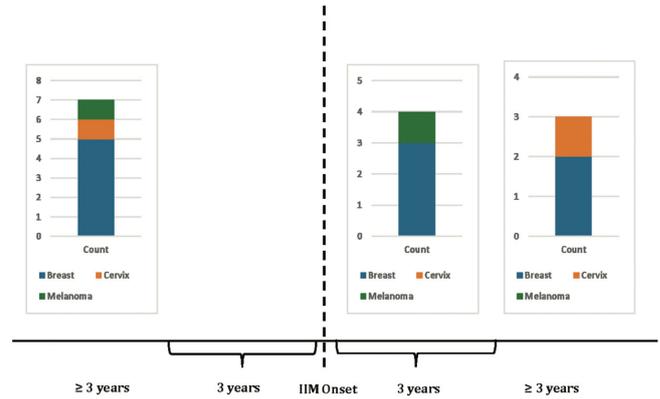
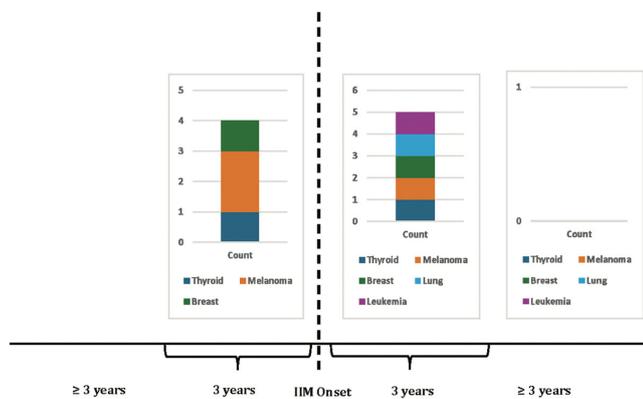


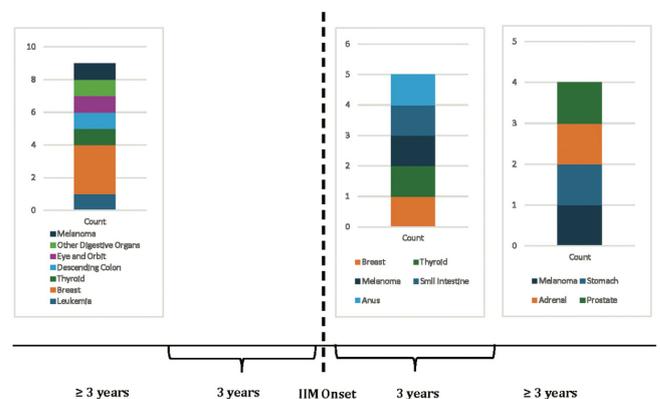
**Supplementary Fig. S1A.** Distribution of the first recurrent tumour among patients with post-IIM malignancies, stratified by timing of the index cancer. All patients (n=6) with cancer diagnosed in the 3 years preceding IIM diagnosis had a recurrence of that same cancer within the first three years after IIM diagnosis.



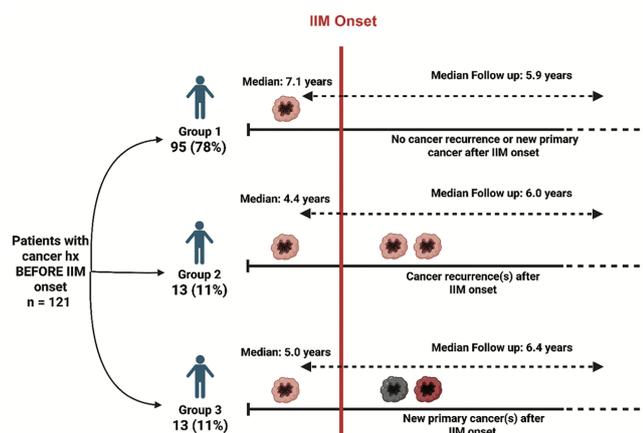
**Supplementary Fig. S1B.** Distribution of the first recurrent tumour among patients with post-IIM malignancies, stratified by timing of the index cancer. Among the seven patients whose cancers were diagnosed more than three years before IIM onset (five of whom had breast cancer), four experienced a recurrence within the first three years after IIM onset, and three had recurrences more than three years after IIM onset.



