip angle= 35°, FOV= 360 mm, SL= 8mm, Ny*Nx= 192 x192 matrix, Inversion Scheme= 5(3)3, parallel imaging technique/factor= GRAPPA2, BW= 1085 Hz/pixel.
<u>T2</u>	
<u>1.5T Siemens</u>	2D SSFP sequence (TrueFISP): TR= ~ 214.07 ms or Min, TE= ~ 1.23 ms, FOV= 384x308 mm <sup>2</sup> , SL= 8mm, Ny*Nx= 192x116 matrix, segment =58, parallel imaging technique/factor= GRAPPA2, BW= 1185 Hz/pixel
<u>3T Siemens</u>	2D TurboFLASH sequence: TR= ~ 214.07 ms or Min, TE= Min, FOV= 360x288 mm <sup>2</sup> , SL= 8mm, Ny*Nx= 192x116 matrix, segment = 58, parallel imaging technique/factor= GRAPPA2, BW= 1185 Hz/pixel.

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- 72 • Liver and pancreas imaging used the LiverMultiScan acquisition protocol (Perspectum,  
73 Oxford, UK), which involves 3 single 2D axial slice breath-held acquisitions that

74 separately are sensitive to the fat content (proton density fat fraction, or PDFF), to T2\*  
75 (which is representative of liver iron content) and a MOLLI-T1 measurement (providing  
76 a measurement of tissue water), additionally a volumetric scan was used that covers  
77 the entire liver (8).

78 • Lungs: Two dynamic cine MR acquisitions were acquired in the coronal plane with a  
79 306.91ms temporal resolution: one 40 s acquisition with the patient instructed to  
80 breathe normally and a second 30 s acquisition with the patient instructed to breathe  
81 deeply.

82 • Kidney: single coronal view that was able to image both kidneys. Imaging contrasts  
83 were MOLLI-T1, and a spoiled gradient recalled acquisition (SPGR).

84 • Spleen: Volumetric SPGR MRI images  
85

## 86 5. Image Analysis:

87 • Cardiac: Experienced cardiac MRI analysts used CVI42v5.11 (Cardiovascular Imaging  
88 Inc, Canada) to trace manually the myocardium in the end-diastolic and end-systolic  
89 phases in each of the short-axis views, following the standard UK Biobank evaluation  
90 approach as previously described (9). We reported ventricular function; end systolic  
91 and diastolic volume; stroke volume and ejection fraction in both ventricles; left  
92 ventricular muscle mass and ventricular max wall thickness and global longitudinal and  
93 circumferential 3D strain metrics. Mean Cardiac T1 and T2 were determined for each  
94 of the 16 cardiac segments (of the AHA 17 segment model excluding the apex)(10).

95 • Liver Images were analysed by data analysts experienced at using the LiverMultiScan  
96 (Perspectum, Oxford, UK) software. This yielded global metrics in each liver of PDFF  
97 (proton density fat fraction), T2\*, and cT1 (cT1 is a measurement of T1 that has been  
98 corrected for the confounding effects of iron and standardised to 3 Tesla; it is elevated  
99 with disease).

100 • Pancreas images were analysed in an equivalent manner to the above except the  
101 software used was not FDA-cleared and iron correction was not performed. The output  
102 T1 was standardized to 3 Tesla.

103 • Lung cine imaging allowed the measurement of the area of the left and right lungs  
104 through the breathing cycle in the coronal plane, which used automated methods that  
105 were reviewed by image analysts. The periodicity of the area fluctuations was used to  
106 determine the respiratory rate. All analysis was performed in-house using MATLAB  
107 based tools. The method was validated by measuring the correlation between the  
108 change in area and the forced vital capacity, the latter being measured using  
109 spirometry. Patient respiration was assessed by imaging a single 2D coronal slice of the  
110 lungs over 30 seconds using a dynamic cine MRI acquisition, during which the patient  
111 instructed to breathe deeply.

112 • Kidney: assessed using in-house tools to fit parametric maps and to allow trained  
113 analysts to make measurements. The kidney cortex was manually segmented using the  
114 MOLLI-T1 map to guide the boundary. Multiple regions-of-interests were manually  
115 placed within the cortex to extract a median value of cortical T1 in each kidney.  
116 Volumetric delineations of the kidneys were derived from SPGR MRI images.  
117 Automated delineations were produced using a 3D convolutional neural network,  
118 trained on expert annotations. Delineations were manually checked, and corrected, if  
119 necessary, for each subject. In addition to kidney cortex T1 and kidney volume, we also  
120 derived kidney length measurements, in the inferior-superior axis, from the same organ

121 segmentations and assessed the correlation of kidney length and kidney volume  
122 measurements

- 123 • Spleen: Volumetric delineations were derived from SPGR MRI images. Automated  
124 delineations were produced using a 3D convolutional neural network, trained on expert  
125 annotations. Delineations were manually checked, and corrected, if necessary, for each  
126 subject.
- 127 • Organ abnormality: Calculated for each organ based on evidence of any of the  
128 measurements appearing out of reference range (*Liver*: elevated cT1 or Fat; *Kidney*:  
129 elevated T1 or volume; *Pancreas*: elevated sT1 or Fat; *Heart*: elevated T1 in 3 or more  
130 segments, decreased RV or LV EF or increased LV or RV EDV or increased LV global  
131 longitudinal strain; *Spleen*: elevated volume; *Lung*: reduced fractional area volume).  
132 Single organ impairment was based on  $\geq 1$  organ impairment and multi-organ  
133 impairment was based on  $\geq 2$  organ impairments.

134

#### 135 6. Reference Ranges for imaging markers:

136 All values but organ volumes were calculated using sex and age matched HC (n=92) (Healthy  
137 Controls) scanned at 1.5T and 3T for this study calculating 2.5% (lower threshold) and 97.5%  
138 percentiles (upper threshold). Organ volumes were calculated from a combined cohort of  
139 the 92 healthy controls and 1744 BMI matched participants (N=1836 from N=36) from the  
140 UK Biobank, (11), representing all sex and height subgroups, as these are known  
141 confounders of organ size.(12) (\*) Reference ranges for the liver cT1 and liver PDFF have  
142 been taken from the available literature (13), as the LMS technology have been widely used  
143 and tested in multiple clinical trials and research settings. For pancreas PDFF, which has a  
144 positive skew in the distribution, reference ranges were extracted with the 95% percentile.  
145 (\$) T2 repeatability coefficients are not provided as this metric was only really available for  
146 follow up patients. (§) Right and left cortical T1 limits were averaged for analysis (**Table S1**).

