Supplementary Figure 1.
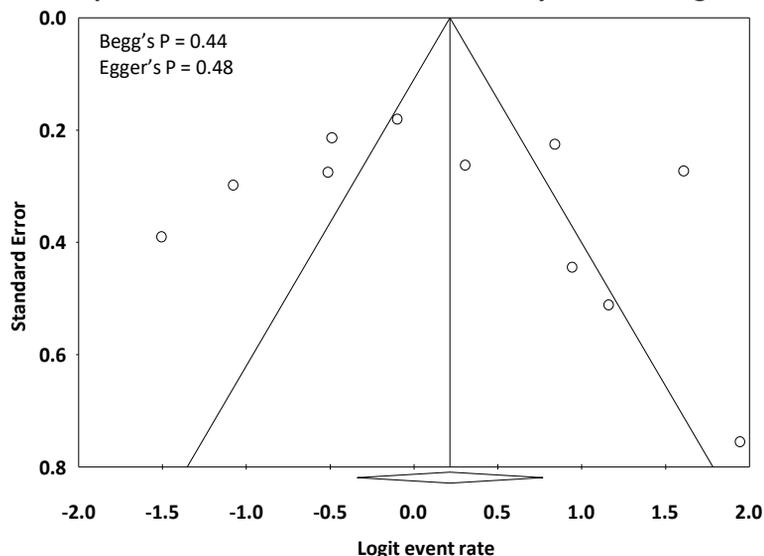
A. Funnel plot of studies included in meta-analysis of serologic response after one dose of vaccine


Begg's P = 0.44
Egger's P = 0.48

Standard Error (y-axis: 0.0, 0.2, 0.4, 0.6, 0.8)
Logit event rate (x-axis: -2.0, -1.5, -1.0, -0.5, 0.0, 0.5, 1.0, 1.5, 2.0)

B. Sensitivity analysis excluding one study at a time for serologic response after one dose of vaccine

Removed study	Point	Lower limit	Upper limit	Event rate (95% CI) with study removed
Monin Solid	0.555	0.416	0.686	
Monin Hemato	0.574	0.447	0.691	
Harrington CML	0.509	0.382	0.635	
Bird	0.537	0.391	0.676	
Chowdhury	0.534	0.393	0.670	
Terpos	0.567	0.437	0.689	
Harrington MPD	0.515	0.384	0.644	
Pimpinelli	0.556	0.414	0.689	
Addeo Solid	0.489	0.381	0.599	
Addeo Hemato	0.519	0.386	0.649	
Barrière	0.547	0.397	0.689	
Overall	0.537	0.409	0.660	
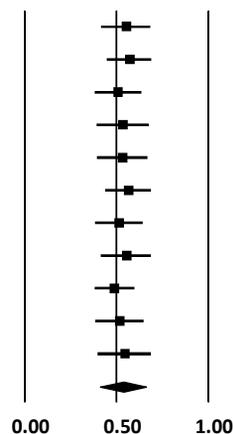
(x-axis: 0.00, 0.50, 1.00)

C. Sensitivity analysis excluding non-mRNA studies for serologic response after one dose of vaccine

Subgroup	Study name	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
Hematologic cancer	Monin Hemato	0.182	0.094	0.323	8 / 44		21.06
	Harrington CML	0.875	0.614	0.969	14 / 16		16.22
	Harrington MPD	0.762	0.540	0.897	16 / 21		19.53
	Pimpinelli	0.380	0.287	0.483	35 / 92		22.79
	Addeo Hemato	0.720	0.518	0.860	18 / 25		20.40
	Subtotal	**0.576**	**0.319**	**0.798**	**91 / 198**		
Solid cancer	Monin Solid	0.375	0.259	0.508	21 / 56		32.85
	Addeo Solid	0.833	0.745	0.895	80 / 96		32.89
	Barrière	0.475	0.388	0.564	58 / 122		34.26
	Subtotal	**0.581**	**0.304**	**0.815**	**159 / 274**		
Overall		**0.579**	**0.385**	**0.750**	**250 / 472**		

(x-axis: 0.00, 0.50, 1.00)
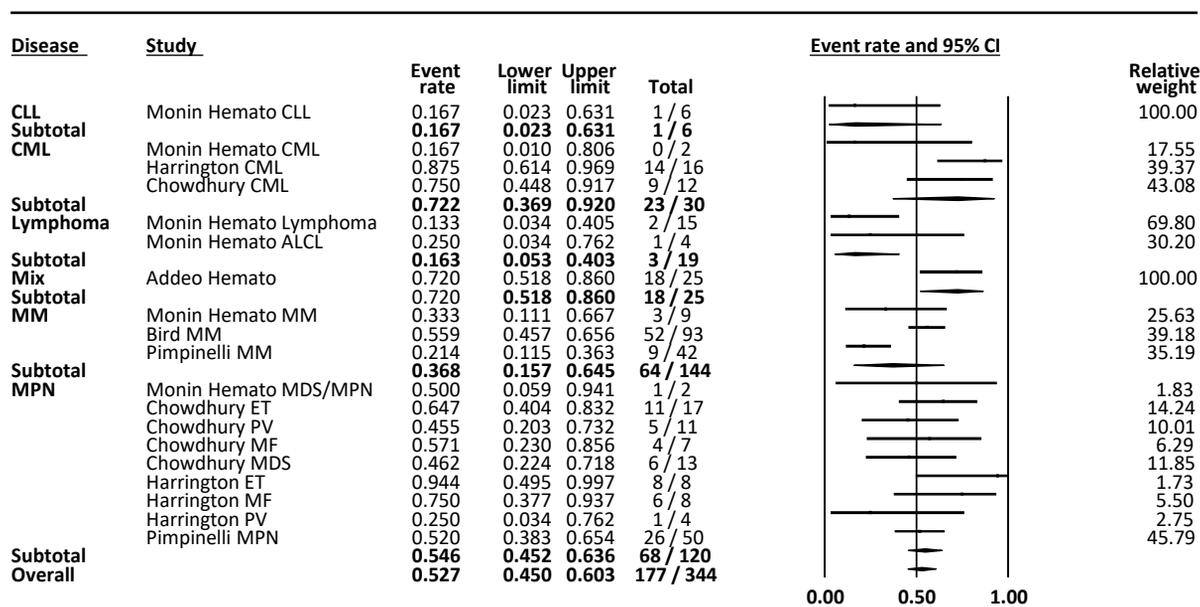
Hemato: Heterogeneity: I^2 = 88.46%, Q = 34.67, P <0.001
Solid: Heterogeneity: I^2 = 94.41%, Q = 35.83, P <0.001
Overall: Heterogeneity: I^2 = 90.58%, Q = 74.37, P <0.001

