

1 **Supplementary Information:**

2 **Supplementary Table 1: Vaccination history of the monovalent vaccinated individuals**

Study-ID (Person)	Age (years)	Sex	1 st vacc.	2 nd vacc.	3 rd vacc.	4 th vacc.	Days 2 nd vacc to 3 rd vacc.	Days 3 rd vacc to 4 th vacc.	Days 3 rd vacc. to blood sampling	Days 4 th vacc. to blood sampling
P3	54.3	f	P	P	P	N	285	N	26	N
P4	27.8	f	P	P	P	N	288	N	23	N
P5	47.9	f	P	P	P	N	287	N	20	N
P9	53.4	f	P	P	P	N	287	N	29	N
P13	32.6	f	P	P	P	N	290	N	26	N
P14	53.0	m	P	P	P	N	273	N	24	N
P15	45.9	f	P	P	P	N	287	N	24	N
P36	29.6	f	P	P	P	N	244	N	38	N
P17	46.8	f	P	P	M	N	224	N	38	N
P19	31.4	f	P	P	P	N	301	N	43	N
P22	32.4	f	P	P	M	N	224	N	28	N
P23	39.5	f	P	P	M	N	211	N	33	N
P24	37.2	f	P	P	M	N	224	N	28	N
P25	59.3	f	P	P	P	N	245	N	22	N
P26	26.3	f	P	P	P	N	268	N	21	N
P37	27.8	m	P	P	P	N	192	N	26	N
P35	27.0	m	P	P	P	N	278	N	23	N
P1	53	f	P	P	P	P	246	265	N	20
P2	42.2	m	P	P	P	P	287	245	N	16
P42	39.3	f	P	P	M	P	238	274	N	20
P6	50.1	f	P	P	M	P	235	287	28	20
P8	59.4	f	P	P	P	P	287	240	28	25
P10	37.6	f	P	P	P	P	286	265	21	23
P11	51.9	f	P	P	M	P	212	152	32	31
P12	57	f	P	P	P	M	163	175	40	29
P16	29.2	f	P	P	P	P	287	224	15	21
P18	52.7	f	P	P	M	P	238	300	22	30
P21	45.8	m	P	P	P	P	288	229	16	21
P27	64.8	f	P	P	P	P	287	156	30	22
P28	82.7	f	P	P	P	P	205	147	N	38
P43	80.1	m	M	M	M	M	NA	211	N	26
P29	56.3	m	P	P	P	P	245	262	N	24
P38	40.8	f	P	P	P	P	NA	231	N	21
P39	38.8	m	P	P	P	P	75	267	N	24
P30	54.6	f	P	P	P	M	251	251	30	30
P44	59.6	m	P	P	P	P	185	221	N	24
P45	59.2	f	P	P	P	P	128	228	N	22
P46	65.5	m	P	P	P	P	185	262	N	22
P31	56.1	f	P	P	P	M	252	263	32	24
P32	53.5	f	P	P	P	P	226	292	32	25
P33	62.4	m	P	P	P	P	283	241	21	21
P34	63.2	f	P	P	P	P	260	270	27	29
P41	58.3	f	P	P	P	P	180	274	N	18

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4 Age: in years at time of blood sampling; m: male. f: female; vacc.: vaccination; P: Biontech/Pfizer “Comirnaty”
5 BNT162b2; M: Moderna “Spikevax” mRNA-1273; NA: not available, N: No

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10 **Supplementary Table 2: Vaccination history of the bivalent vaccinated individuals**

Study-ID (Person)	Age (years)	Sex	1st vacc.	2nd vacc.	3rd vacc.	4th vacc.	Days 2nd vacc to 3rd vacc.	Days 3rd vacc. to 4th vacc.	Days 4th vacc. to blood sampling
P89	39.4	m	AZ	AZ	P	P-BA.1	177	306	27
P90	52.8	f	P	P	P	P-BA.1	142	306	21
P91	54.3	f	P	P	P	P-BA.1	160	308	28
P92	38.1	m	P	P	P	P-BA.1	146	291	21
P93	62.2	m	P	P	P	P-BA.1	162	291	21
P94	52.7	m	P	P	P	P-BA.1	NA	NA	21
P95	51.4	f	AZ	AZ	P	P-BA.1	138	302	31
P96	44.73	w	J	P	P	P-BA.1	148	203	21
P97	40.10	m	P	P	P	P-BA.1	148	279	22
P98	58.92	m	P	P	P	P-BA.1	167	308	21
P99	54.54	m	P	P	P	P-BA.1	277	238	21
P100	46.43	w	P	P	P	P-BA.1	138	296	20
P101	39.1	f	P	P	P	P-BA.5	147	331	21
P102	46.4	m	P	P	P	P-BA.5	157	309	21
P103	38.6	m	J	P	P	P-BA.5	125	231	21
P104	34.4	m	P	P	P	P-BA.5	107	243	21
P105	56.0	f	J	P	P	P-BA.5	122	232	21
P106	58.4	f	P	P	P	P-BA.5	187	302	21
P107	52.6	f	AZ	AZ	P	P-BA.5	138	308	21
P108	62.5	m	P	P	P	P-BA.5	183	298	21
P109	52.1	f	P	P	P	P-BA.5	188	306	21
P110	41.9	m	J	P	P	P-BA.5	125	232	21
P111	38.8	f	P	P	P	P-BA.5	134	301	21
P112	32.8	f	P	P	P	P-BA.5	132	318	21
P113	55.9	f	P	P	P	P-BA.5	140	298	21
P114	45.0	f	P	P	P	P-BA.5	173	287	21
P115	57.3	f	P	P	P	P-BA.5	158	304	21
P116	50.1	f	P	P	P	P-BA.5	163	307	21
P117	56.2	f	P	P	P	P-BA.5	148	298	21
P118	50.7	f	AZ	AZ	P	P-BA.5	153	306	21
P119	55.7	m	J	P	P	P-BA.5	105	243	21
P120	57.0	m	P	P	P	P-BA.5	179	322	30
BT55	27.8	m	P	P	P	P-BA.5	278	329	28
P121	26.6	f	P	P	P	P-BA.5	NA	330	28