147 Table S1: Reference Ranges for imaging metrics across organs

	Gender	Field Strength	Height (cm)	Lower threshold	Upper threshold (*)	Repeatability coefficient
<b>CARDIAC METRICS</b>						
<b>Field strength independent variables (BSA corrected)</b>						
Left end diastolic volume (mL)	F	-	-	-	108	17
Left end diastolic volume (mL)	M	-	-	-	132	17
Right end diastolic volume (mL)	F	-	-	-	110	19
Right end diastolic volume (mL)	M	-	-	-	139	19
Left end Systolic volume (mL)	F	-	-	-	47	12.5
Left end Systolic volume (mL)	M	-	-	-	57	12.5
Right end Systolic volume (mL)	F	-	-	-	49	12
Right end Systolic volume (mL)	M	-	-	-	60	12
Left Stroke volume (mL)	F	-	-	-	66	16
Left Stroke volume (mL)	M	-	-	-	84	16
Right Stroke volume (mL)	F	-	-	-	65	16
Right Stroke volume (mL)	M	-	-	-	84	16
<b>Field strength independent variables (non-BSA corrected)</b>						
Global circumferential strain 3D (%)	F	-	-	-	-18.1	2.5
Global circumferential strain 3D (%)	M	-	-	-	-16.8	2.5
Global longitudinal strain 3D (%)	F	-	-	-	-11.5	5.1
Global longitudinal strain 3D (%)	M	-	-	-	-7.8	5.1
Left ventricle ejection fraction (%)	F	-	-	52	-	6.6
Left ventricle ejection fraction (%)	M	-	-	51	-	6.6
Right ventricle ejection fraction (%)	F	-	-	50	-	7.0
Right ventricle ejection fraction (%)	M	-	-	50	-	7.0
Left ventricular max wall thickness (mm)	F	-	-	-	10.6	2.1
Left ventricular max wall thickness (mm)	M	-	-	-	14	2.1
Left ventricular muscle mass (g)	F	-	-	-	95	13
Left ventricular muscle mass (g)	M	-	-	-	151	13
<b>Field strength Dependent variables: 1.5T</b>						
Global T1 ref range (ms)	F	1.5T	-	-	1042	-
Global T1 ref range (ms)	M	1.5T	-	-	997	-
Segment 1: T1 basal anterior (ms)	F	1.5T	-	-	1043	42
Segment 1: T1 basal anterior (ms)	M	1.5T	-	-	1000	42
Segment 2: T1 basal anteroseptal (ms)	F	1.5T	-	-	1031	49
Segment 2: T1 basal anteroseptal (ms)	M	1.5T	-	-	1022	49
Segment 3: T1 basal inferoseptal (ms)	F	1.5T	-	-	1031	54
Segment 3: T1 basal inferoseptal (ms)	M	1.5T	-	-	1001	54
Segment 4: T1 basal inferior (ms)	F	1.5T	-	-	1091	57
Segment 4: T1 basal inferior (ms)	M	1.5T	-	-	995	57
Segment 5: T1 basal inferolateral (ms)	F	1.5T	-	-	1042	55
Segment 5: T1 basal inferolateral (ms)	M	1.5T	-	-	998	55
Segment 6: T1 basal anterolateral (ms)	F	1.5T	-	-	1041	54
Segment 6: T1 basal anterolateral (ms)	M	1.5T	-	-	979	54
Segment 7: T1 mid anterior (ms)	F	1.5T	-	-	1014	52
Segment 7: T1 mid anterior (ms)	M	1.5T	-	-	969	52
Segment 8: T1 mid anteroseptal (ms)	F	1.5T	-	-	1030	39
Segment 8: T1 mid anteroseptal (ms)	M	1.5T	-	-	1006	39
Segment 9: T1 mid inferoseptal (ms)	F	1.5T	-	-	1036	37
Segment 9: T1 mid inferoseptal (ms)	M	1.5T	-	-	994	37
Segment 10: T1 mid inferior (ms)	F	1.5T	-	-	1035	44
Segment 10: T1 mid inferior (ms)	M	1.5T	-	-	1023	44
Segment 11: T1 mid inferolateral (ms)	F	1.5T	-	-	1016	44
Segment 11: T1 mid inferolateral (ms)	M	1.5T	-	-	982	44
Segment 12: T1 mid anterolateral (ms)	F	1.5T	-	-	1029	62
Segment 12: T1 mid anterolateral (ms)	M	1.5T	-	-	979	62
Segment 13: T1 apical anterior (ms)	F	1.5T	-	-	1059	86
Segment 13: T1 apical anterior (ms)	M	1.5T	-	-	1004	86
Segment 14: T1 apical septal (ms)	F	1.5T	-	-	1065	48
Segment 14: T1 apical septal (ms)	M	1.5T	-	-	992	48
Segment 15: T1 apical inferior (ms)	F	1.5T	-	-	1070	43
Segment 15: T1 apical inferior (ms)	M	1.5T	-	-	1003	43
Segment 16: T1 apical lateral (ms)	F	1.5T	-	-	1040	70
Segment 16: T1 apical lateral (ms)	M	1.5T	-	-	1011	70
Global T2 ref range (ms) (S)	-	1.5T	-	-	51	-
<b>Field strength Dependent variables: 3T</b>						
Global T1 ref range (ms)	F	3T	-	-	1255	-
Global T1 ref range (ms)	M	3T	-	-	1214	-

	Gender	Field Strength	Height (cm)	Lower threshold	Upper threshold (*)	Repeatability coefficient
Segment 1: T1 basal anterior (ms)	F	3T	-	-	1226	72
Segment 1: T1 basal anterior (ms)	M	3T	-	-	1201	72
Segment 2: T1 basal anteroseptal (ms)	F	3T	-	-	1248	70
Segment 2: T1 basal anteroseptal (ms)	M	3T	-	-	1218	70
Segment 3: T1 basal inferoseptal (ms)	F	3T	-	-	1251	74
Segment 3: T1 basal inferoseptal (ms)	M	3T	-	-	1218	74
Segment 4: T1 basal inferior (ms)	F	3T	-	-	1271	112
Segment 4: T1 basal inferior (ms)	M	3T	-	-	1231	112
Segment 5: T1 basal inferolateral (ms)	F	3T	-	-	1240	109
Segment 5: T1 basal inferolateral (ms)	M	3T	-	-	1209	109
Segment 6: T1 basal anterolateral (ms)	F	3T	-	-	1200	61
Segment 6: T1 basal anterolateral (ms)	M	3T	-	-	1193	61
Segment 7: T1 mid anterior (ms)	F	3T	-	-	1266	90
Segment 7: T1 mid anterior (ms)	M	3T	-	-	1161	90
Segment 8: T1 mid anteroseptal (ms)	F	3T	-	-	1264	89
Segment 8: T1 mid anteroseptal (ms)	M	3T	-	-	1219	89
Segment 9: T1 mid inferoseptal (ms)	F	3T	-	-	1272	74
Segment 9: T1 mid inferoseptal (ms)	M	3T	-	-	1226	74
Segment 10: T1 mid inferior (ms)	F	3T	-	-	1279	84
Segment 10: T1 mid inferior (ms)	M	3T	-	-	1228	84
Segment 11: T1 mid inferolateral (ms)	F	3T	-	-	1226	60
Segment 11: T1 mid inferolateral (ms)	M	3T	-	-	1210	60
Segment 12: T1 mid anterolateral (ms)	F	3T	-	-	1278	75
Segment 12: T1 mid anterolateral (ms)	M	3T	-	-	1228	75
Segment 13: T1 apical anterior (ms)	F	3T	-	-	1271	63
Segment 13: T1 apical anterior (ms)	M	3T	-	-	1227	63
Segment 14: T1 apical septal (ms)	F	3T	-	-	1280	62
Segment 14: T1 apical septal (ms)	M	3T	-	-	1230	62
Segment 15: T1 apical inferior (ms)	F	3T	-	-	1257	57
Segment 15: T1 apical inferior (ms)	M	3T	-	-	1202	57
Segment 16: T1 apical lateral (ms)	F	3T	-	-	1254	77
Segment 16: T1 apical lateral (ms)	M	3T	-	-	1214	77
Global T2 ref range (ms) (\$)	-	3T	-	-	46	-
<b>LIVER METRICS</b>						
<b>Field strength independent variables</b>						
cT1 ROI (ms)	-	-	-	-	800 (*)	48
PDFF %	-	-	-	-	5 (*)	1.5
Volume (mL)	F	-	<164	-	1778	64
Volume (mL)	M	-	<164	-	2003	64
Volume (mL)	F	-	≥ 164, < 250	-	2049	64
Volume (mL)	M	-	≥ 164, < 250	-	2284	64
<b>KIDNEY METRICS</b>						
<b>Field strength independent variables</b>						
Left Volume (mL)	F	-	<164	-	177	10
Left Volume (mL)	M	-	<164	-	221	10
Left Volume (mL)	F	-	≥ 164, < 250	-	192	10
Left Volume (mL)	M	-	≥ 164, < 250	-	255	10
Right Volume (mL)	F	-	<164	-	176	8
Right Volume (mL)	M	-	<164	-	207	8
Right Volume (mL)	F	-	≥ 164, < 250	-	186	8
Right Volume (mL)	M	-	≥ 164, < 250	-	229	8
<b>Field strength Dependent variables: 1.5T</b>						
Cortex T1 (ms) (\$)	-	1.5T	-	-	1154	76
<b>Field strength Dependent variables: 3T</b>						
Cortex T1 (ms) (\$)	-	3T	-	-	1512	68
<b>PANCREAS</b>						
<b>Field strength independent variables</b>						
sT1 ROI (ms)	-	-	-	-	821	74
PDFF %	-	-	-	-	6.6 (*)	2.8
<b>SPLEEN</b>						
<b>Field strength independent variables</b>						
Volume (mL)	F	-	<164	-	254	17
Volume (mL)	M	-	<164	-	392	17
Volume (mL)	F	-	≥ 164, < 250	-	293	17
Volume (mL)	M	-	≥ 164, < 250	-	411	17
<b>LUNG</b>						
<b>Field strength independent variables</b>						