Supplementary Figure 1.

D. Subgroup analysis stratified by type of disease in hematologic cancer studies for serologic response after one dose of vaccine

Disease	Study	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
CLL	Monin Hemato CLL	0.167	0.023	0.631	1 / 6		100.00
Subtotal		**0.167**	**0.023**	**0.631**	**1 / 6**		
CML	Monin Hemato CML	0.167	0.010	0.806	0 / 2		17.55
	Harrington CML	0.875	0.614	0.969	14 / 16		39.37
	Chowdhury CML	0.750	0.448	0.917	9 / 12		43.08
Subtotal		**0.722**	**0.369**	**0.920**	**23 / 30**		
Lymphoma	Monin Hemato Lymphoma	0.133	0.034	0.405	2 / 15		69.80
	Monin Hemato ALCL	0.250	0.034	0.762	1 / 4		30.20
Subtotal		**0.163**	**0.053**	**0.403**	**3 / 19**		
Mix	Addeo Hemato	0.720	0.518	0.860	18 / 25		100.00
Subtotal		**0.720**	**0.518**	**0.860**	**18 / 25**		
MM	Monin Hemato MM	0.333	0.111	0.667	3 / 9		25.63
	Bird MM	0.559	0.457	0.656	52 / 93		39.18
	Pimpinelli MM	0.214	0.115	0.363	9 / 42		35.19
Subtotal		**0.368**	**0.157**	**0.645**	**64 / 144**		
MPN	Monin Hemato MDS/MPN	0.500	0.059	0.941	1 / 2		1.83
	Chowdhury ET	0.647	0.404	0.832	11 / 17		14.24
	Chowdhury PV	0.455	0.203	0.732	5 / 11		10.01
	Chowdhury MF	0.571	0.230	0.856	4 / 7		6.29
	Chowdhury MDS	0.462	0.224	0.718	6 / 13		11.85
	Harrington ET	0.944	0.495	0.997	8 / 8		1.73
	Harrington MF	0.750	0.377	0.937	6 / 8		5.50
	Harrington PV	0.250	0.034	0.762	1 / 4		2.75
	Pimpinelli MPN	0.520	0.383	0.654	26 / 50		45.79
Subtotal		**0.546**	**0.452**	**0.636**	**68 / 120**		
Overall		**0.527**	**0.450**	**0.603**	**177 / 344**		

CLL: Heterogeneity: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
CML: Heterogeneity: $I^2 = 53.31\%$, $Q = 4.28$, $P = 0.12$
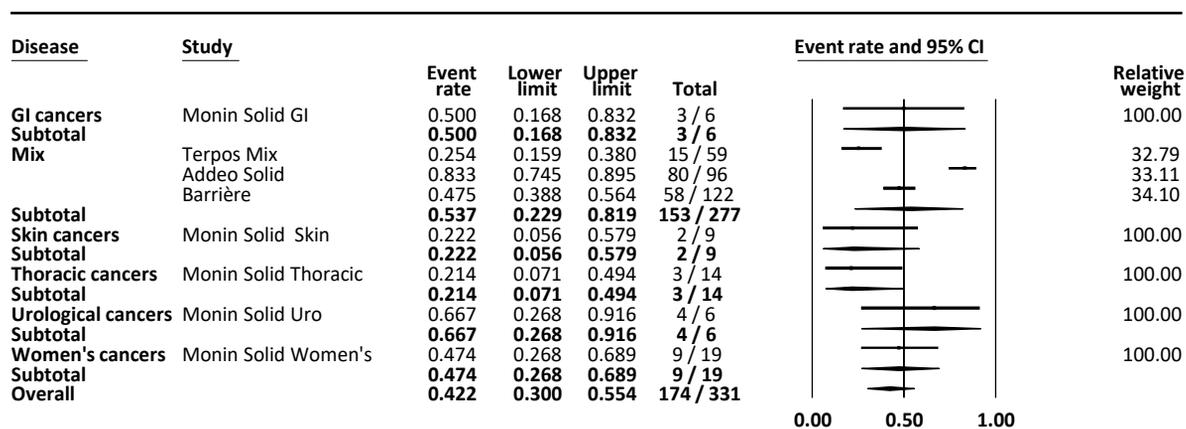Lymphoma: Heterogeneity: $I^2 = 0\%$, $Q = 0.31$, $P = 0.58$
Mix: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
MM: $I^2 = 85.04\%$, $Q = 13.37$, $P = 0.001$
MPN: $I^2 = 0\%$, $Q = 7.40$, $P = 0.49$
Overall: Heterogeneity: $I^2 = 61.12\%$, $Q = 46.30$, $P < 0.001$