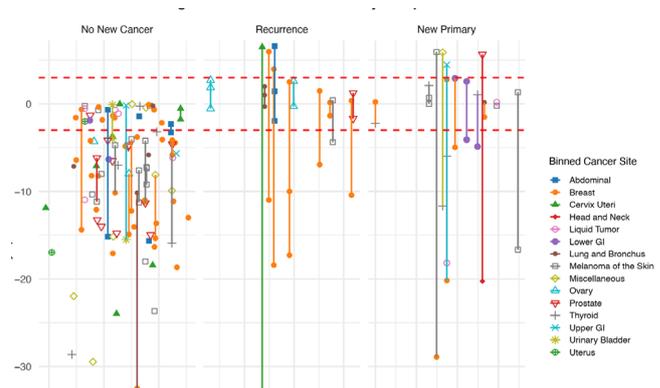
**Supplementary Fig. S2A.** Distribution of the new primary tumour among patients with post-IIM malignancies, stratified by timing of the index cancer. Among the four patients with a history of cancer prior to IIM onset, five new primary cancers were diagnosed, all occurring within the first three years after IIM onset.



**Supplementary Fig. S2B.** Distribution of the new primary tumour among patients with post-IIM malignancies, stratified by timing of the index cancer. Among the nine patients whose cancers were diagnosed more than three years before IIM onset, five developed a new primary tumour within the first three years after IIM onset, and four developed a new primary tumour more than three years after IIM onset.



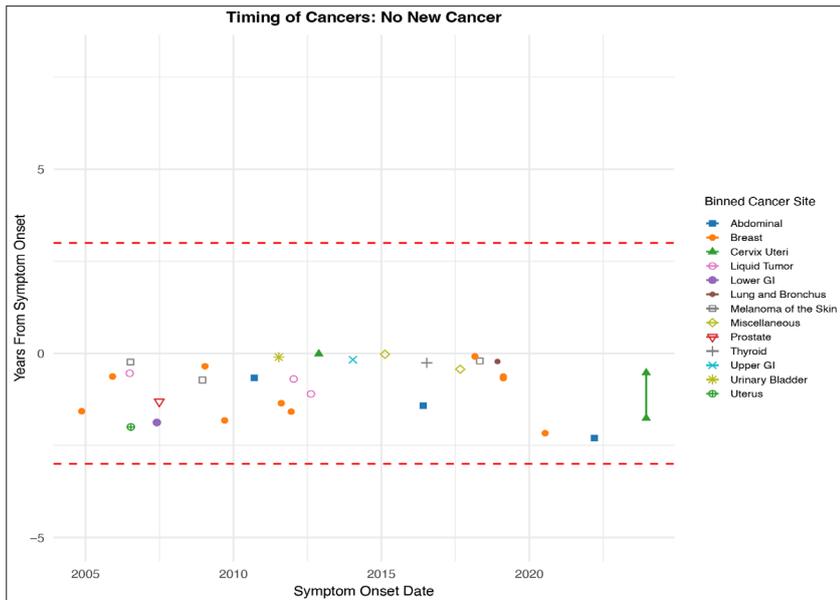
**Supplementary Fig. S3.** Adult IIM patients with a history of cancer prior to IIM symptom onset. Patients can have one of three outcomes: Group 1: cancer free, Group 2: cancer recurrence, Group 3: new primary cancer.



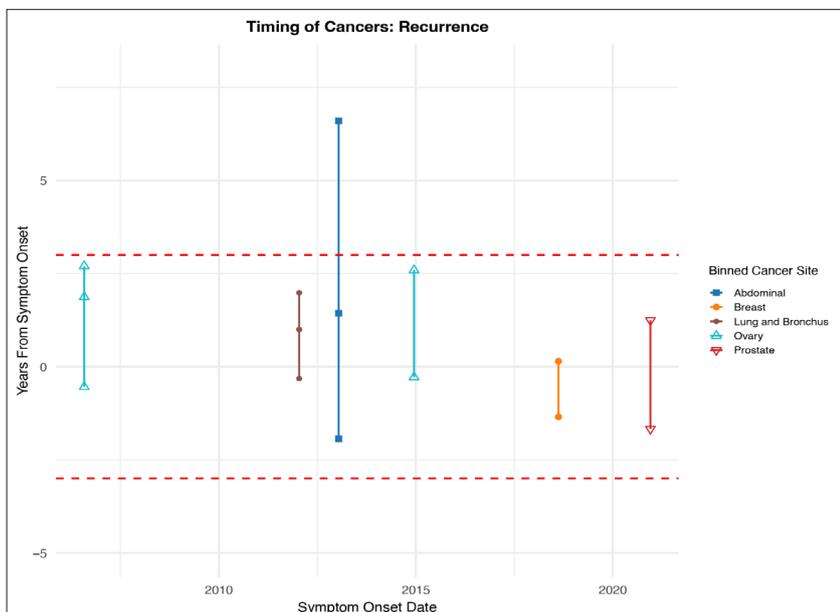
**Supplementary Fig. S4.** Timing of cancers relative to symptom onset date in patients with a history of cancer diagnosed at any time prior to idiopathic inflammatory myopathy (IIM) onset (secondary analysis). Patients are grouped based on cancer outcome: no new cancer, recurrence of prior cancer, and development of new primary cancer after IIM onset. Red dashed lines indicate a period of 3 years before and after IIM symptom onset (-3 to +3 years).