	Gender	Field Strength	Height (cm)	Lower threshold	Upper threshold (*)	Repeatability coefficient
Total deep fractional area change (%)	-	-	-	22	-	15.9

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149 Table S2: Demographics of HC compared to the Long COVID cohort, with and without CMR abnormalities

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Demographic	HC, N = 91	COVID, N = 534	Post-COVID CMR abnormalities n=102	Post-COVID No CMR abnormalities n=424	P (HC vs COVID cohort)	P (HC vs Post-COVID CMR abnormalities)	P (HC vs Post-COVID No CMR abnormalities)
Age	44 (33, 53)	44 (38, 52)	43 (37, 51)	44 (38, 52)	0.6	>0.9	0.5
Sex (% male)	30 (33%)	147 (28%)	42 (41%)	103 (24%)	0.3	0.2	0.086
BMI kg/m <sup>2</sup> (Median (IQR))	22.8 (20.9, 25.1)	25.5 (22.6, 29.3)	26.3 (23.1, 29.0)	25.3 (22.6, 29.4)	<b>&lt;0.001</b>	<0.001	<0.001
BMI ≥25 to <30 kg/m <sup>2</sup> (%)	20 (22%)	172 (32%)	38 (37%)	131 (31%)	<b>0.051</b>	<b>0.021</b>	0.090
BMI ≥30 kg/m <sup>2</sup> (%)	3 (3.3%)	119 (22%)	23 (23%)	96 (23%)	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Ethnicity (%)					0.3	0.3	0.3
White	84 (92%)	475 (89%)	88 (86%)	382 (90%)			
Asian	6 (6.6%)	24 (4.5%)	7 (6.9%)	16 (3.8%)			
Black	0 (0%)	13 (2.4%)	3 (2.9%)	9 (2.1%)			
Mix	1 (1.1%)	21 (3.9%)	4 (3.9%)	16 (3.8%)			
Other	0 (0%)	1 (0.2%)	0 (0%)	1 (0.2%)			
Smoking					<b>0.02</b>	<b>0.013</b>	<b>0.01</b>
Never	71 (78%)	348 (65%)	66 (65%)	275 (65%)			
Current	3 (3.3%)	13 (2.4%)	5 (4.9%)	7 (1.7%)			
Past	17 (19%)	172 (32%)	31 (30%)	141 (33%)			
Hypertension	0 (0%)	44 (8.2%)	12 (12%)	32 (7.5%)	<b>0.005</b>	<b>&lt;0.001</b>	<b>0.007</b>

Diabetes	0 (0%)	10 (1.9%)	3 (2.9%)	7 (1.7%)	0.4	0.20	0.60
Asthma	2 (2.2%)	101 (19%)	22 (22%)	78 (18%)	<b>&lt;0.001</b>	<b>&lt;0.001</b>	<b>&lt;0.001</b>
Previous heart disease	0 (0%)	9 (1.7%)	2 (2%)	7 (1.7%)	<b>0.21</b>	<b>0.5</b>	<b>0.6</b>

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**Table S3: Differences in CMR abnormalities and symptoms by COVID-19 diagnosis method**

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	Clinically diagnosed COVID-19	COVID-19 positive PCR test result	Proportion test P value
Prevalence of CMR abnormalities at baseline			
CMR abnormalities	43 (18%)	59 (20%)	0.557
No CMR abnormalities	196 (82%)	236 (80%)	0.557
Total	239	295	
Severity of symptoms at baseline			
Mild/moderate	113 (47%)	161 (55%)	0.138
Severe/Extreme	125 (52%)	132(45%)	0.138
Total	238	293	
Trajectory of CMR abnormalities at 12 months			
Never	117(80%)	132 (72%)	0.08
New	3 (2%)	7 (4%)	0.35
Ongoing	13 (9%)	28 (15%)	0.09
Resolved	13 (9%)	17 (9%)	0.92
Total	146	184	-

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Table S4: Blood investigations by abnormalities on CMR