E. Subgroup analysis stratified by type of disease in solid organ cancer studies for serologic response after one dose of vaccine

Disease	Study	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
GI cancers	Monin Solid GI	0.500	0.168	0.832	3 / 6		100.00
Subtotal		**0.500**	**0.168**	**0.832**	**3 / 6**		
Mix	Terpos Mix	0.254	0.159	0.380	15 / 59		32.79
	Addeo Solid	0.833	0.745	0.895	80 / 96		33.11
	Barrière	0.475	0.388	0.564	58 / 122		34.10
Subtotal		**0.537**	**0.229**	**0.819**	**153 / 277**		
Skin cancers	Monin Solid Skin	0.222	0.056	0.579	2 / 9		100.00
Subtotal		**0.222**	**0.056**	**0.579**	**2 / 9**		
Thoracic cancers	Monin Solid Thoracic	0.214	0.071	0.494	3 / 14		100.00
Subtotal		**0.214**	**0.071**	**0.494**	**3 / 14**		
Urological cancers	Monin Solid Uro	0.667	0.268	0.916	4 / 6		100.00
Subtotal		**0.667**	**0.268**	**0.916**	**4 / 6**		
Women's cancers	Monin Solid Women's	0.474	0.268	0.689	9 / 19		100.00
Subtotal		**0.474**	**0.268**	**0.689**	**9 / 19**		
Overall		**0.422**	**0.300**	**0.554**	**174 / 331**		

GI: Heterogeneity: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
Mix: Heterogeneity: $I^2 = 95.75\%$, $Q = 47.04$, $P < 0.001$
Skin: Heterogeneity: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
Thoracic : Heterogeneity: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
Uro: Heterogeneity: $I^2 = 0\%$, $Q = 0$, $P = 1.00$
Women's: Heterogeneity : $I^2 = 0\%$, $Q = 0$, $P = 1.00$
Overall: Heterogeneity: $I^2 = 87.24\%$, $Q = 54.85$, $P < 0.001$

Supplementary Figure 1.

F. Subgroup analysis stratified by type of vaccine in hematologic and solid organ cancer studies for serologic response after one dose of vaccine

Vaccine type	Study	Type of cancer	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
AZD1222	Bird AZD1222	Hematologic cancer	0.578	0.431	0.712	26 / 45		55.17
	Chowdhury AZD1222	Hematologic cancer	0.595	0.432	0.739	22 / 37		44.83
Subtotal			**0.585**	**0.476**	**0.687**	**48 / 82**		
BNT162b2	Monin Solid	Solid cancer	0.375	0.259	0.508	21 / 56		12.72
	Monin Hemato	Hematologic cancer	0.182	0.094	0.323	8 / 44		11.12
	Harrington CML	Hematologic cancer	0.875	0.614	0.969	14 / 16		6.58
	Bird BNT162b2	Hematologic cancer	0.542	0.401	0.676	26 / 48		12.54
	Chowdhury BNT162b2	Hematologic cancer	0.545	0.341	0.735	12 / 22		10.58
	Harrington MPD BNT162b2	Hematologic cancer	0.762	0.540	0.897	16 / 21		9.41
	Pimpinelli BNT162b2	Hematologic cancer	0.380	0.287	0.483	35 / 92		13.49
	Addeo BNT162b2	Solid/Hemato	0.828	0.647	0.926	24 / 29		9.70
	Barrière BNT162b2	Solid cancer	0.475	0.388	0.564	58 / 122		13.86
Subtotal			**0.530**	**0.404**	**0.652**	**214 / 450**		
mRNA-1273	Addeo mRNA-1273	Solid/Hemato	0.804	0.711	0.873	74 / 92		100.00
Subtotal			**0.804**	**0.711**	**0.873**	**74 / 92**		
Overall			**0.644**	**0.577**	**0.705**	**336 / 624**		

0.00   0.50   1.00

AZD1222: Heterogeneity: I^2 = 0%, Q = 0.024, P = 0.88
BNT162b2: Heterogeneity: I^2 = 82.02%, Q = 44.50, P <0.001
mRNA-1273: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Overall: Heterogeneity: I^2 = 85.51%, Q = 75.90, P <0.001

G. Subgroup analysis stratified by type of therapy in hematologic and solid organ cancer studies for serologic response after one dose of vaccine

