

## 第 3 回 厚生科学審議会予防接種・ワクチン分科会

## 研究開発及び生産・流通部会

ポリオワクチン (OPV, IPV, DPT-IPV) の互換性に関する免疫原性・安全性試験

平成 23 年度厚生労働科学研究費補助金

「予防接種に関するワクチンの有効性・安全性等についての分析疫学研究」

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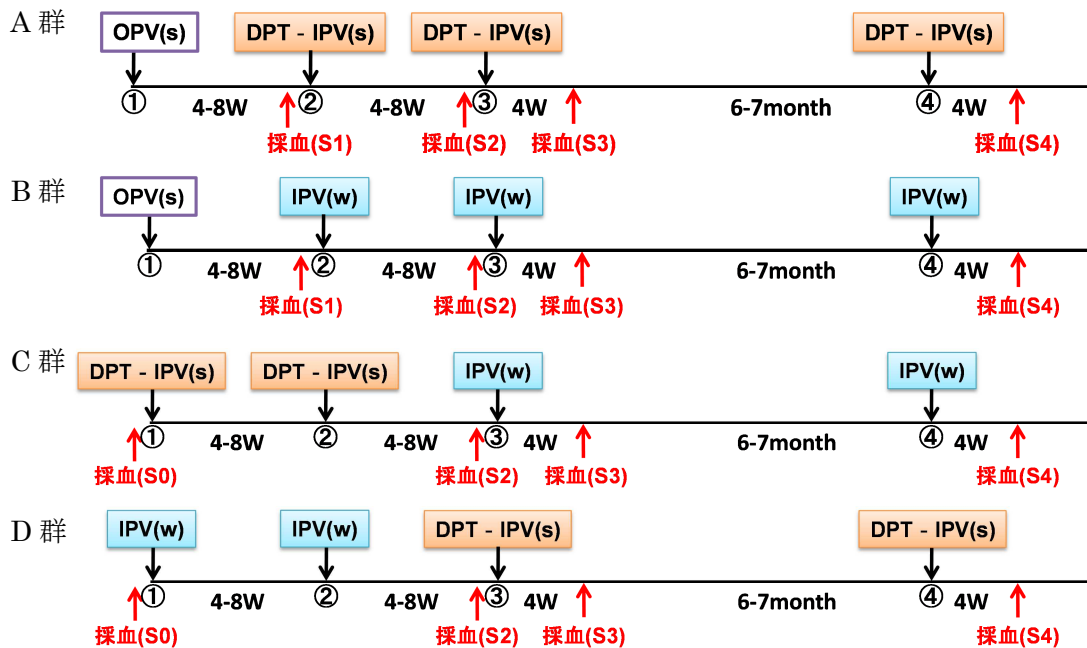
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## 【対象と方法】

対象 148 例 (A : 11, B : 48, C : 48, D : 41). 生後 3 ヶ月以上 74 ヶ月未満.

群	1回目	2回目	3回目	4回目
A群	OPV(s)	DPT-IPV(s)	DPT-IPV(s)	DPT-IPV(s)
B群	OPV(s)	IPV(w)	IPV(w)	IPV(w)
C群	DPT-IPV(s)	DPT-IPV(s)	IPV(w)	IPV(w)
D群	IPV(w)	IPV(w)	DPT-IPV(s)	DPT-IPV(s)



測定抗原・測定施設 (測定法は WHO の standard method に準拠)

	Sabin 株	Wild 株
Type I	Sabin (LSc,2ab)	Mahoney
Type II	Sabin (P712,Ch,2ab)	MEF1
Type III	Sabin (Leon,12a1b)	Saukett
測定施設	一般財団法人阪大微生物病研究会	Sanofi Pasteur USA

## 【結果】

○初回及び追加免疫 (4 回接種) の結果、

- ・ワクチンの組み合わせ (OPV/ DPT-IPV / IPV)
- ・測定抗原 (Sabin/ Wild)
- ・接種前抗体価 (titer<1:8/ titer≥1:8)
- ・接種年齢 (month age<8/ month age8-10/ month age≥10)

に拘わらず、防御レベルをはるかに上回る抗体が誘導された。

表 1-1  
幾何平均値 (Geometric Mean Titer) および平均上昇倍数 (Mean Fold Rise)

group		N	GMT					MFR				
Virus Type	Titer Level		So	S1	S2	S3	S4	S2/S0, 1	S3/S2	S3/S0, 1	S4/S3	S4/S0, 1
<b>Group A</b>												
<b>Type I</b>												
Entire		11		619	3285	3846	4948	5 **	1	6 **	1	8 *
S1 Titer												
<1:8		0										
≥1:8		11		619	3285	3846	4948	5 **	1	6 **	1	8 *
<b>Type II</b>												
Entire		11		2181	4646	5439	6781	2	1	2 *	1	3 *
S1 Titer												
<1:8		0										
≥1:8		11		2181	4646	5439	6781	2	1	2 *	1	3 *
<b>Type III</b>												
Entire		11		37	351	1199	3969	9 **	3	32 **	3	106 **
S1 Titer												
<1:8		6		4	60	542	3866	15 *	9	136 *	7	967 *
≥1:8		5		549	2896	3104	4096	5	1	6	1	7
				‡	†							
<b>Group B</b>												
<b>Type I</b>												
Entire		48		1557	4978	4978	6644	3 **	1	3 **	1	4 **
S1 Titer												
<1:8		4		4	99	332	1448	25	3	83	4	362
≥1:8		44		2677	7109	6367	7631	3 **	0.9	2 **	1	3 **
				‡	‡	‡	‡					
<b>Type II</b>												
Entire		48		2332	4340	6226	6317	2 **	1 **	3 **	1	3 **
S1 Titer												
<1:8		0										
≥1:8		48		2332	4340	6226	6317	2 **	1 **	3 **	1	3 **
<b>Type III</b>												
Entire		48		13	186	1149	6271	14 **	6 **	86 **	5 **	470 **
S1 Titer												
<1:8		38		4	84	800	5240	21 **	10 **	200 **	7 **	1310 **
≥1:8		10		1305	3822	4545	12417	3 *	1	3 **	3	10 **
				‡	‡	‡	†					
<b>Group C</b>												
<b>Type I</b>												
Entire		48	10		932	2814	5919	95 **	3 **	285 **	2 **	600 **
So Titer												
<1:8		29	4		1036	2828	7183	259 **	3 **	707 **	3 **	1796 **
≥1:8		19	39		793	2793	4406	20 **	4 **	71 **	2	113 **
			‡									
<b>Type II</b>												
Entire		48	8		1469	2282	6989	186 **	2 **	289 **	3 **	886 **
So Titer												
<1:8		30	4		1261	2299	8005	315 **	2 **	575 **	3 **	2001 **
≥1:8		18	24		1896	2255	5574	78 **	1	92 **	2 **	228 **
			‡									
<b>Type III</b>												
Entire		48	4		654	2794	10701	159 **	4 **	679 **	4 **	2599 **
So Titer												
<1:8		47	4		625	2751	10841	156 **	4 **	688 **	4 **	2710 **
≥1:8		1	16		5793	5793	5793	362	1	362	1	362
			‡									
<b>Group D</b>												
<b>Type I</b>												
Entire		41	8		665	990	1658	85 **	1 **	126 **	2 **	211 **
So Titer												
<1:8		25	4		613	879	1808	153 **	1	220 **	2 **	452 **
≥1:8		16	23		756	1192	1448	33 **	2 **	53 **	1	64 **
			‡									
<b>Type II</b>												
Entire		41	10		706	2921	8262	67 **	4 **	279 **	3 **	788 **
So Titer												
<1:8		18	4		738	2682	8514	185 **	4 **	670 **	3 **	2128 **
≥1:8		23	22		682	3123	8069	31 **	5 **	140 **	3 **	362 **
			‡									
<b>Type III</b>												
Entire		41	4		1287	1930	5891	293 **	2 *	440 **	3 **	1342 **
So Titer												
<1:8		37	4		1212	1847	6482	303 **	2 *	462 **	4 **	1620 **
≥1:8		4	10		2233	2896	2435	215	1	279	0.8	235
			‡									