	6 months						12 months						
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
<b>Haemoglobin</b>													
H	6 (1.2%)	4 (1.0%)	2 (2.2%)	0.36	0 (0%)	2 (2.6%)	0.60	1 (2.6%)	0 (0%)	0.51	1 (2.4%)	0 (0%)	1.00
L	13 (2.6%)	9 (2.2%)	3 (3.3%)		1 (6.7%)	2 (2.6%)		2 (5.3%)	0 (0%)		1 (2.4%)	0 (0%)	
N	487 (96%)	393 (97%)	87 (95%)		14 (93%)	73 (95%)		35 (92%)	27 (100%)		39 (95%)	27 (100%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>HCT</b>													
H	10 (2.0%)	9 (2.2%)	1 (1.1%)	0.69	0 (0%)	1 (1.3%)	0.42	1 (2.6%)	0 (0%)	1.00	1 (2.4%)	2 (7.4%)	0.56
L	8 (1.6%)	5 (1.2%)	2 (2.2%)		1 (6.7%)	1 (1.3%)		1 (2.6%)	0 (0%)		0 (0%)	0 (0%)	
N	488 (96%)	392 (97%)	89 (97%)		14 (93%)	75 (97%)		36 (95%)	27 (100%)		40 (98%)	25 (93%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>Red cell count</b>													
H	14 (2.8%)	13 (3.2%)	1 (1.1%)	0.69	0 (0%)	1 (1.3%)	0.52	0 (0%)	0 (0%)	0.51	1 (2.4%)	1 (3.7%)	0.38
L	17 (3.4%)	12 (3.0%)	3 (3.3%)		1 (6.7%)	2 (2.6%)		2 (5.3%)	0 (0%)		3 (7.3%)	0 (0%)	
N	475 (94%)	381 (94%)	88 (96%)		14 (93%)	74 (96%)		36 (95%)	27 (100%)		37 (90%)	26 (96%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>MCV</b>													
H	1 (0.2%)	0 (0%)	1 (1.1%)	0.20	0 (0%)	1 (1.3%)	1.00	1 (2.6%)	0 (0%)	0.51	2 (4.9%)	0 (0%)	0.30
L	10 (2.0%)	8 (2.0%)	2 (2.2%)		0 (0%)	2 (2.6%)		2 (5.3%)	0 (0%)		0 (0%)	1 (3.7%)	
N	495 (98%)	398 (98%)	89 (97%)		15 (100%)	74 (96%)		35 (92%)	27 (100%)		39 (95%)	26 (96%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>MCH</b>													
H	4 (0.8%)	3 (0.7%)	1 (1.1%)	0.84	0 (0%)	1 (1.3%)	1.00	1 (2.6%)	0 (0%)	1.00	1 (2.4%)	0 (0%)	1.00
L	8 (1.6%)	7 (1.7%)	1 (1.1%)		0 (0%)	1 (1.3%)		1 (2.6%)	0 (0%)		1 (2.4%)	1 (3.7%)	
N	494 (98%)	396 (98%)	90 (98%)		15 (100%)	75 (97%)		36 (95%)	27 (100%)		39 (95%)	26 (96%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>MCHC</b>													
H	105 (21%)	76 (19%)	26 (28%)	<b>0.04</b>	2 (13%)	24 (31%)	0.22	13 (34%)	4 (15%)	0.08	10 (24%)	2 (7.4%)	0.07
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	401 (79%)	330 (81%)	66 (72%)		13 (87%)	53 (69%)		25 (66%)	23 (85%)		31 (76%)	25 (93%)	
Missing	28	18	10		4	6		3	3		0	3	

	6 months									12 months			
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
<b>RDW</b>													
H	12 (2.4%)	10 (2.5%)	2 (2.2%)	0.94	0 (0%)	2 (2.6%)	1.00	2 (5.3%)	0 (0%)	0.53	0 (0%)	0 (0%)	1.00
L	26 (5.1%)	22 (5.4%)	4 (4.3%)		0 (0%)	4 (5.2%)		3 (7.9%)	1 (3.7%)				
N	467 (92%)	373 (92%)	86 (93%)		15 (100%)	71 (92%)		33 (87%)	26 (96%)				
Missing	29	19	10		4	6		3	3				
<b>Platelet count</b>													
H	22 (4.4%)	15 (3.7%)	6 (6.6%)	0.13	1 (6.7%)	5 (6.6%)	1.00	4 (11%)	1 (3.7%)	0.49	1 (2.4%)	3 (11%)	0.29
L	2 (0.4%)	1 (0.2%)	1 (1.1%)		0(0%)	1 (1.3%)		1 (2.7%)	0(0%)				
N	479 (95%)	388 (96%)	84 (92%)		14 (93%)	70 (92%)		32 (86%)	26 (96%)				
Missing	31	20	11		4	7		4	3				
<b>MPV</b>													
H	8 (1.6%)	6 (1.5%)	1 (1.1%)	1.00	0 (0%)	1 (1.3%)	1.00	1 (2.6%)	0 (0%)	1.00	2 (4.9%)	0 (0%)	0.51
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)				
N	496 (98%)	398 (99%)	91 (99%)		15 (100%)	76 (99%)		37 (97%)	27 (100%)				
Missing	30	20	10		4	6		3	3				
<b>White cell count</b>													
H	19 (3.8%)	13 (3.2%)	3 (3.3%)	1.00	0 (0%)	3 (3.9%)	1.00	2 (5.3%)	0 (0%)	0.51	0 (0%)	0 (0%)	1.00
L	1 (0.2%)	1 (0.2%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)				
N	486 (96%)	392 (97%)	89 (97%)		15 (100%)	74 (96%)		36 (95%)	27 (100%)				
Missing	28	18	10		4	6		3	3				
<b>Neutrophils</b>													
H	8 (1.6%)	7 (1.7%)	1 (1.1%)	0.60	0 (0%)	1 (1.3%)	0.66	1 (2.6%)	0 (0%)	0.78	0 (0%)	0 (0%)	1.00
L	30 (5.9%)	20 (4.9%)	7 (7.6%)		0 (0%)	7 (9.1%)		3 (7.9%)	1 (3.7%)				
N	468 (92%)	379 (93%)	84 (91%)		15 (100%)	69 (90%)		34 (89%)	26 (96%)				
Missing	28	18	10		4	6		3	3				
<b>Lymphocytes</b>													
H	2 (0.4%)	1 (0.2%)	1 (1.1%)	0.27	0 (0%)	1 (1.3%)	0.65	0 (0%)	1 (3.7%)	0.59	1 (2.4%)	1 (3.7%)	0.22
L	38 (7.5%)	32 (7.9%)	5 (5.4%)		0 (0%)	5 (6.5%)		2 (5.3%)	2 (7.4%)				
N	466 (92%)	373 (92%)	86 (93%)		15 (100%)	71 (92%)		36 (95%)	24 (89%)				
Missing	28	18	10		4	6		3	3				
<b>Monocytes</b>													
H	4 (0.8%)	2 (0.5%)	1 (1.1%)	0.64	0 (0%)	1 (1.3%)	1.00	1 (2.6%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00
L	2 (0.4%)	2 (0.5%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)				
N	500 (99%)	402 (99%)	91 (99%)		15 (100%)	76 (99%)		37 (97%)	27 (100%)				
Missing	28	18	10		4	6		3	3				