Therapy	Study	Type of cancer	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
Anti-CD20	Addeo Anti-CD20	Hemato/Solid	0.100	0.006	0.674	0 / 4		100.00
Subtotal			**0.100**	**0.006**	**0.674**	**0 / 4**		
Chemotherapy	Addeo Chemotherapy	Hemato/Solid	0.690	0.503	0.830	20 / 29		44.82
	Barrière Chemotherapy	Solid cancer	0.429	0.338	0.525	45 / 105		55.18
Subtotal			**0.550**	**0.297**	**0.779**	**65 / 134**		
Hydroxycarbamide	Chowdhury Hydroxycarbamide	Hematologic cancer	0.364	0.143	0.661	4 / 11		62.04
	Harrington Hydroxycarbamide	Hematologic cancer	0.900	0.326	0.994	4 / 4		37.96
Subtotal			**0.619**	**0.106**	**0.957**	**8 / 15**		
Kinase inhibitors	Chowdhury Ruxolitinib	Hematologic cancer	0.100	0.006	0.674	0 / 4		23.73
	Harrington Ruxolitinib	Hematologic cancer	0.667	0.268	0.916	4 / 6		36.85
	Addeo Kinase inhibitors	Hemato/Solid	0.867	0.595	0.966	13 / 15		39.42
Subtotal			**0.616**	**0.187**	**0.918**	**17 / 25**		
ICI	Addeo ICI	Hemato/Solid	0.846	0.549	0.961	11 / 13		100.00
Subtotal			**0.846**	**0.549**	**0.961**	**11 / 13**		
IFN	Chowdhury IFN	Hematologic cancer	0.875	0.463	0.983	7 / 8		66.04
	Harrington IFN	Hematologic cancer	0.900	0.326	0.994	4 / 4		33.96
Subtotal			**0.884**	**0.581**	**0.977**	**11 / 12**		
Targeted therapy	Barrière Targeted therapy	Solid cancer	0.765	0.514	0.909	13 / 17		100.00
Subtotal			**0.765**	**0.514**	**0.909**	**13 / 17**		
No therapy	Chowdhury No therapy	Hematologic cancer	0.583	0.308	0.815	7 / 12		33.51
	Harrington No therapy	Hematologic cancer	0.571	0.230	0.856	4 / 7		26.86
	Addeo No therapy	Hemato/Solid	0.864	0.728	0.937	38 / 44		39.63
Subtotal			**0.715**	**0.451**	**0.885**	**49 / 63**		
Overall			**0.701**	**0.584**	**0.797**	**174 / 283**		

0.00   0.50   1.00

Anti-CD20: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Chemotherapy: Heterogeneity: I^2 = 83.05%, Q = 5.90, P = 0.015
Hydroxycarbamide : Heterogeneity: I^2 = 65.59%, Q = 2.91, P = 0.088
Kinase inhibitors: I^2 = 66.73%, Q = 6.01, P = 0.050
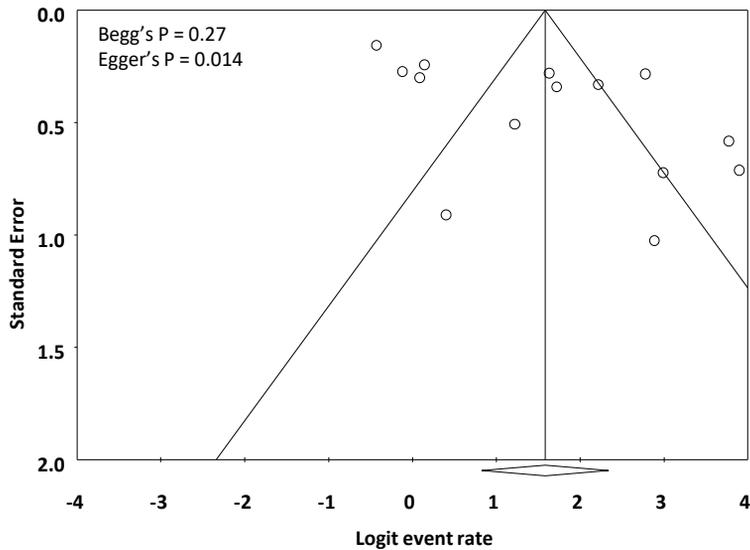ICI: I^2 = 0%, Q = 0, P = 1.00
IFN: I^2 = 0%, Q = 0.019, P = 0.89
Targeted therapy: I^2 = 0%, Q = 0, P = 1.00
No therapy: I^2 = 64.96%, Q = 5.71, P = 0.058
Overall: Heterogeneity: I^2 = 69.52%, Q = 45.93, P <0.001

Supplementary Figure 2.

A. Funnel plot of studies included in meta-analysis of serologic response after two doses of vaccine

Begg's P = 0.27
Egger's P = 0.014

Standard Error (y-axis): 0.0, 0.5, 1.0, 1.5, 2.0

Logit event rate (x-axis): -4, -3, -2, -1, 0, 1, 2, 3, 4

B. Sensitivity analysis excluding preprints for serologic response after two doses of vaccine

Subgroup	Study name	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
Hematologic cancer	Monin Hemato	0.600	0.200	0.900	3 / 5		11.28
	Herishanu	0.395	0.324	0.471	66 / 167		19.02
	Roeker	0.523	0.377	0.664	23 / 44		18.01
	Thakkar Hemato	0.848	0.741	0.916	56 / 66		17.63
	Pimpinelli	0.837	0.747	0.899	77 / 92		18.18
	Addeo Hemato	0.773	0.556	0.902	17 / 22		15.87
	Subtotal	**0.685**	**0.462**	**0.846**	**242 / 396**		
Solid cancer	Monin Solid	0.947	0.706	0.993	18 / 19		6.07
	Thakkar Solid	0.978	0.933	0.993	131 / 134		14.70
	Palich	0.942	0.902	0.966	210 / 223		30.36
	Addeo Solid	0.980	0.924	0.995	99 / 101		11.00
	Barrière	0.952	0.829	0.988	40 / 42		10.76
	Massarweh	0.902	0.827	0.946	92 / 102		27.11
	Subtotal	**0.949**	**0.916**	**0.970**	**590 / 621**		
Overall		**0.916**	**0.874**	**0.946**	**832 / 1017**		

(Event rate scale: 0.00, 0.50, 1.00)