全ての時点で抗体価が得られたものを解析対象。

階級間の比較: Wilcoxon rank sum test (†: p<0.05, ‡: p<0.01);

階級内の比較: Wilcoxon signed rank test (\*: p<0.05, \*\*: p<0.01)

表 1-2

group	Virus Type	N	Wild Strain										
			Titer Level	GMT					MFR				
				So	S1	S2	S3	S4	S2/S0,1	S3/S2	S3/S0,1	S4/S3	S4/S0,1
<b>Group A</b>													
<b>Type I</b>													
Entire		11		48	212	240	374	4 **	1	5 **	2	8 *	
S1 Titer													
<1:8		1		2	23	11	64	11	0.5	6	6	32	
≧1:8		10		66	265	326	446	4 **	1	5 **	1	7 *	
<b>Type II</b>													
Entire		11		581	1695	2397	3611	3 *	1	4 **	2	6 **	
S1 Titer													
<1:8		0											
≧1:8		11		581	1695	2397	3611	3 *	1	4 **	2	6 **	
<b>Type III</b>													
Entire		11		14	106	451	1984	8 **	4 **	32 **	4 *	141 **	
S1 Titer													
<1:8		6		2	23	192	2170	11 *	8	96 *	11 *	1085 *	
≧1:8		5		147	676	1261	1783	5	2	9	1	12	
<b>Group B</b>													
<b>Type I</b>													
Entire		37		171	1331	1763	3035	8 **	1	10 **	2 *	18 **	
S1 Titer													
<1:8		6		3	161	323	2896	60 *	2	121 *	9 *	1084 *	
≧1:8		31		383	2003	2449	3063	5 **	1	6 **	1	8 **	
<b>Type II</b>													
Entire		37		881	2313	2869	3765	3 **	1	3 **	1	4 **	
S1 Titer													
<1:8		0											
≧1:8		37		881	2313	2869	3765	3 **	1	3 **	1	4 **	
<b>Type III</b>													
Entire		37		6	99	502	4541	17 **	5 **	86 **	9 **	773 **	
S1 Titer													
<1:8		30		2	50	354	4493	23 **	7 **	165 **	13 **	2096 **	
≧1:8		7		441	1949	2261	4752	4 *	1	5 *	2	11 *	
<b>Group C</b>													
<b>Type I</b>													
Entire		36	3		48	493	2841	18 **	10 **	186 **	6 **	1074 **	
So Titer													
<1:8		31	2		57	573	3132	28 **	10 **	277 **	5 **	1514 **	
≧1:8		5	12		15	194	1552	1	13	16	8	128	
<b>Type II</b>													
Entire		36	3		465	895	4018	144 **	2 **	276 **	4 **	1241 **	
So Titer													
<1:8		28	2		481	830	4304	226 **	2 **	390 **	5 **	2022 **	
≧1:8		8	14		412	1166	3158	29 **	3 *	83 **	3 *	225 **	
<b>Type III</b>													
Entire		36	2		447	1520	5682	194 **	3 **	657 **	4 **	2459 **	
So Titer													
<1:8		35	2		420	1463	5736	192 **	3 **	669 **	4 **	2623 **	
≧1:8		1	16		4096	5793	4096	256	1	362	0.7	256	
<b>Group D</b>													
<b>Type I</b>													
Entire		30	2		623	708	2353	250 **	1	284 **	3 **	944 **	
So Titer													
<1:8		28	2		579	632	2289	253 **	1	276 **	4 **	999 **	
≧1:8		2	8		1722	3444	3444	215	2	431	1	431	
<b>Type II</b>													
Entire		30	3		1085	2551	9090	319 **	2 **	749 **	4 **	2669 **	
So Titer													
<1:8		26	3		1202	2436	9742	460 **	2 **	932 **	4 **	3727 **	
≧1:8		4	19		558	3444	5793	29	6	181	2	305	
<b>Type III</b>													
Entire		30	3		967	1261	5161	375 **	1	489 **	4 **	2000 **	
So Titer													
<1:8		29	2		931	1240	5328	375 **	1	500 **	4 **	2147 **	
≧1:8		1	8		2896	2048	2048	362	0.7	256	1	256	

全ての時点で抗体価が得られたものを解析対象。  
 階級間の比較: Wilcoxon rank sum test (†: p<0.05, ‡: p<0.01);  
 階級内の比較: Wilcoxon signed rank test (\*: p<0.05, \*\*: p<0.01)