	6 months									12 months			
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
<b>Eosinophils</b>													
H	14 (2.8%)	10 (2.5%)	4 (4.3%)	0.30	0 (0%)	4 (5.2%)	1.00	0 (0%)	1 (3.7%)	0.42	2 (4.9%)	1 (3.7%)	1.00
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)		
N	492 (97%)	396 (98%)	88 (96%)		15 (100%)	73 (95%)		38 (100%)	26 (96%)		39 (95%)	26 (96%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>Basophils</b>													
H	2 (0.4%)	2 (0.5%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.0	0 (0%)	0 (0%)	1.00	0 (0%)	2 (7.4%)	0.15
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)		
N	504 (100%)	404 (100%)	92 (100%)		15 (100%)	77 (100%)		38 (100%)	27 (100%)		41 (100%)	25 (93%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>ESR</b>													
H	40 (7.9%)	32 (7.9%)	8 (8.6%)	0.81	1 (6.7%)	7 (9.0%)	1.00	4 (11%)	3 (11%)	1.00	3 (7.3%)	4 (15%)	1.0
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)		
N	468 (92%)	375 (92%)	85 (91%)		14 (93%)	71 (91%)		34 (89%)	24 (89%)		38 (93%)	23 (85%)	
Missing	26	17	9		4	5		3	3		0	3	
<b>Sodium</b>													
H	1 (0.2%)	1 (0.2%)	0 (0%)	0.62	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	0.13	0 (0%)	0 (0%)	0.14
L	17 (3.4%)	13 (3.2%)	4 (4.3%)		0 (0%)	4 (5.2%)		4 (11%)	0 (0%)		4 (9.8%)	0 (0%)	
N	488 (96%)	392 (97%)	88 (96%)		15 (100%)	73 (95%)		34 (89%)	27 (100%)		37 (90%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Potassium</b>													
H	231 (49%)	188 (49%)	42 (49%)	0.97	6 (46%)	36 (50%)	0.80	17 (47%)	12 (52%)	0.71	8 (32%)	9 (47%)	0.30
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	243 (51%)	194 (51%)	43 (51%)		7 (54%)	36 (50%)		19 (53%)	11 (48%)		17 (68%)	10 (53%)	
Missing	60	42	17		6	11		5	7		16	11	
<b>Chloride</b>													
H	10 (2.0%)	7 (1.7%)	2 (2.2%)	<b>0.05</b>	0 (0%)	2 (2.6%)	0.71	1 (2.6%)	0 (0%)	0.26	0 (0%)	0 (0%)	0.51
L	11 (2.2%)	6 (1.5%)	5 (5.4%)		0 (0%)	5 (6.5%)		3 (7.9%)	0 (0%)		2 (4.9%)	0 (0%)	
N	485 (96%)	393 (97%)	85 (92%)		15 (100%)	70 (91%)		34 (89%)	27 (100%)		39 (95%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Bicarbonate</b>													
H	25 (4.9%)	18 (4.4%)	7 (7.6%)	0.30	2 (13%)	5 (6.5%)	0.24	4 (11%)	2 (7.4%)	0.82	2 (4.9%)	1 (3.6%)	1.00
L	49 (9.7%)	37 (9.1%)	10 (11%)		0 (0%)	10 (13%)		4 (11%)	4 (15%)		1 (2.4%)	1 (3.6%)	
N	432 (85%)	351 (86%)	75 (82%)		13 (87%)	62 (81%)		30 (79%)	21 (78%)		38 (93%)	26 (93%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Urea</b>													

	6 months							12 months							
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P		
H	1 (0.2%)	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	1 (2.4%)	0 (0%)	1.00		
L	1 (0.2%)	1 (0.2%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)
N	504(100%)	405 (100%)	92 (100%)		15 (100%)	77 (100%)		38 (100%)	27 (100%)		40 (98%)	28 (100%)			
Missing	28	18	10		4	6		3	3		0	2			
<b>Creatinine</b>															
H	6 (1.2%)	6 (1.5%)	0 (0%)	0.65	0 (0%)	0 (0%)	0.19	0 (0%)	0 (0%)	1.00	1 (2.4%)	0 (0%)	1.00		
L	25 (4.9%)	20 (4.9%)	5 (5.4%)		2 (13%)	3 (3.9%)		2 (5.3%)	2 (7.4%)		2 (4.9%)	2 (7.1%)			
N	475 (94%)	380 (94%)	87 (95%)		13 (87%)	74 (96%)		36 (95%)	25 (93%)		38 (93%)	26 (93%)			
Missing	28	18	10		4	6		3	3		0	2			
<b>Bilirubin</b>															
H	17 (3.4%)	11 (2.7%)	4 (4.3%)	0.49	1 (6.7%)	3 (3.9%)	0.52	3 (7.9%)	0 (0%)	0.26	2 (4.9%)	2 (7.1%)	1.00		
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)			
N	489 (97%)	395 (97%)	88 (96%)		14 (93%)	74 (96%)		35 (92%)	27 (100%)		39 (95%)	26 (93%)			
Missing	28	18	10		4	6		3	3		0	2			
<b>Alkaline phosphatase</b>															
H	12 (2.4%)	9 (2.2%)	2 (2.2%)	0.44	0 (0%)	2 (2.6%)	1.00	1 (2.6%)	0 (0%)	1.00	0 (0%)	0 (0%)	0.41		
L	13 (2.6%)	9 (2.2%)	4 (4.3%)		0 (0%)	4 (5.2%)		2 (5.3%)	1 (3.7%)		0 (0%)	1 (3.6%)			
N	481 (95%)	388 (96%)	86 (93%)		15 (100%)	71 (92%)		35 (92%)	26 (96%)		41 (100%)	27 (96%)			
Missing	28	18	10		4	6		3	3		0	2			
<b>Aspartate transferase</b>															
H	43 (8.8%)	33 (8.4%)	10 (12%)	0.35	1 (7.1%)	9 (12%)	1.00	4 (11%)	2 (8.3%)	1.00	6 (15%)	2 (8.0%)	0.47		
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)			
N	443 (91%)	359 (92%)	76 (88%)		13 (93%)	63 (88%)		31 (89%)	22 (92%)		34 (85%)	23 (92%)			
Missing	48	32	16		5	11		6	6		1	5			
<b>Alanine transferase</b>															
H	73 (14%)	62 (15%)	11 (12%)	0.81	1 (6.7%)	10 (13%)	0.74	5 (13%)	4 (15%)	0.69	7 (17%)	5 (18%)	1.00		
L	7 (1.4%)	6 (1.5%)	1 (1.1%)		0 (0%)	1 (1.3%)		0 (0%)	1 (3.7%)		1 (2.4%)	0 (0%)			
N	426 (84%)	338 (83%)	80 (87%)		14 (93%)	66 (86%)		33 (87%)	22 (81%)		33 (80%)	23 (82%)			
Missing	28	18	10		4	6		3	3		0	2			
<b>LDH</b>															
H	80 (16%)	63 (16%)	16 (18%)	0.79	1 (6.7%)	15 (20%)	0.40	9 (25%)	4 (15%)	0.19	10 (24%)	7 (26%)	0.89		
L	18 (3.6%)	12 (3.0%)	3 (3.4%)		0 (0%)	3 (4.1%)		0 (0%)	2 (7.7%)		0 (0%)	0 (0%)			
N	400 (80%)	326 (81%)	70 (79%)		14 (93%)	56 (76%)		27 (75%)	20 (77%)		31 (76%)	20 (74%)			
Missing	36	23	13		4	9		5	4		0	3			
<b>CK</b>															
H	40 (7.9%)	31 (7.6%)	9 (9.8%)	0.28	1 (6.7%)	8 (10%)	1.00	3 (7.9%)	3 (11%)	0.82	4 (9.8%)	4 (15%)	0.82		
L	2 (0.4%)	1 (0.2%)	1 (1.1%)		0 (0%)	1 (1.3%)		1 (2.6%)	0 (0%)		1 (2.4%)	0 (0%)			