Hemato: Heterogeneity: I^2 = 92.23%, Q = 64.35, P <0.001
Solid: Heterogeneity: I^2 = 39.79%, Q = 8.31, P = 0.14
Overall: Heterogeneity: I^2 = 94.57%, Q = 202.68, P <0.001

C. Sensitivity analysis excluding one study at a time for serologic response after two doses of vaccine

Removed study	Point	Lower limit	Upper limit	Event rate (95% CI) with study removed
Monin Solid	0.82	0.68	0.91	
Monin Hemato	0.84	0.70	0.92	
Herishanu	0.85	0.73	0.92	
Agha	0.85	0.71	0.93	
Roeker	0.85	0.71	0.93	
Thakkar Solid	0.80	0.66	0.90	
Thakkar Hemato	0.83	0.68	0.91	
Palich	0.81	0.68	0.90	
Diefenbach	0.85	0.71	0.93	
Pimpinelli	0.83	0.68	0.92	
Addeo Solid	0.81	0.66	0.90	
Addeo Hemato	0.83	0.69	0.92	
Barrière	0.82	0.67	0.91	
Massarweh	0.82	0.68	0.91	
Overall	**0.83**	**0.70**	**0.91**	

(Event rate scale: 0.00, 0.50, 1.00)

Supplementary Figure 2.

D. Subgroup analysis stratified by type of disease in hematologic cancer studies for serologic response after two doses of vaccine

Disease	Study	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
CLL	Monin CLL	0.500	0.059	0.941	1 / 2		2.14
	Herishanu CLL	0.395	0.324	0.471	66 / 167		57.82
	Agha CLL	0.231	0.076	0.522	3 / 13		9.08
	Roeker CLL	0.523	0.377	0.664	23 / 44		30.95
Subtotal		**0.419**	**0.323**	**0.521**	**93 / 226**		
Lymphoma	Agha Lymphoma	0.524	0.318	0.721	11 / 21		100.00
Subtotal		**0.524**	**0.318**	**0.721**	**11 / 21**		
MM	Agha MM	0.655	0.469	0.803	19 / 29		48.70
	Pimpinelli MM	0.786	0.637	0.885	33 / 42		51.30
Subtotal		**0.727**	**0.583**	**0.835**	**52 / 71**		
AML/CML	Agha AML/CML	0.750	0.238	0.966	3 / 4		100.00
Subtotal		**0.750**	**0.238**	**0.966**	**3 / 4**		
MPN	Pimpinelli MPN	0.880	0.758	0.945	44 / 50		100.00
Subtotal		**0.880**	**0.758**	**0.945**	**44 / 50**		
Overall		**0.577**	**0.503**	**0.648**	**203 / 372**		

0.00   0.50   1.00

CLL: Heterogeneity: I^2 = 26.94%, Q = 4.11, P = 0.25
Lymphoma: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
MM: I^2 = 31.97%, Q = 1.47, P = 0.23
AML/CML: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
MPN: I^2 = 0%, Q = 0, P = 1.00
Overall: Heterogeneity: I^2 = 82.86%, Q = 46.68, P <0.001

E. Subgroup analysis stratified by type of disease in solid organ cancer studies for serologic response after two doses of vaccine

Disease	Study	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
Brain	Massarweh Brain	0.950	0.525	0.997	9 / 9		100.00
Subtotal		**0.950**	**0.525**	**0.997**	**9 / 9**		
GI	Monin GI	0.900	0.326	0.994	4 / 4		11.54
	Massarweh GI	0.862	0.685	0.947	25 / 29		88.46
Subtotal		**0.867**	**0.707**	**0.946**	**29 / 33**		
Skin	Monin Skin	0.800	0.309	0.973	4 / 5		100.00
Subtotal		**0.800**	**0.309**	**0.973**	**4 / 5**		
Thoracic	Monin Thoracic	0.875	0.266	0.993	3 / 3		19.16
	Massarweh Thoracic	0.923	0.739	0.981	24 / 26		80.84
Subtotal		**0.915**	**0.747**	**0.975**	**27 / 29**		
Urological	Massarweh Uro	0.875	0.463	0.983	7 / 8		100.00
Subtotal		**0.875**	**0.463**	**0.983**	**7 / 8**		
Women's	Monin Women's	0.929	0.423	0.996	6 / 6		26.40
	Massarweh Women's	0.667	0.333	0.889	6 / 9		73.60
Subtotal		**0.766**	**0.394**	**0.943**	**12 / 15**		
Overall		**0.871**	**0.783**	**0.927**	**88 / 99**		

0.00   0.50   1.00

Brain: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
GI: Heterogeneity: I^2 = 0%, Q = 0.053, P = 0.82
Skin: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Thoracic : Heterogeneity: I^2 = 0%, Q = 0.10, P = 0.75
Urological: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Women's: Heterogeneity : I^2 = 24.26%, Q = 1.32, P = 0.25
Overall: Heterogeneity: I^2 = 0%, Q = 4.45, P = 0.82

Supplementary Figure 2.