表 2  
抗体保有割合

group	Virus Type	Baseline Titer Level	Sabin Strain						Wild Strain						
			N	So	S1	S2	S3	S4	N	So	S1	S2	S3	S4	
				n (%)	n (%)	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	n (%)	n (%)	
<b>Group A</b>															
<b>Type I</b>															
Entire S1 Titer															
			11		11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11		10 (91)	11 (100)	11 (100)	11 (100)
	<1:8		0							1		0 (0)	1 (100)	1 (100)	1 (100)
	≥1:8		11		11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	10		10 (100)	10 (100)	10 (100)	10 (100)
<b>Type II</b>															
Entire S1 Titer															
			11		11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11		11 (100)	11 (100)	11 (100)	11 (100)
	<1:8		0							0					
	≥1:8		11		11 (100)	11 (100)	11 (100)	11 (100)	11 (100)	11		11 (100)	11 (100)	11 (100)	11 (100)
<b>Type III</b>															
Entire S1 Titer															
			11		5 (45)	11 (100)	11 (100)	11 (100)	11 (100)	11		5 (45)	9 (82)	11 (100)	11 (100)
	<1:8		6		0 (0)	6 (100)	6 (100)	6 (100)	6 (100)	6		0 (0)	4 (67)	6 (100)	6 (100)
	≥1:8		5		5 (100)	5 (100)	5 (100)	5 (100)	5 (100)	5		5 (100)	5 (100)	5 (100)	5 (100)
<b>Group B</b>															
<b>Type I</b>															
Entire S1 Titer															
			48		44 (92)	48 (100)	48 (100)	48 (100)	48 (100)	37		31 (84)	37 (100)	37 (100)	37 (100)
	<1:8		4		0 (0)	4 (100)	4 (100)	4 (100)	4 (100)	6		0 (0)	6 (100)	6 (100)	6 (100)
	≥1:8		44		44 (100)	44 (100)	44 (100)	44 (100)	44 (100)	31		31 (100)	31 (100)	31 (100)	31 (100)
<b>Type II</b>															
Entire S1 Titer															
			48		48 (100)	48 (100)	48 (100)	48 (100)	48 (100)	37		37 (100)	37 (100)	37 (100)	37 (100)
	<1:8		0							0					
	≥1:8		48		48 (100)	48 (100)	48 (100)	48 (100)	48 (100)	37		37 (100)	37 (100)	37 (100)	37 (100)
<b>Type III</b>															
Entire S1 Titer															
			48		10 (21)	47 (98)	48 (100)	48 (100)	48 (100)	37		7 (19)	35 (95)	37 (100)	37 (100)
	<1:8		38		0 (0)	37 (97)	38 (100)	38 (100)	38 (100)	30		0 (0)	28 (93)	30 (100)	30 (100)
	≥1:8		10		10 (100)	10 (100)	10 (100)	10 (100)	10 (100)	7		7 (100)	7 (100)	7 (100)	7 (100)
<b>Group C</b>															
<b>Type I</b>															
Entire So Titer															
			48		19 (40)	48 (100)	48 (100)	48 (100)	48 (100)	36		5 (14)	34 (94)	36 (100)	36 (100)
	<1:8		29		0 (0)	29 (100)	29 (100)	29 (100)	29 (100)	31		0 (0)	30 (97)	31 (100)	31 (100)
	≥1:8		19		19 (100)	19 (100)	19 (100)	19 (100)	19 (100)	5		5 (100)	4 (80)	5 (100)	5 (100)
<b>Type II</b>															
Entire So Titer															
			48		18 (38)	48 (100)	48 (100)	48 (100)	48 (100)	36		8 (22)	36 (100)	36 (100)	36 (100)
	<1:8		30		0 (0)	30 (100)	30 (100)	30 (100)	30 (100)	28		0 (0)	28 (100)	28 (100)	28 (100)
	≥1:8		18		18 (100)	18 (100)	18 (100)	18 (100)	18 (100)	8		8 (100)	8 (100)	8 (100)	8 (100)
<b>Type III</b>															
Entire So Titer															
			48		1 (2)	47 (98)	48 (100)	48 (100)	48 (100)	36		1 (3)	36 (100)	36 (100)	36 (100)
	<1:8		47		0 (0)	46 (98)	47 (100)	47 (100)	47 (100)	35		0 (0)	35 (100)	35 (100)	35 (100)
	≥1:8		1		1 (100)	1 (100)	1 (100)	1 (100)	1 (100)	1		1 (100)	1 (100)	1 (100)	1 (100)
<b>Group D</b>															
<b>Type I</b>															
Entire So Titer															
			41		16 (39)	41 (100)	41 (100)	41 (100)	41 (100)	30		2 (7)	30 (100)	30 (100)	30 (100)
	<1:8		25		0 (0)	25 (100)	25 (100)	25 (100)	25 (100)	28		0 (0)	28 (100)	28 (100)	28 (100)
	≥1:8		16		16 (100)	16 (100)	16 (100)	16 (100)	16 (100)	2		2 (100)	2 (100)	2 (100)	2 (100)
<b>Type II</b>															
Entire So Titer															
			41		23 (56)	41 (100)	41 (100)	41 (100)	41 (100)	30		4 (13)	30 (100)	30 (100)	30 (100)
	<1:8		18		0 (0)	18 (100)	18 (100)	18 (100)	18 (100)	26		0 (0)	26 (100)	26 (100)	26 (100)
	≥1:8		23		23 (100)	23 (100)	23 (100)	23 (100)	23 (100)	4		4 (100)	4 (100)	4 (100)	4 (100)
<b>Type III</b>															
Entire So Titer															
			41		4 (10)	41 (100)	41 (100)	41 (100)	41 (100)	30		1 (3)	30 (100)	30 (100)	30 (100)
	<1:8		37		0 (0)	37 (100)	37 (100)	37 (100)	37 (100)	29		0 (0)	29 (100)	29 (100)	29 (100)
	≥1:8		4		4 (100)	4 (100)	4 (100)	4 (100)	4 (100)	1		1 (100)	1 (100)	1 (100)	1 (100)

全ての時点で抗体価が得られたものを解析対象。

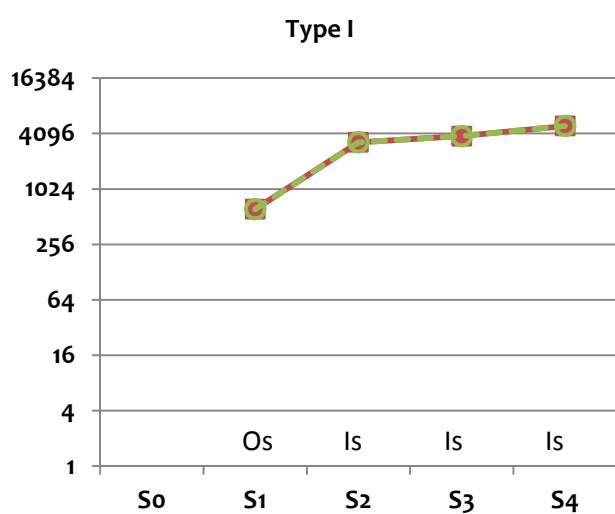
階級間の比較: Fisher's Exact Test (†: p<0.05, ‡: p<0.01)

図1-1 幾何平均抗体価および抗体保有割合  
Group A

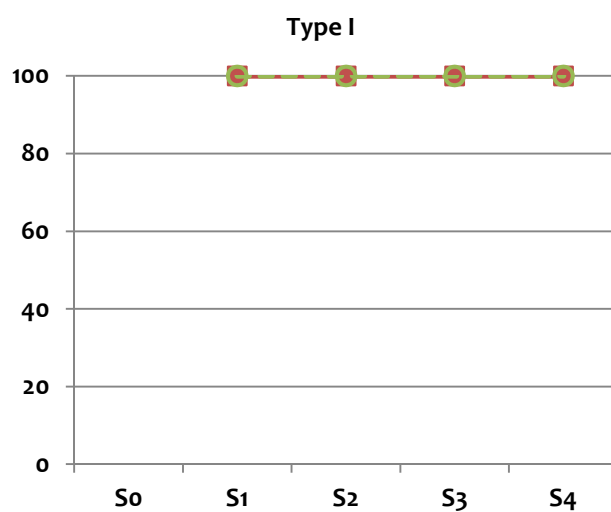
解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