	6 months									12 months			
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalized, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
N	464 (92%)	374 (92%)	82 (89%)		14 (93%)	68 (88%)		34 (89%)	24 (89%)		36 (88%)	23 (85%)	
Missing	28	18	10		4	6		3	3		0	3	
<b>Gamma GT</b>													
H	32 (6.3%)	26 (6.4%)	5 (5.4%)		0 (0%)	5 (6.5%)		3 (7.9%)	1 (3.7%)		3 (7.3%)	0 (0%)	
L	12 (2.4%)	8 (2.0%)	3 (3.3%)	0.66	0 (0%)	3 (3.9%)	0.76	2 (5.3%)	0 (0%)	0.53	3 (7.3%)	0 (0%)	0.16
N	462 (91%)	372 (92%)	84 (91%)		15 (100%)	69 (90%)		33 (87%)	26 (96%)		35 (85%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Total protein</b>													
H	2 (0.4%)	1 (0.2%)	1 (1.1%)		0 (0%)	1 (1.3%)		1 (2.6%)	0 (0%)		0 (0%)	0 (0%)	
L	7 (1.4%)	5 (1.2%)	2 (2.2%)	0.30	0 (0%)	2 (2.6%)	1.00	1 (2.6%)	1 (3.7%)	1.00	1 (2.4%)	0 (0%)	1.00
N	497 (98%)	400 (99%)	89 (97%)		15 (100%)	74 (96%)		36 (95%)	26 (96%)		40 (98%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Albumin</b>													
H	27 (5.3%)	21 (5.2%)	6 (6.5%)		0 (0%)	6 (7.8%)		4 (11%)	2 (7.4%)		1 (2.4%)	0 (0%)	
L	0 (0%)	0 (0%)	0 (0%)	0.61	0 (0%)	0 (0%)	0.58	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00
N	479 (95%)	385 (95%)	86 (93%)		15 (100%)	71 (92%)		34 (89%)	25 (93%)		40 (98%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Globulin</b>													
H	2 (0.4%)	2 (0.5%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
L	14 (2.8%)	11 (2.7%)	3 (3.3%)	0.82	0 (0%)	3 (3.9%)	1.00	2 (5.3%)	0 (0%)	0.51	1 (2.4%)	0 (0%)	1.00
N	490 (97%)	393 (97%)	89 (97%)		15 (100%)	74 (96%)		36 (95%)	27 (100%)		40 (98%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Calcium</b>													
H	7 (1.4%)	4 (1.0%)	3 (3.3%)		0 (0%)	3 (3.9%)		2 (5.3%)	1 (3.7%)		0 (0%)	0 (0%)	
L	8 (1.6%)	6 (1.5%)	2 (2.2%)	0.12	0 (0%)	2 (2.6%)	1.00	0 (0%)	1 (3.7%)	0.75	1 (2.4%)	0 (0%)	1.00
N	491 (97%)	396 (98%)	87 (95%)		15 (100%)	72 (94%)		36 (95%)	25 (93%)		40 (98%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Magnesium</b>													
H	2 (0.4%)	2 (0.5%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
L	1 (0.2%)	0 (0%)	1 (1.1%)	0.21	0 (0%)	1 (1.3%)	1.00	1 (2.6%)	0 (0%)	1.00	1 (2.4%)	0 (0%)	1.00
N	503 (99%)	404 (100%)	91 (99%)		15 (100%)	76 (99%)		37 (97%)	27 (100%)		40 (98%)	28 (100%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Phosphate</b>													
H	13 (2.6%)	8 (2.0%)	5 (5.4%)		1 (6.7%)	4 (5.2%)		2 (5.3%)	2 (7.4%)		2 (4.9%)	2 (7.1%)	
L	53 (10%)	46 (11%)	6 (6.5%)	0.08	0 (0%)	6 (7.8%)	0.66	3 (7.9%)	3 (11%)	0.88	4 (9.8%)	5 (18%)	0.56
N	440 (87%)	352 (87%)	81 (88%)		14 (93%)	67 (87%)		33 (87%)	22 (81%)		35 (85%)	21 (75%)	
Missing	28	18	10		4	6		3	3		0	2	



	6 months							12 months					
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalized, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
<b>Uric acid</b>													
H	29 (5.7%)	22 (5.4%)	7 (7.6%)	0.71	3 (20%)	4 (5.2%)	<b>0.03</b>	1 (2.6%)	4 (15%)	0.21	1 (2.4%)	4 (14%)	0.11
L	59 (12%)	48 (12%)	10 (11%)		3 (20%)	7 (9.1%)		4 (11%)	2 (7.4%)		7 (17%)	2 (7.1%)	
N	418 (83%)	336 (83%)	75 (82%)		9 (60%)	66 (86%)		33 (87%)	21 (78%)		33 (80%)	22 (79%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>Triglycerides</b>													
H	26 (20%)	20 (20%)	4 (17%)	1.00	0 (0%)	4 (19%)	1.00	3 (27%)	1 (20%)	1.00	3 (10%)	5 (26%)	0.24
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	102 (80%)	81 (80%)	20 (83%)		3 (100%)	17 (81%)		8 (73%)	4 (80%)		26 (90%)	14 (74%)	
Missing	406	323	78		16	62		30	25		12	11	
<b>Fasting triglycerides</b>													
H	44 (12%)	39 (13%)	5 (7.4%)	0.21	1 (8.3%)	4 (7.1%)	1.00	2 (7.4%)	1 (4.5%)	1.00	1 (8.3%)	0 (0%)	1.00
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	334 (88%)	266 (87%)	63 (93%)		11 (92%)	52 (93%)		25 (93%)	21 (95%)		11 (92%)	9 (100%)	
Missing	156	119	34		7	27		14	8		29	21	
<b>Cholesterol</b>													
H	68 (53%)	54 (53%)	13 (54%)	0.95	1 (33%)	12 (57%)	0.58	5 (45%)	3 (60%)	1.00	10 (34%)	8 (42%)	0.86
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	1 (3.4%)	
N	60 (47%)	47 (47%)	11 (46%)		2 (67%)	9 (43%)		6 (55%)	2 (40%)		18 (62%)	11 (58%)	
Missing	406	323	78		16	62		30	25		12	11	
<b>Fasting cholesterol</b>													
H	167 (44%)	143 (47%)	24 (35%)	0.08	4 (33%)	20 (36%)	1.00	8 (30%)	8 (36%)	0.62	9 (75%)	5 (56%)	0.40
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	211 (56%)	162 (53%)	44 (65%)		8 (67%)	36 (64%)		19 (70%)	14 (64%)		3 (25%)	4 (44%)	
Missing	156	119	34		7	27		14	8		29	21	
<b>HDL cholesterol</b>													
H	176 (35%)	141 (35%)	31 (34%)	0.94	6 (40%)	25 (32%)	0.91	13 (34%)	7 (26%)	0.72	12 (29%)	6 (21%)	0.22
L	40 (7.9%)	31 (7.6%)	8 (8.7%)		1 (6.7%)	7 (9.1%)		5 (13%)	3 (11%)		2 (4.9%)	5 (18%)	
N	290 (57%)	234 (58%)	53 (58%)		8 (53%)	45 (58%)		20 (53%)	17 (63%)		27 (66%)	17 (61%)	
Missing	28	18	10		4	6		3	3		0	2	
<b>LDL cholesterol</b>													
H	166 (33%)	137 (34%)	28 (31%)	0.63	5 (36%)	23 (31%)	0.71	8 (22%)	9 (35%)	0.28	15 (37%)	9 (32%)	0.70
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	332 (67%)	264 (66%)	61 (69%)		9 (64%)	52 (69%)		28 (78%)	17 (65%)		26 (63%)	19 (68%)	
Missing	36	23	13		5	8		5	4		0	2	
<b>Iron</b>													