F. Subgroup analysis stratified by type of vaccine in hematologic and solid organ cancer studies for serologic response after two dose of vaccine

Vaccine type	Study	Type of cancer	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
BNT162b2	Monin Solid	Solid cancer	0.947	0.706	0.993	18 / 19		7.92
	Monin Hemato	Hematologic cancer	0.600	0.200	0.900	3 / 5		8.45
	Herishanu	Hematologic cancer	0.395	0.324	0.471	66 / 167		11.15
	Agha BNT162b2	Hematologic cancer	0.441	0.286	0.608	15 / 34		10.75
	Thakkar BNT162b2	Hemato/Solid cancer	0.948	0.889	0.976	109 / 115		10.52
	Palich	Solid cancer	0.942	0.902	0.966	210 / 223		10.91
	Pimpinelli	Hematologic cancer	0.837	0.747	0.899	77 / 92		10.92
	Addeo BNT162b2	Hemato/Solid cancer	0.933	0.769	0.983	28 / 30		9.28
	Barrière	Solid cancer	0.952	0.829	0.988	40 / 42		9.31
	Massarweh	Solid cancer	0.902	0.827	0.946	92 / 102		10.79
Subtotal			**0.851**	**0.668**	**0.942**	**658 / 829**		
Mix	Roeker	Hematologic cancer	0.523	0.377	0.664	23 / 44		45.39
	Diefenbach	Hematologic cancer	0.472	0.342	0.605	25 / 53		54.61
Subtotal			**0.495**	**0.397**	**0.593**	**48 / 97**		
mRNA-1273	Agha mRNA-1273	Hematologic cancer	0.571	0.387	0.738	16 / 28		34.21
	Thakkar mRNA-1273	Hemato/Solid cancer	0.935	0.840	0.976	58 / 62		32.52
	Addeo mRNA-1273	Hemato/Solid cancer	0.946	0.877	0.977	88 / 93		33.27
Subtotal			**0.872**	**0.542**	**0.975**	**162 / 183**		
Overall			**0.569**	**0.479**	**0.655**	**868 / 1109**		

BNT162b2: Heterogeneity: I^2 = 95.20%, Q = 187.58, P <0.001
Mix: Heterogeneity: I^2 = 0%, Q = 0.25, P = 0.62
mRNA-1273: Heterogeneity: I^2 = 91.55%, Q = 233.67, P <0.001
Overall: Heterogeneity: I^2 = 94.18%, Q = 240.44, P <0.001

G. Subgroup analysis stratified by type of therapy in hematologic and solid organ cancer studies for serologic response after two doses of vaccine

Therapy	Study	Type of cancer	Event rate	Lower limit	Upper limit	Total	Event rate and 95% CI	Relative weight
Anti-CD20	Herishanu Venetoclax/CD20	Hematologic cancer	0.136	0.045	0.348	3 / 22		19.55
	Roeker CD20	Hematologic cancer	0.143	0.036	0.427	2 / 14		17.62
	Roeker Venetoclax/CD20	Hematologic cancer	0.063	0.004	0.539	0 / 7		9.91
	Thakkar CD20	Hematologic cancer	0.696	0.485	0.847	16 / 23		21.74
	Diefenbach CD20	Hematologic cancer	0.250	0.117	0.456	6 / 24		21.51
	Addeo CD20	Hematologic cancer	0.100	0.006	0.674	0 / 4		9.67
Subtotal			**0.229**	**0.085**	**0.487**	**27 / 94**		
Any active therapy	Agha Active tx	Hematologic cancer	0.500	0.328	0.672	15 / 30		100.00
Subtotal			**0.500**	**0.328**	**0.672**	**15 / 30**		
CAR-T	Thakkar CAR-T	Hematologic cancer	0.125	0.007	0.734	0 / 3		100.00
Subtotal			**0.125**	**0.007**	**0.734**	**0 / 3**		
Chemotherapy	Diefenbach Chemotx	Hematologic cancer	0.900	0.326	0.994	4 / 4		19.42
	Addeo Chemotx	Hemato/Solid cancer	0.933	0.769	0.983	28 / 30		80.58
Subtotal			**0.928**	**0.780**	**0.979**	**32 / 34**		
Daratumab	Pimpinelli	Hematologic cancer	0.500	0.260	0.740	7 / 14		100.00
Subtotal			**0.500**	**0.260**	**0.740**	**7 / 14**		
Hornmonal therapy	Thakkar Hormonal tx	Solid cancer	0.990	0.854	0.999	47 / 47		100.00
Subtotal			**0.990**	**0.854**	**0.999**	**47 / 47**		
ICI	Thakkar ICI	Hemato/Solid cancer	0.968	0.804	0.995	30 / 31		51.03
	Addeo ICI	Hemato/Solid cancer	0.929	0.630	0.990	13 / 14		48.97
Subtotal			**0.952**	**0.828**	**0.988**	**43 / 45**		
Kinase inhibitors	Herishanu BTK inh	Hematologic cancer	0.160	0.082	0.289	8 / 50		29.65
	Roeker BTK inh	Hematologic cancer	0.214	0.071	0.494	3 / 14		25.54
	Diefenbach BTK inh	Hematologic cancer	0.400	0.158	0.703	4 / 10		25.64
	Addeo Kinase inh	Hematologic cancer	0.923	0.609	0.989	12 / 13		19.18
Subtotal			**0.389**	**0.136**	**0.720**	**27 / 87**		
No therapy	Herishanu No tx	Hematologic cancer	0.587	0.484	0.683	54 / 92		21.57
	Agha No tx	Hematologic cancer	0.568	0.406	0.716	21 / 37		20.39
	Roeker No tx	Hematologic cancer	0.944	0.693	0.992	17 / 18		11.37
	Thakkar No tx	Hemato/Solid cancer	0.932	0.833	0.974	55 / 59		18.01
	Diefenbach No tx	Hematologic cancer	0.733	0.467	0.896	11 / 15		17.09
	Addeo No tx	Hemato/Solid cancer	0.978	0.858	0.997	44 / 45		11.56
Subtotal			**0.823**	**0.638**	**0.924**	**202 / 266**		
Proteasome inhibitors	Pimpinelli PI/IMiD	Hematologic cancer	0.929	0.755	0.982	26 / 28		100.00
Subtotal			**0.929**	**0.755**	**0.982**	**26 / 28**		
SCT	ThakkarSCT	Hematologic cancer	0.731	0.533	0.866	19 / 26		100.00
Subtotal			**0.731**	**0.533**	**0.866**	**19 / 26**		
Overall			**0.685**	**0.605**	**0.754**	**445 / 674**		