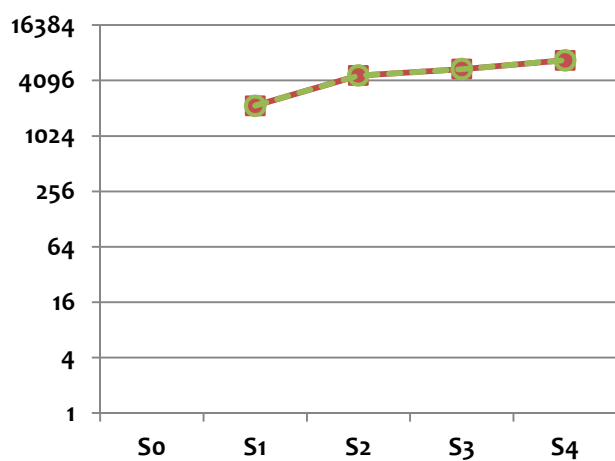
幾何平均抗体価



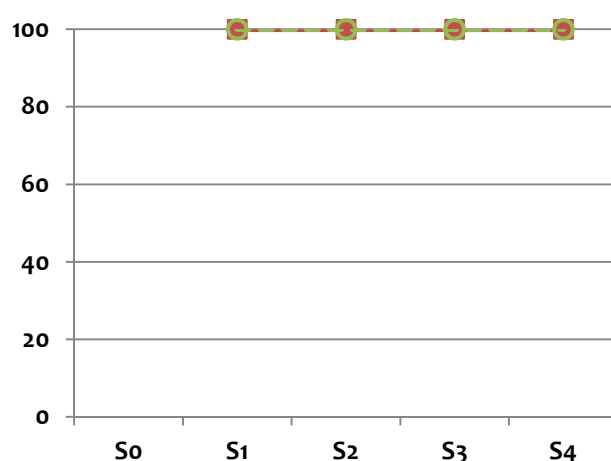
抗体保有割合(%)



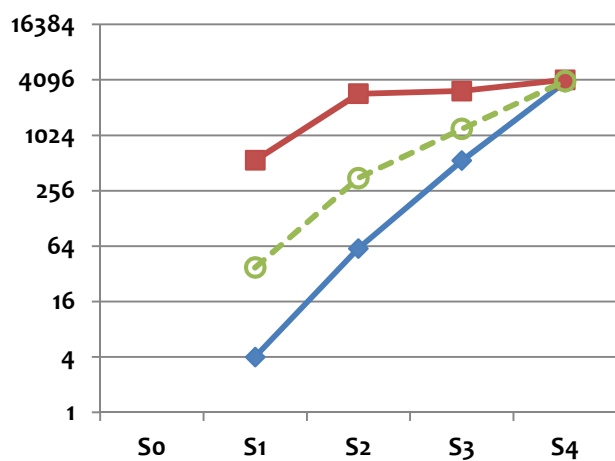
Type II



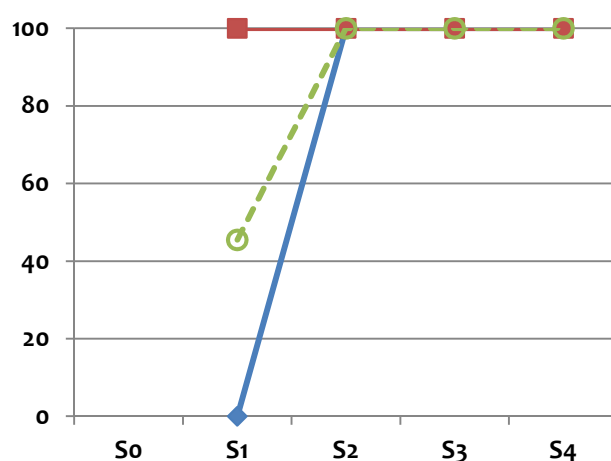
Type II



Type III



Type III



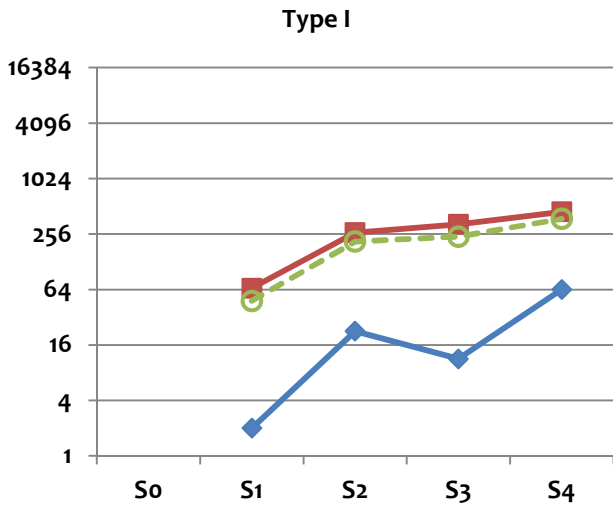
○ : Entier;    ◆ : S1 titer < 1:8;    ■ : ≥ 1:8.

図1-2  
Group A

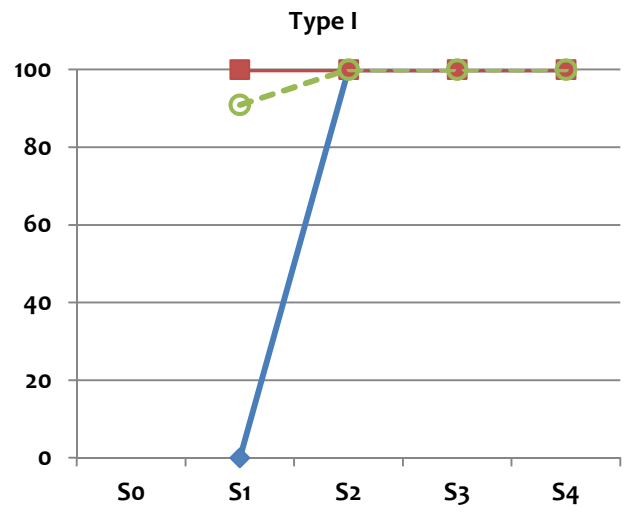
解析データ : Polio\_Ab\_Ver3(130517).xls

Wild Strain

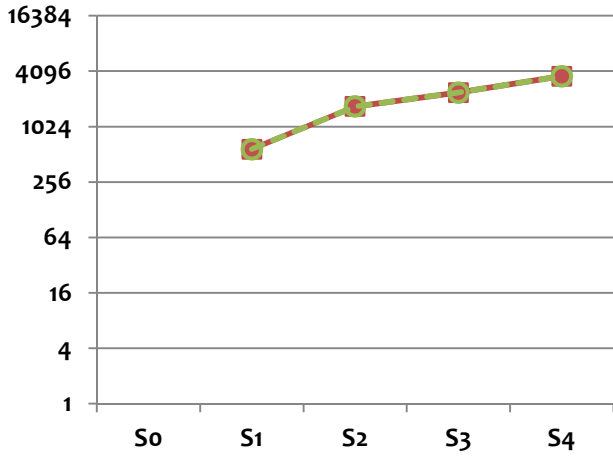
幾何平均抗体価



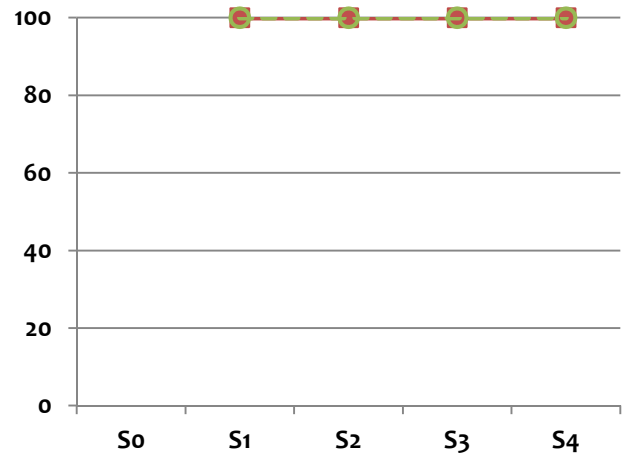
抗体保有割合(%)