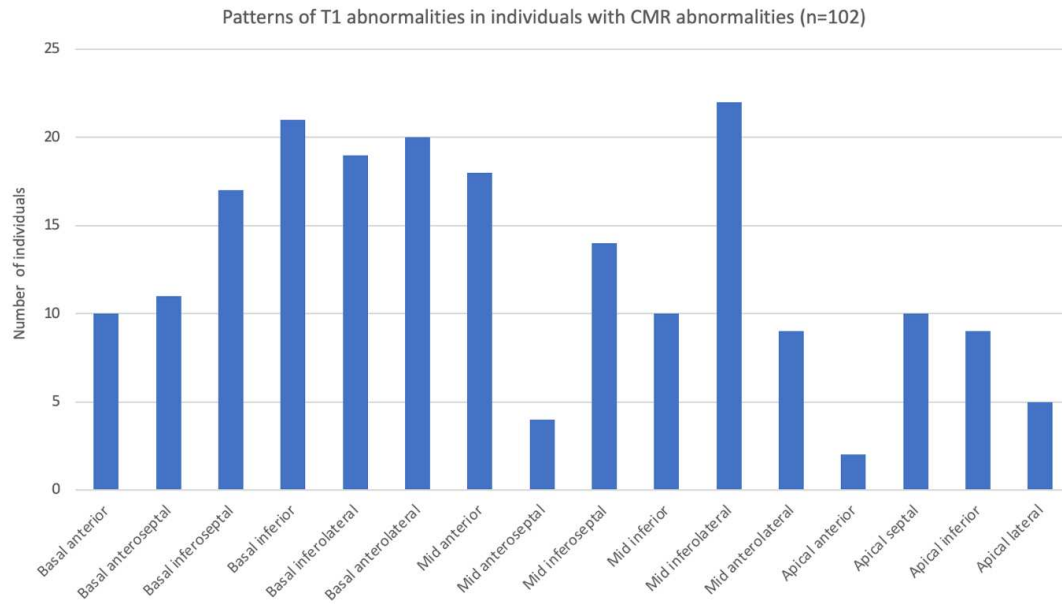
	6 months							12 months					
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
H	24 (4.7%)	19 (4.7%)	4 (4.3%)	1.00	0 (0%)	4 (5.2%)	1.00	3 (7.9%)	1 (3.7%)	0.78	1 (2.4%)	0 (0%)	1.00
L	10 (2.0%)	8 (2.0%)	2 (2.2%)		0 (0%)	2 (2.6%)		1 (2.6%)	0 (0%)		2 (4.9%)	2 (7.1%)	
N	472 (93%)	379 (93%)	86 (93%)		15 (100%)	71 (92%)		34 (89%)	26 (96%)		38 (93%)	26 (93%)	
Missing	28	18	10		4	6		3	3		0	2	
TIBC													
H	19 (3.8%)	15 (3.7%)	3 (3.3%)	1.00	0 (0%)	3 (4.0%)	1.00	2 (5.4%)	0 (0%)	0.51	1 (2.4%)	0 (0%)	0.64
L	1 (0.2%)	1 (0.2%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		1 (3.7%)		
N	479 (96%)	385 (96%)	87 (97%)		15 (100%)	72 (96%)		35 (95%)	26 (100%)		40 (98%)	26 (96%)	
Missing	35	23	12		4	8		4	4		0	3	
Transferrin saturation													
H	9 (1.8%)	8 (2.0%)	1 (1.1%)	0.64	0 (0%)	1 (1.3%)	1.00	1 (2.7%)	0 (0%)	0.86	0 (0%)	0 (0%)	1.00
L	78 (16%)	60 (15%)	17 (19%)		3 (20%)	14 (19%)		7 (19%)	6 (23%)		6 (15%)	3 (11%)	
N	412 (83%)	333 (83%)	72 (80%)		12 (80%)	60 (80%)		29 (78%)	20 (77%)		35 (85%)	24 (89%)	
Missing	35	23	12		4	8		4	4		0	3	
CRP highly sensitive													
H	37 (7.3%)	33 (8.1%)	4 (4.3%)	0.21	1 (6.7%)	3 (3.9%)	0.52	0 (0%)	2 (7.4%)	0.17	2 (4.9%)	2 (7.1%)	1.00
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	468 (93%)	372 (92%)	88 (96%)		14 (93%)	74 (96%)		38 (100%)	25 (93%)		39 (95%)	26 (93%)	
Missing	29	19	10		4	6		3	3		0	2	
Troponin I highly sensitive													
H	4 (0.9%)	4 (1.1%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00
L	0 (0%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	458 (99%)	368 (99%)	83 (100%)		18 (100%)	65 (100%)		33 (100%)	24 (100%)		32 (100%)	24 (100%)	
Missing	72	52	19		1	18		8	6		9	6	
Amylase													
H	34 (7.3%)	23 (6.2%)	8 (9.6%)	<b>0.03</b>	2 (11%)	6 (9.2%)	0.73	3 (9.1%)	3 (12%)	0.84	3 (9.4%)	4 (17%)	0.82
L	10 (2.2%)	5 (1.3%)	5 (6.0%)		0 (0%)	5 (7.7%)		1 (3.0%)	1 (4.2%)		1 (3.1%)	0 (0%)	
N	418 (91%)	344 (92%)	70 (84%)		16 (89%)	54 (83%)		29 (88%)	20 (83%)		28 (88%)	20 (83%)	
Missing	72	52	19		1	18		8	6		9	6	
Ferritin													
H	61 (13.2%)	48 (13%)	13 (16%)	0.76	2 (11%)	11 (17%)	0.78	6 (18%)	3 (12%)	0.72	6 (19%)	4 (17%)	1.00
L	11 (2.4%)	10 (2.7%)	1 (1.2%)		0 (0%)	1 (1.5%)		0 (0%)	0 (0%)		1 (3.1%)	0 (0%)	
N	390 (84%)	314 (84%)	69 (83%)		16 (89%)	53 (82%)		27 (82%)	21 (88%)		25 (78%)	20 (83%)	
Missing	72	52	19		1	18		8	6		9	6	
Lipase													
H	36 (7.7%)	29 (7.7%)	5 (5.9%)	0.88	1 (5.6%)	4 (6.0%)	0.26	2 (5.9%)	2 (8.0%)	1.00	3 (9.4%)	1 (4.2%)	0.63