11 Age: in years at time of blood sampling; m: male, f: female; vacc.: vaccination; AZ: Astra-Zeneca “Vaxzevria”
 12 ChAdOx1; P: Monovalent Biontech/Pfizer “Comirnaty” BNT162b2; J: Johnson & Johnson Ad26.COV2.S; P-BA.1:
 13 Biontech/Pfizer Bivalent (WT/BA.1) BNT162b2 BA.1; P-BA.5: Biontech/Pfizer Bivalent (WT/BA.5) BNT162b2
 14 BA.5; M: Moderna “Spikevax” mRNA-1273; NA: not available

15 **Supplementary Table 3: Vaccination history of the subjects who experienced Omicron**
 16 **breakthrough infection**

Study-ID (Person)	Age (years)	Sex	1st vacc.	2nd vacc.	3rd vacc.	4th vacc.	Days 2nd vacc to 3rd vacc.	Days 3rd vacc. to 4th vacc.	Infecting Omicron variant	Days last vacc. to infecti on	Days infecti on to blood sampli ng
P09	53.6	f	P	P	P	N	287	N	BA.1	101	20
P17	47.1	f	P	P	M	N	224	N	BA.1	143	19
P22	32.8	f	P	P	M	N	224	N	BA.1	139	18
P23	39.9	f	P	P	M	N	211	N	BA.1	142	18
P52	26.8	m	M	M	M	N	185	N	BA.1	28	20
P53	22.5	m	P	P	P	N	178	N	BA.1	35	20
P54	25.2	f	P	P	N	N	N	N	BA.1	202	17
P55	43.1	m	P	P	N	N	N	N	BA.1	123	13
P56	76.6	f	P	P	P	N	195	N	BA.1	110	30
P57	33.7	f	P	P	P	N	145	N	BA.1	105	36
P59	55.4	m	P	P	P	N	165	N	BA.1	99	24
P04	28.1	f	P	P	P	N	288	N	BA.2	110	22
P28	82.8	f	P	P	P	P	205	147	BA.2	80	16
P37	28.0	m	P	P	P	N	192	N	BA.2	59	28
P48	39.2	f	P	P	M	N	238	N	BA.2	245	56
P49	57.2	f	P	P	M	N	224	N	BA.2	190	27
P51	59.6	f	P	P	P	N	244	N	BA.2	179	35
P58	51.9	f	P	P	P	N	143	N	BA.2	114	27
P03	54.9	f	P	P	P	N	285	N	BA.4/5	218	24
P14	53.6	m	P	P	P	N	273	N	BA.4/5	216	28
P19	31.9	f	P	P	P	N	301	N	BA.4/5	199	24
P24	38.0	f	P	P	M	N	224	N	BA.4/5	321	30
P25	60.1	f	P	P	P	P	245	282	BA.4/5	13	22
P27	64.9	f	P	P	P	P	287	156	BA.4/5	40	36
P29	56.4	m	P	P	P	P	245	262	BA.4/5	50	23
P44	59.7	m	P	P	P	P	185	221	BA.4/5	38	24
P47	47.5	f	P	P	M	N	218	N	BA.4/5	285	52
P50	56.6	f	P	P	P	N	288	N	BA.4/5	212	22

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 18 *Age: in years at time of blood sampling; m: male, f: female; vacc.: vaccination; AZ: Astra-Zeneca “Vaxzevria”*
 19 *ChAdOx1; P: Monovalent Biontech/Pfizer “Comirnaty” BNT162b2; P-BA.1: Biontech/Pfizer Bivalent (WT/BA.1)*
 20 *BNT162b2 BA.1; P-BA.5: Biontech/Pfizer Bivalent (WT/BA.5) BNT162b2 BA.5, M: Moderna “Spikevax” mRNA-*
 21 *1273; NA: not available, N: No*