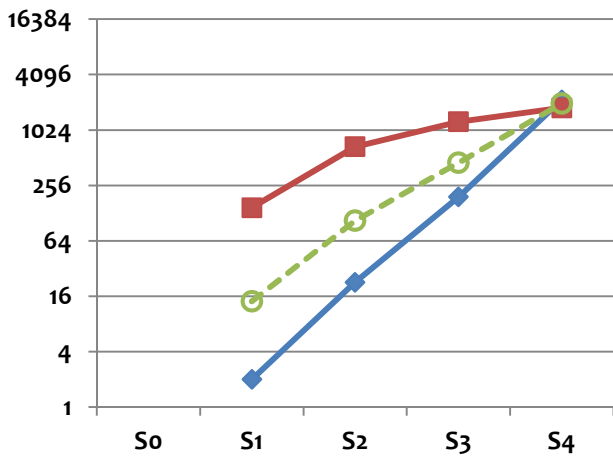
Type II



Type II



Type III



Type III

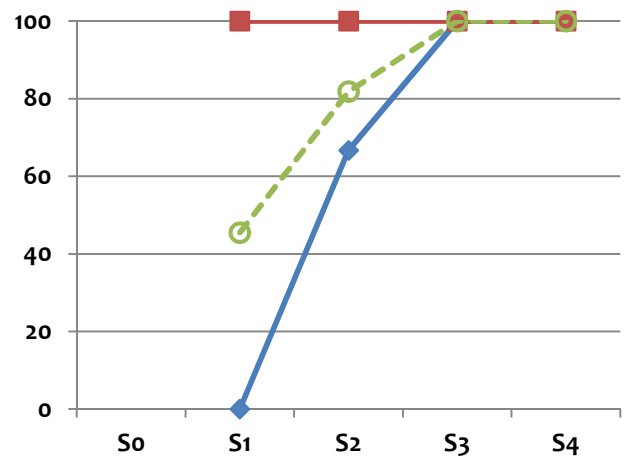
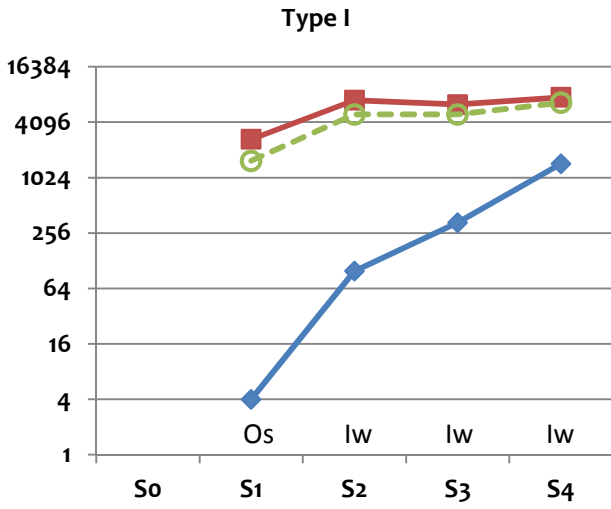


図2-1  
Group B

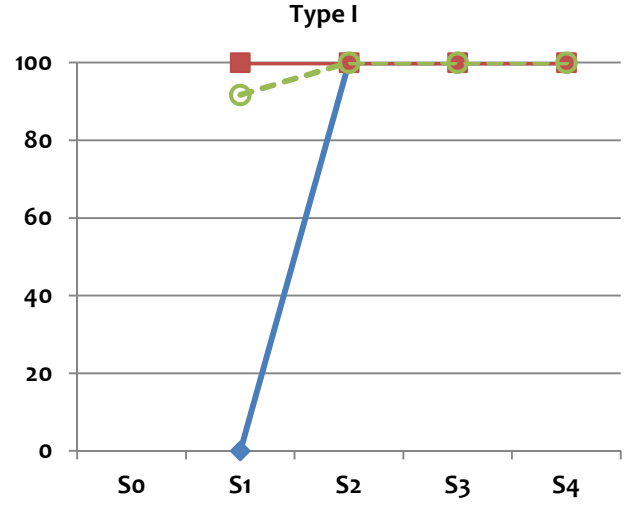
解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

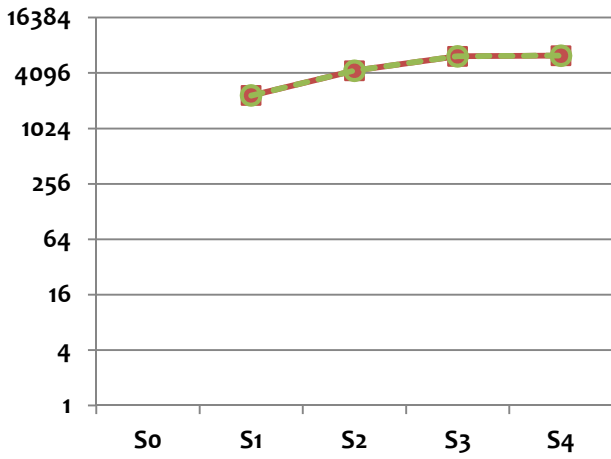
幾何平均抗体価



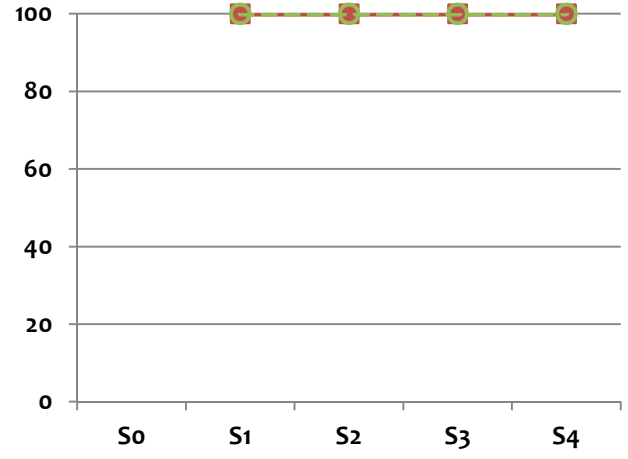
抗体保有割合(%)