	6 months							12 months					
	COVID, N=534	No CMR abnormalities, N = 424	CMR abnormalities, N = 102	P	CMR abnormalities hospitalised, N = 19	CMR abnormalities non hospitalised, N = 83	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P	Ongoing CMR abnormalities, N = 41	Resolved CMR abnormalities, N = 30	P
L	5 (1.1%)	4 (1.1%)	1 (1.2%)		1 (5.6%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
N	425 (91%)	341 (91%)	79 (93%)		16 (89%)	63 (94%)		32 (94%)	23 (92%)		29 (91%)	23 (96%)	
Missing	68	50	17		1	16		7	5		9	6	
<b>Thyroid stimulating hormone</b>													
H	3 (0.6%)	3 (0.8%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)		1 (3.1%)	1 (4.2%)	
L	0 (0%)	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00	0 (0%)	0 (0%)	1.00
N	464 (99%)	372 (99%)	85 (100%)		18 (100%)	67 (100%)		34 (100%)	25 (100%)		31 (97%)	23 (96%)	
Missing	67	49	17		1	16		7	5		9	6	
<b>Testosterone</b>													
H	19 (4.1%)	17 (4.6%)	1 (1.2%)		0 (0%)	1 (1.5%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
L	9 (1.9%)	6 (1.6%)	3 (3.6%)	0.30	3 (17%)	0 (0%)	<b>0.01</b>	1 (3.0%)	1 (4.2%)	1.00	2 (6.2%)	2 (8.3%)	1.00
N	434 (94%)	349 (94%)	79 (95%)		15 (83%)	64 (98%)		32 (97%)	23 (96%)		30 (94%)	22 (92%)	
Missing	72	52	19		1	18		8	6		9	6	
<b>Insulin</b>													
H	41 (8.9%)	32 (8.6%)	8 (9.9%)		2 (12%)	6 (9.4%)		3 (9.4%)	4 (17%)		3 (9.4%)	3 (12%)	
L	10 (2.2%)	7 (1.9%)	3 (3.7%)	0.59	0 (0%)	3 (4.7%)	1.00	1 (3.1%)	0 (0%)	0.68	0 (0%)	0 (0%)	1.00
N	408 (89%)	332 (89%)	70 (86%)		15 (88%)	55 (86%)		28 (88%)	19 (83%)		29 (91%)	21 (88%)	
Missing	75	53	21		2	19		9	7		9	6	
<b>C peptide</b>													
H	19 (4.1%)	16 (4.3%)	2 (2.4%)		1 (5.9%)	1 (1.5%)		2 (6.1%)	0 (0%)		3 (9.4%)	3 (12%)	
L	0 (0%)	0 (0%)	0 (0%)	0.75	0 (0%)	0 (0%)	0.37	0 (0%)	0 (0%)	0.51	0 (0%)	0 (0%)	1.00
N	443 (96%)	357 (96%)	80 (98%)		16 (94%)	64 (98%)		31 (94%)	23 (100%)		29 (91%)	21 (88%)	
Missing	72	51	20		2	18		8	7		9	6	
<b>NT-proBNP</b>													
H	2 (0.4%)	1 (0.3%)	1 (1.2%)		1 (5.6%)	0 (0%)		0 (0%)	1 (4.2%)		0 (0%)	0 (0%)	
L	0 (0%)	0 (0%)	0 (0%)	0.45	0 (0%)	0 (0%)	0.22	0 (0%)	0 (0%)	0.42	0 (0%)	0 (0%)	1.00
N	460 (99%)	371 (99%)	82 (99%)		17 (94%)	65 (100%)		33 (100%)	23 (96%)		32 (100%)	24 (100%)	
Missing	72	52	19		1	18		8	6		9	6	

Values presented as count and %. Cells with red shading indicating significant differences

Abbreviations: H, high; L, Low; N, Normal range; HCT, haematocrit test; MCV, Mean corpuscular volume; MCH, mean corpuscular haemoglobin; MCHC, mean corpuscular haemoglobin concentration; RDW, red cell distribution width; MPV, mean platelet volume; ESR, erythrocyte sedimentation rate; LDH, Lactate dehydrogenase; CK, Creatine Kinase; HDL, high-density lipoprotein; LDL, low-density lipoprotein; TIBC, total iron-binding capacity; CRP, C-reactive protein; NT-proBNP, N-terminal pro B-type natriuretic peptide.

Figure S5: T1 topographical abnormalities in participants classified as CMR abnormal at 6 months (n=102)



**Table S6. Detailed CMR findings in new onset cardiac abnormalities at 12 months. Red cells indicate abnormal values**

		A	B	C	D	E	F	G	H	I	J
<b>Field Strength</b>		1.5T	1.5T	1.5T	1.5T	1.5T	3T	1.5T	1.5T	3T	3T
<b>sex</b>		F	F	F	M	M	F	F	M	M	F
<b>Age range</b>		56-60	41-45	46-50	51-55	66-70	46-50	46-50	56-60	30-35	30-35
<b>Global T1</b>	baseline	1018	968	976	985	952	1219	1001	942	1141	1182
	follow up	1025	1018	1024	998	988	1278	998	934	1170	1238
<b>≥ 3 elevated T1 segments</b>	baseline	No	No	No	No	No	No	No	No	No	No
	follow up	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
<b>Global T2</b>	follow up	48	NA	47	47	47	45	NA	46	NA	NA
<b>≥ 3 elevated T2 segments</b>	follow up	No	No	No	No	No	Yes	No	No	No	No
<b>Left end diastolic volume (mL)</b>	baseline	65	81	80	89	81	90	75	117	80	73
	follow up	64	91	83	78	86	91	68	103	79	54
<b>Left end systolic volume (mL)</b>	baseline	27	29	34	35	28	34	29	49	34	28
	follow up	23	31	31	36	33	38	30	49	35	27
<b>Left ejection fraction (%)</b>	baseline	58	64	58	61	65	63	62	58	57	62
	follow up	64	66	63	55	61	58	56	53	55	51
<b>Left stroke volume (mL)</b>	baseline	38	52	46	54	53	57	47	68	46	45
	follow up	41	60	52	42	53	53	38	54	44	27
<b>Left ventricular max wall thickness (mm)</b>	baseline	10	9	7	9	9	9	8	10	10	9
	follow up	11	8	8	12	9	7	9	12	8	11
<b>Left ventricular muscle mass (mm)</b>	baseline	79	79	61	99	84	56	63	134	74	83
	follow up	89	75	65	118	82	58	67	149	70	92
<b>Left global circumferential strain (%)</b>	baseline	-20	-25	-24	-23	-21	-20	-24	-19	-20	-23
	follow up	-21	-25	-24	-19	-20	-22	NA	-17	-19	-19
<b>Left global longitudinal strain (%)</b>	baseline	-13	-18	-14	-15	-15	-15	-16	-9	-14	-16
	follow up	-13	-17	-18	-16	-12	-17	NA	-10	-13	-14
<b>Right end diastolic volume (mL)</b>	baseline	68	79	80	86	94	90	77	132	75	77
	follow up	62	81	78	56	98	92	71	130	86	56
<b>Right end systolic volume (mL)</b>	baseline	31	28	34	32	39	40	31	60	33	28
	follow up	31	28	31	23	41	41	37	71	44	28
<b>Right ejection fraction (%)</b>	baseline	54	64	58	63	58	56	59	55	56	63
	follow up	50	65	60	58	58	55	48	45	49	49
<b>Right stroke volume (mL)</b>	baseline	36	51	46	54	55	50	46	72	42	48
	follow up	31	52	47	33	57	51	34	59	42	27

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