Anti-CD20: Heterogeneity: I^2 = 75.45%, Q = 20.36, P = 0.001
Any active therapy: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
CAR-T: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Chemotherapy: Heterogeneity: I^2 = 0%, Q = 0.071, P = 0.89
Daratumumab: Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
Hormonal therapy : Heterogeneity: I^2 = 0%, Q = 0, P = 1.00
ICI: I^2 = 0%, Q = 0.33, P = 0.57
Kinase inhibitors: I^2 = 80.21%, Q = 15.16, P = 0.002
No therapy: I^2 = 84.36%, Q = 31.97, P <0.001
Proteasome inhibitors/IMiD: I^2 = 0%, Q = 0, P = 1.00
SCT: I^2 = 0%, Q = 0, P = 1.00
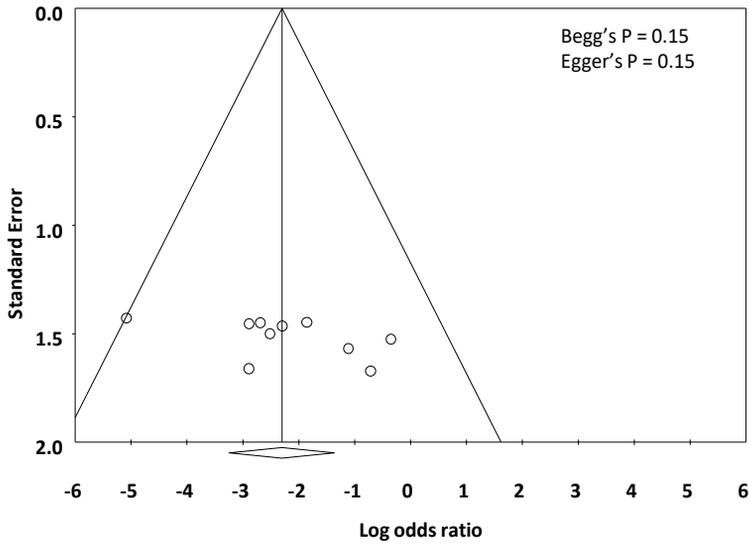**Overall: Heterogeneity: I^2 = 84.72%, Q = 163.66, P <0.001**

Supplementary Figure 3.

A. Funnel plot of studies included in meta-analysis of comparison of serologic response after one dose of vaccine compared to controls

Begg's P = 0.55
Egger's P = 0.099

Standard Error

Log odds ratio

B. Funnel plot of studies included in meta-analysis of comparison of serologic response after two doses of vaccine compared to controls

Begg's P = 0.15
Egger's P = 0.15

Standard Error

Log odds ratio
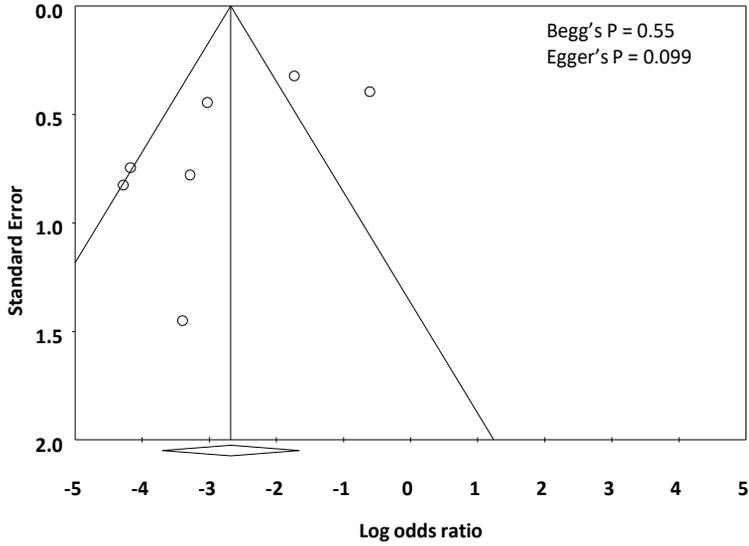
Supplementary Figure Legends

Supplementary Figure 1. (A) Funnel plot of studies included in meta-analysis of serological response after one dose of vaccine. Begg's test P = 0.44; Egger's tests P = 0.48. **(B)** Sensitivity analysis excluding one study at a time for serologic response after one dose of vaccine. **(C)** Sensitivity analysis excluding non-mRNA studies for serologic response after one dose of vaccine. **(D)** Subgroup analysis stratified by type of disease in hematologic cancer studies for serologic response after one dose of vaccine. **(E)** Subgroup analysis stratified by type of disease in solid organ cancer studies for serologic response after one dose of vaccine. **(F)** Subgroup analysis stratified by type of vaccine in hematologic and solid organ cancer studies for serologic response after one dose of vaccine. **(G)** Subgroup analysis stratified by type of therapy in hematologic and solid organ cancer studies for serologic response after one dose of vaccine.