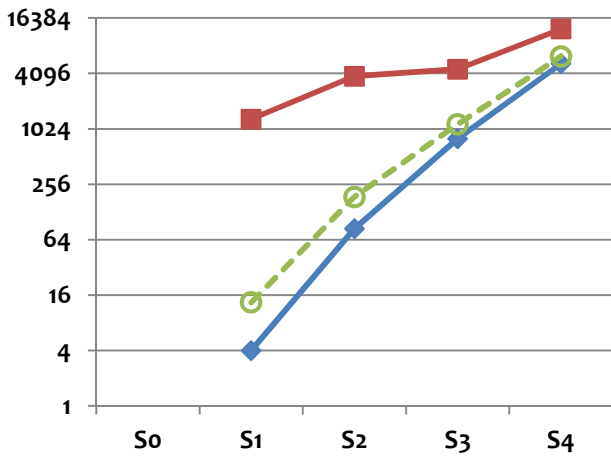
Type II



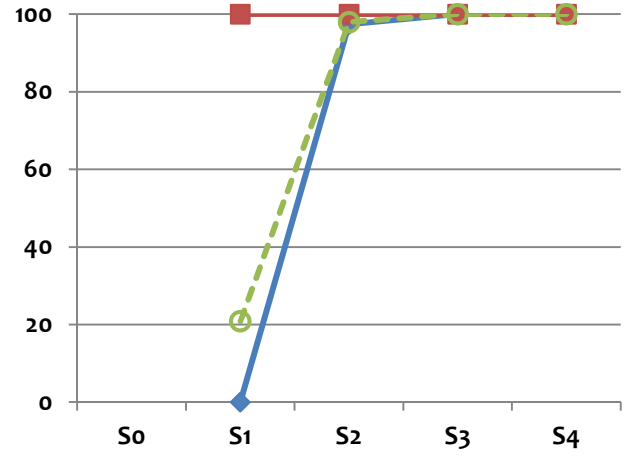
Type II



Type III



Type III



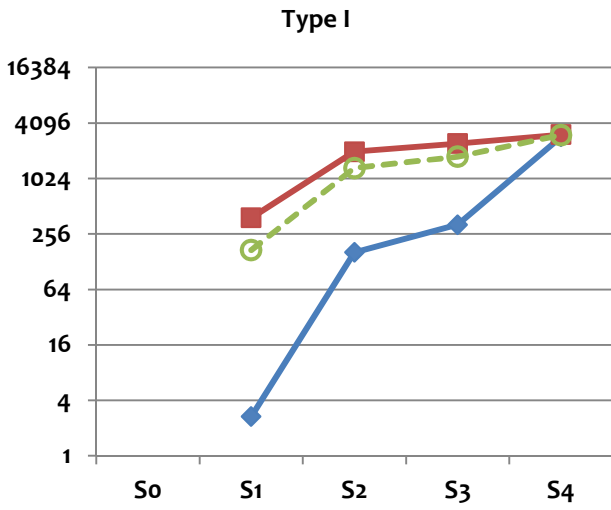
○ : Entier;    ◆ : S1 titer < 1:8;    ■ : ≥ 1:8.

図2-2 Group B

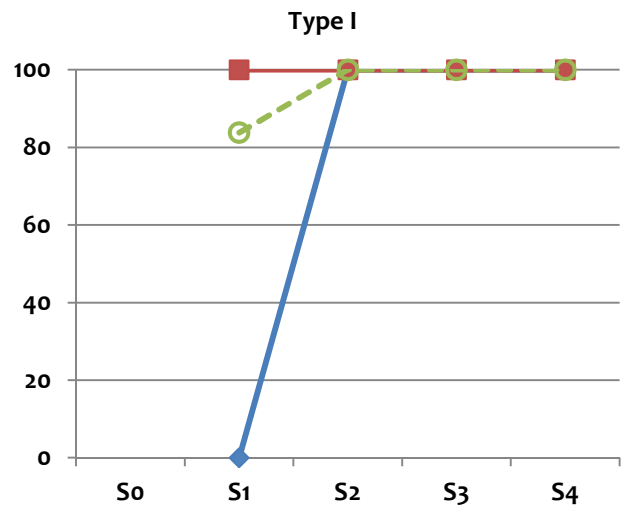
解析データ : Polio\_Ab\_Ver3(130517).xls

Wild Strain

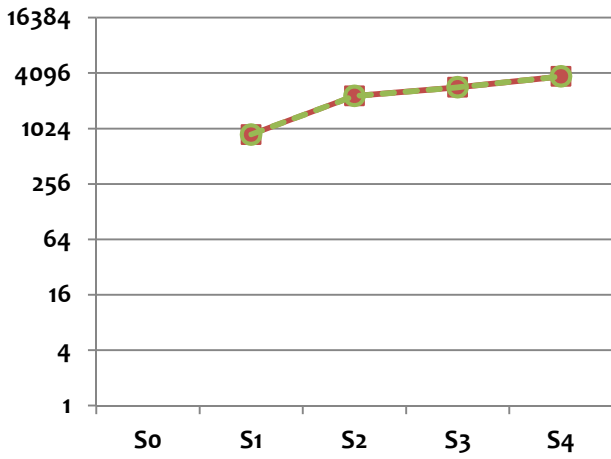
幾何平均抗体価



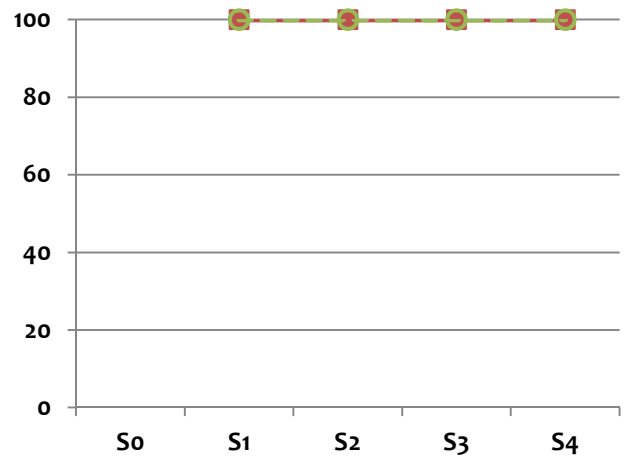
抗体保有割合(%)