Supplementary Table S1. Demographic summary for IIM patients with a history of cancer prior to IIM symptom onset.

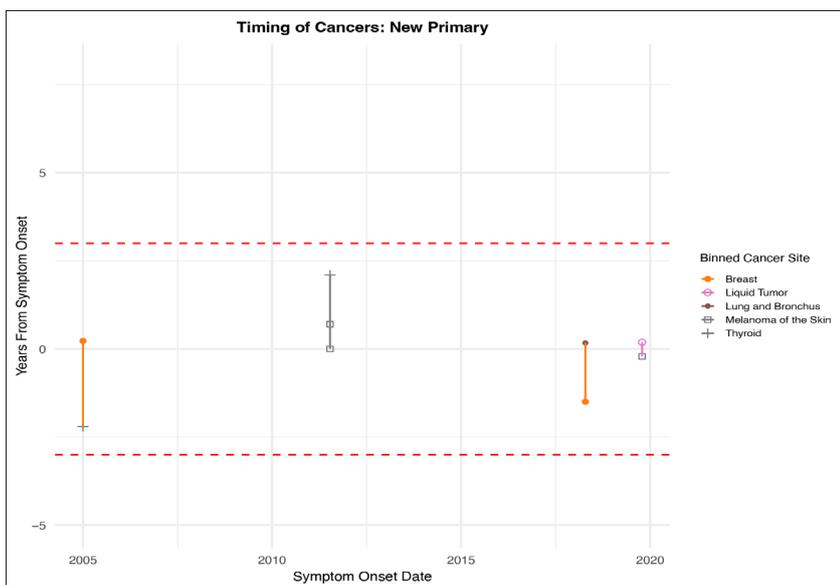
Patients who had a history of cancer prior to IIM symptom onset						
	Total	Patients without recurrence or primary after IIM Onset	Patients with Multiple Cancers (either recurrence or new primary)		p-value (single vs recurrence)	p-value (single vs new primary)
			Recurrence	New Primary		
Cancer	121 (100%)	95 (78%)	13 (11%)	13 (11%)		
Median number of cancers (range)	1 (1 - 4)	1	2 (2 - 3)	2 (2 - 3)		
Median Time between Cancers (range, years)	6.7 (IQR: 10.4)	NA	4.8 (IQR: 8.4)	7.9 (IQR: 15.7)		
Median Time between Index Cancer and Symptom Onset (years)	7.1 (IQR: 12.9)	7.1 (IQR: 11.5)	4.4 (IQR: 9.6)	5.0 (IQR: 16.0)	0.453	0.763
Median Follow up Duration since Symptom Onset (years)	5.9 (IQR: 5.8)	5.9 (IQR: 7.5)	6.0 (IQR: 2.9)	6.4 (IQR: 1.9)	0.977	0.854
Median Age at IIM Onset	61.0 (IQR: 13.9)	60.8 (IQR: 14.8)	57.3 (IQR: 14.0)	66 (IQR: 6.7)	0.594	0.067
Number of Deceased Patients	34 (100%)	23 (68%)	8 (24%)	3 (8%)	0.009	1.000
<b>Sex</b>						
Male	39 (100%)	35 (90%)	2 (5%)	2 (5%)	0.212	0.212
Female	82 (100%)	60 (74%)	11 (13%)	11 (13%)		
<b>Race</b>						
Asian	1 (100%)	1 (100%)	0	0	0.063	0.687
Black	14 (100%)	11 (79%)	2 (14%)	1 (7%)		
White	100 (100%)	80 (80%)	8 (8%)	12 (12%)		
Other/Unknown	6 (100%)	3 (50%)	3 (50%)	0 (0%)		
<b>IIM Type</b>						
Dermatomyositis	68 (100%)	53 (78%)	8 (12%)	7 (10%)	0.809	0.808
Polymyositis	53 (100%)	42 (79%)	5 (9%)	6 (11%)		
ASyS	12 (100%)	7 (58%)	4 (33%)	1 (8%)		
IMNM	32 (100%)	25 (78%)	1 (3%)	6 (19%)		
Overlap myositis	8 (100%)	7 (88%)	1 (12%)	0 (0%)		
<b>Autoantibody</b>						
Anti-TIF1-γ (ELISA)	23 (100%)	15 (65%)	5 (22%)	3 (13%)	0.063	0.451
Anti-TIF1-γ alone (Anti-CCAR1 and Anti-SP4 neg)	12 (100%)	8 (67%)	2 (17%)	2 (17%)	0.345	0.345
Anti-TIF1-γ (Anti-CCAR1 OR Anti-SP4)	5 (100%)	3 (60%)	1 (20%)	1 (20%)	0.406	0.406
Anti-TIF1-γ (Anti-CCAR1 and Anti-SP4)	4 (100%)	2 (50%)	1 (25%)	1 (25%)	0.322	0.322
Anti-HMGCR (ELISA)	16 (100%)	12 (75%)	0	4 (25%)	0.353	0.100