Supplementary Figure 2. (A) Funnel plot of studies included in meta-analysis of serological response after two doses of vaccine. Begg's test P = 0.27; Egger's tests P = 0.014. **(B)** Sensitivity analysis excluding preprints for serologic response after two doses of vaccine. **(C)** Sensitivity analysis excluding one study at a time for serologic response after two doses of vaccine. **(D)** Subgroup analysis stratified by type of disease in hematologic cancer studies for serologic response after two doses of vaccine. **(E)** Subgroup analysis stratified by type of disease in solid organ cancer studies for serologic response after two doses of vaccine. **(F)** Subgroup analysis stratified by type of vaccine in hematologic and solid organ cancer studies for serologic response after two doses of vaccine. **(G)** Subgroup analysis stratified by type of therapy in hematologic and solid organ cancer studies for serologic response after two doses of vaccine.

Supplementary Figure 3. (A) Funnel plot of studies included in meta-analysis of comparison of serological response after one dose of vaccine compared to controls. Begg's test P = 0.55; Egger's tests P = 0.099. **(B)** Funnel plot of studies included in meta-analysis of comparison of serological response after two doses of vaccine compared to controls. Begg's test P = 0.15; Egger's tests P = 0.15.

Supplementary Table 1. Search strategy

PubMed search strategy		Number of studies
#1	"COVID-19" OR "SARS-CoV-2" [MeSH Terms]	98,051
#2	"cancer" OR "malignancy" OR "leukemia" OR "lymphoma" OR "immunosuppressed" OR "hematologic diseases" [MeSH Terms]	2,567,229
#3	"vaccine" OR "immunization" [MeSH Terms]	162,867
#4	#1 AND #2 AND #3	602
EMBASE search strategy		**Number of studies**
#1	"COVID-19" OR "SARS-CoV-2" [MeSH Terms]	87,226
#2	"cancer" OR "malignancy" OR "leukemia" OR "lymphoma" OR "immunosuppressed" OR "hematologic diseases" [MeSH Terms]	2,015,921
#3	"vaccine" OR "immunization" [MeSH Terms]	139,516
#4	#1 AND #2 AND #3	591
medRxiv search strategy		**Number of studies**
#1	"COVID-19" OR "SARS-CoV-2"	14,517
#2	"cancer" OR "malignancy" OR "leukemia" OR "lymphoma" OR "immunosuppressed" OR "hematologic diseases"	21,185
#3	"vaccine" OR "immunization"	11,642
#4	#1 AND #2 AND #3	420

Supplementary Table 2. Risk of bias assessment by Joanna Briggs Institute Critical Appraisal Checklist

Author	Year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Monin	2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Harrington	2021	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Bird	2021	Yes	Yes	Yes	Unclear	No	NA	Yes	Yes	Yes
Herishanu	2021	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Agha	2021	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Roeker	2021	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Thakkar	2021	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Palich	2021	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Chowdhury	2021	Yes	Yes	Yes	Yes	No	Yes	Unclear	Yes	Yes
Diefenbach	2021	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear
Terpos	2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Harrington	2021	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Pimpinelli	2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Addeo	2021	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Barrière	2021	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Massarweh	2021	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes

Q1: Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?; Q2: Were the participants included in any comparisons similar?; Q3: Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?; Q4: Was there a control group?; Q5: Were there multiple measurements of the outcome both pre and post the intervention/exposure?; Q6: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?; Q7: Were the outcomes of participants included in any comparisons measured in the same way?; Q8: Were outcomes measured in a reliable way?; Q9: Was appropriate statistical analysis used?; NA not applicable.

Supplementary Table 3. Univariate and multivariate meta-regression models of variables associated with serologic response after one dose of vaccine

	Univariate meta-regression			Multivariate meta-regression		
	Coefficient	95% CI	P-value	Coefficient	95% CI	P-value
Anti-cancer therapy	-0.036	-0.066-(-0.0053)	0.021	-0.029	-0.055-(-0.0016)	**0.038**
Age	-0.11	-0.17-(-0.056)	**<0.001**	-0.11	-0.16-(-0.050)	**<0.001**
Hematologic cancer	0.28	-0.86-1.42	0.63	-0.33	-1.080-0.41	0.38

Supplementary Table 4. Univariate and multivariate meta-regression models of variables associated with serologic response after two doses of vaccine

	Univariate meta-regression			Multivariate meta-regression		
	Coefficient	**95% CI**	**P-value**	**Coefficient**	**95% CI**	**P-value**
Anti-cancer therapy	0.038	0.010-0.066	**0.0077**	0.012	-0.014-0.037	0.38
Age	-0.11	-0.33-0.11	0.32	-0.033	-0.17-(-0.47)	0.64
Hematologic cancer	-2.46	-3.45-(-1.48)	**<0.001**	-2.16	-3.26-(-3.86)	**<0.001**

Supplementary Table 5. Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) criteria for studies included in the meta-analysis

(A) Meta-analysis of observational studies assessing serological response after two doses of vaccine

Number of participants	Starting Level of Evidence	Quality assessment					Reasons to increase level of evidence (Large magnitude of effect; Dose-response gradient; Potential confounding)	Overall quality of evidence
		Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication bias		
1137	Low	Not serious	Not serious	Serious	Not serious	Not serious	N/A	Low

(B) Meta-analysis of case control studies comparing serological response after two doses of vaccine to controls

Number of participants	Starting Level of Evidence	Quality assessment					Reasons to increase level of evidence (Large magnitude of effect; Dose-response gradient; Potential confounding)	Overall quality of evidence
		Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication bias		
903 (cases) and 320 (controls)	Low	Not serious	Serious	Serious	Not serious	Not serious	N/A	Low