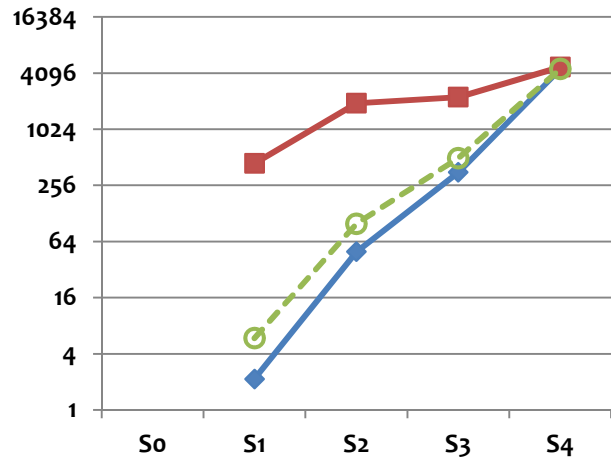
Type II



Type II



Type III



Type III

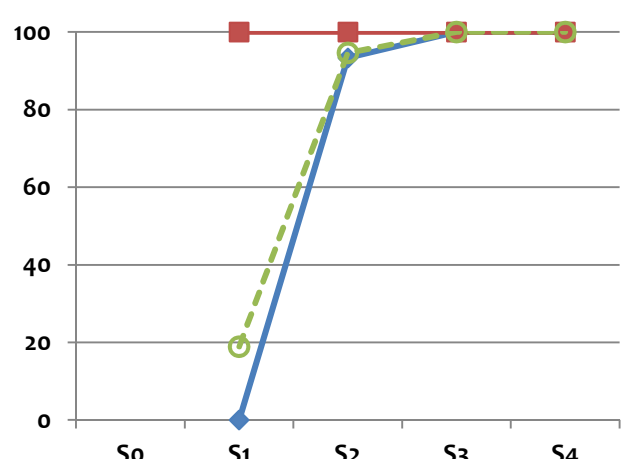




図3-1  
Group C

解析データ : Polio\_Ab\_Ver3(130517).xls

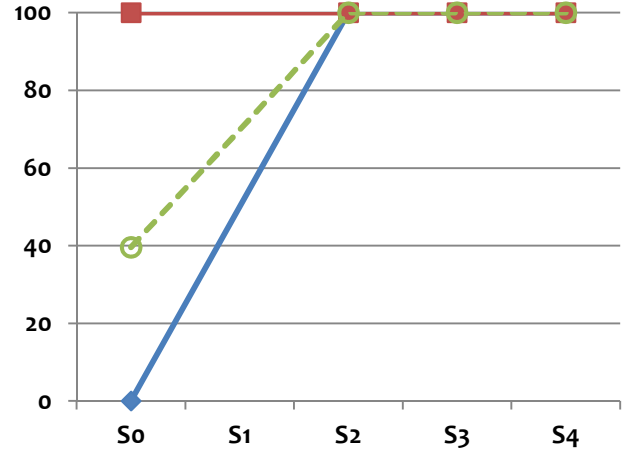
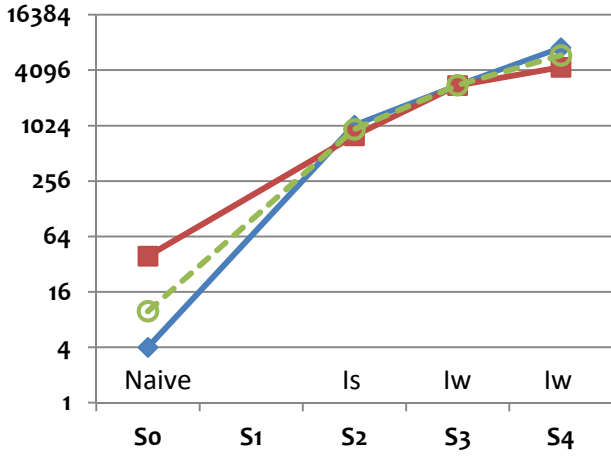
Sabin Strain

幾何平均抗体価

抗体保有割合(%)

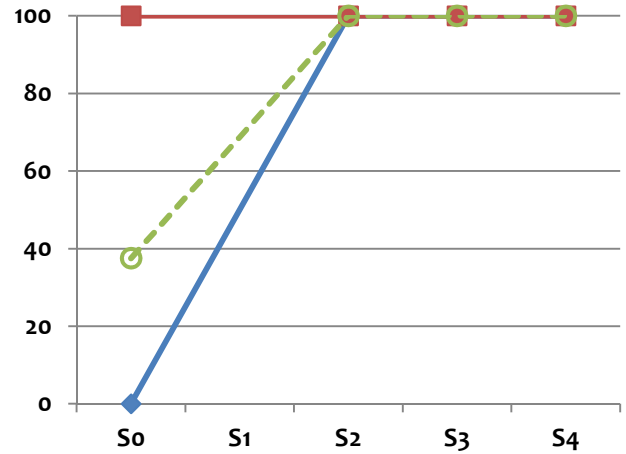
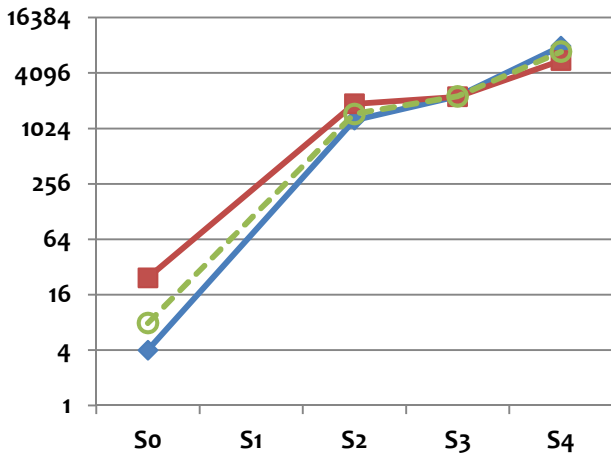
Type I

Type I



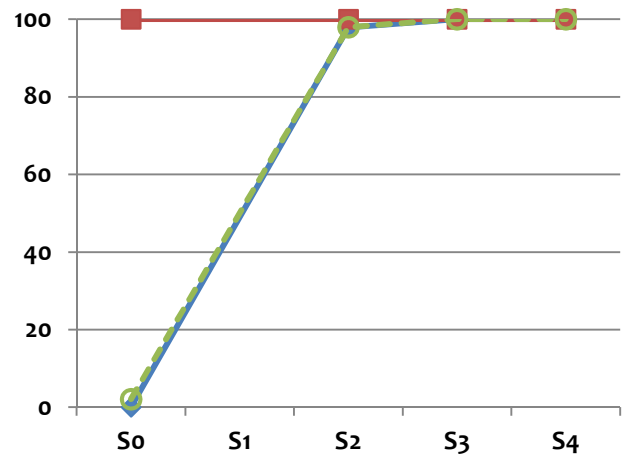
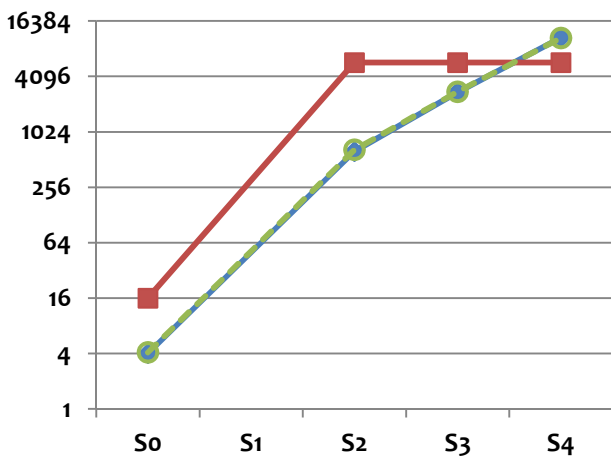
Type II

Type II



Type III

Type III



○ : Entier;    ◆ : So titer  $< 1:8$ ;    ■ :  $\geq 1:8$ .