Anti-Mi2 (Line Blot/ELISA)	12 (100%)	8 (67%)	1 (8%)	3 (25%)	1.000	0.127
Anti-Jo1 (Line Blot)	10 (100%)	7 (70%)	3 (30%)	0	0.100	0.595
Anti-NXP2 (IVTT IP)	9 (100%)	8 (89%)	0	1 (11%)	0.592	1.000
Anti-SRP (Line Blot)	6 (100%)	4 (67%)	0	2 (33%)	1.000	0.152
Anti-PL7 (Line Blot)	6 (100%)	5 (83%)	1 (17%)	0	0.546	1.000
Anti-MDA5 (Line Blot)	4 (100%)	3 (75%)	0	1 (25%)	1.000	0.406
Anti-SAE (Line Blot)	3 (100%)	1 (33%)	1 (33%)	1 (33%)	0.227	0.227
Anti-Ku (Line Blot)	2 (100%)	2 (100%)	0	0	1.000	1.000
Anti-PL12 (Line Blot)	2 (100%)	1 (50%)	1 (50%)	0	0.227	1.000
Anti-OJ (Line Blot)	1 (100%)	1 (100%)	0	0	1.000	1.000
Anti-PM/Scl (Line Blot)	0	0	0	0	1.000	1.000
Anti-EJ (Line Blot)	0	0	0	0	1.000	1.000
<b>Cancer Site</b>						
Breast	47 (100%)	35 (74%)	6 (13%)	6 (13%)	0.552	0.552
Melanoma	19 (100%)	14 (74%)	1 (5%)	4 (21%)	0.689	0.225
Prostate	14 (100%)	12 (86%)	1 (7%)	1 (7%)	1.000	1.000
Thyroid	10 (100%)	5 (50%)	0 (0%)	5 (50%)	1.000	0.002
Cervix Uteri	9 (100%)	8 (89%)	1 (11%)	0 (0%)	1.000	0.592
Ovary	2 (100%)	0 (0%)	2 (100%)	0 (0%)	0.133	1.000



**Supplementary Fig. S5A.** Timing of cancers relative to symptom onset date in patients diagnosed with cancer within 3 years prior to IIM symptom onset (-3 to 0 years) (primary analysis). Patients who had no new cancer after IIM symptom onset. Red dashed lines indicate a period of 3 years before and after IIM symptom onset (-3 to +3 years).



**Supplementary Fig. S5B.** Timing of cancers relative to symptom onset date in patients diagnosed with cancer within 3 years prior to IIM symptom onset (-3 to 0 years) (primary analysis). Patients who developed recurrent cancer after IIM symptom onset. Red dashed lines indicate a period of 3 years before and after IIM symptom onset (-3 to +3 years).



**Supplementary Fig. S5C.** Timing of cancers relative to symptom onset date in patients diagnosed with cancer within 3 years prior to IIM symptom onset (-3 to 0 years) (primary analysis). Patients who developed new cancer after IIM symptom onset. Red dashed lines indicate a period of 3 years before and after IIM symptom onset (-3 to +3 years).