図3-2  
Group C

解析データ : Polio\_Ab\_Ver3(130517).xls

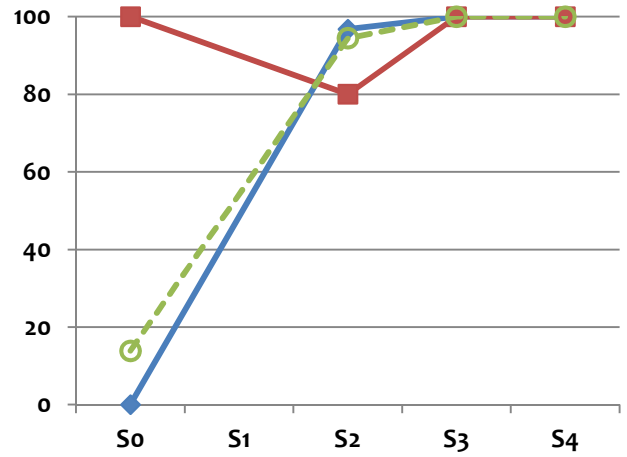
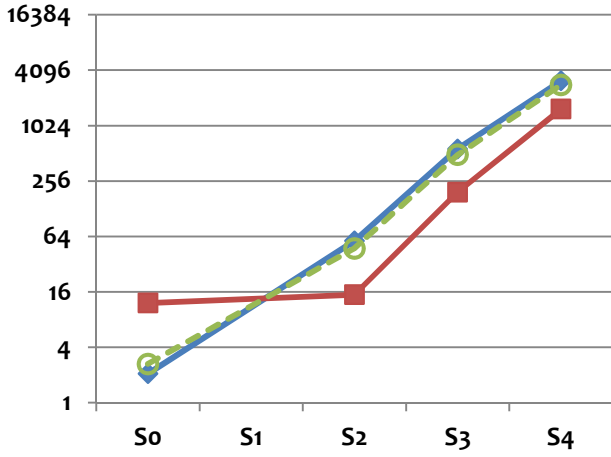
Wild Strain

幾何平均抗体価

抗体保有割合(%)

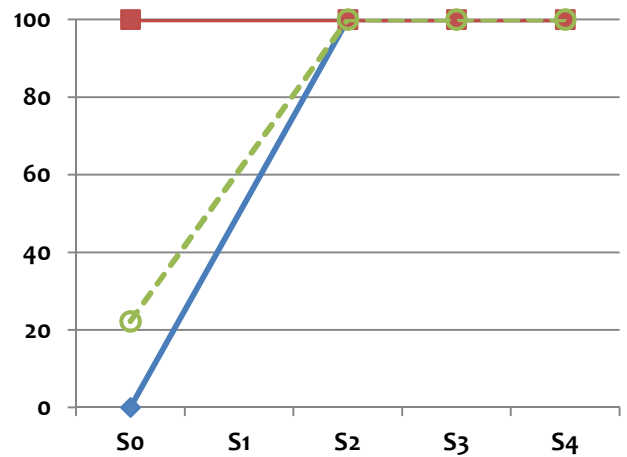
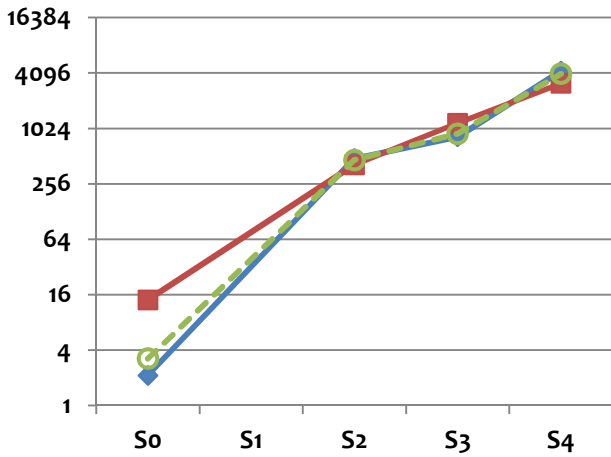
Type I

Type I



Type II

Type II



Type III

Type III

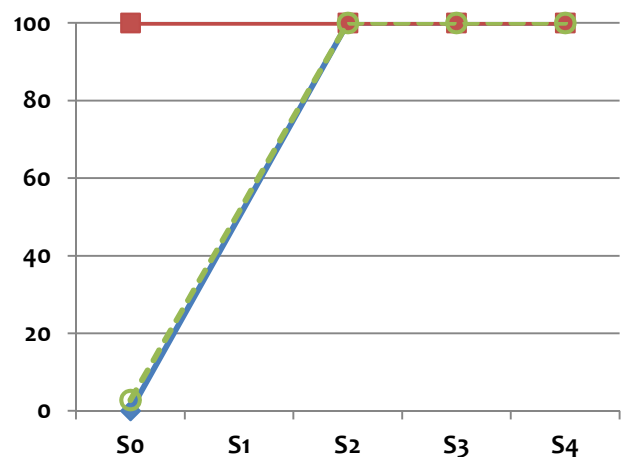
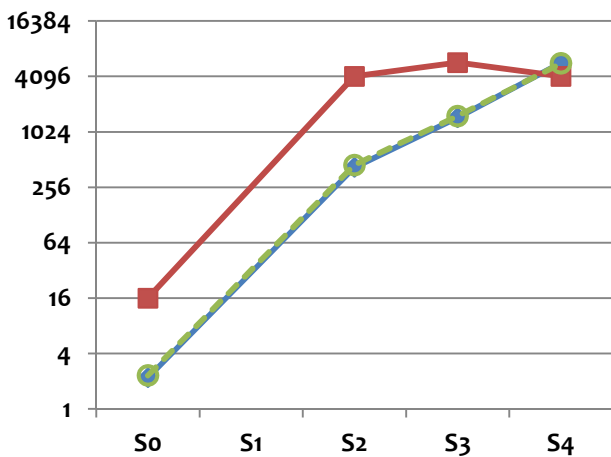
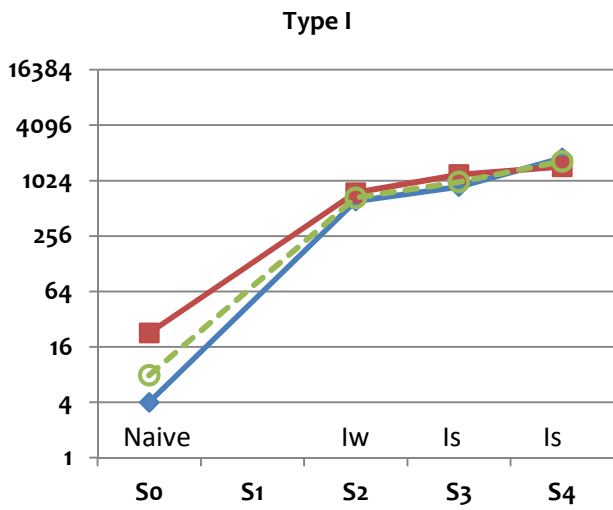


図4-1  
Group D

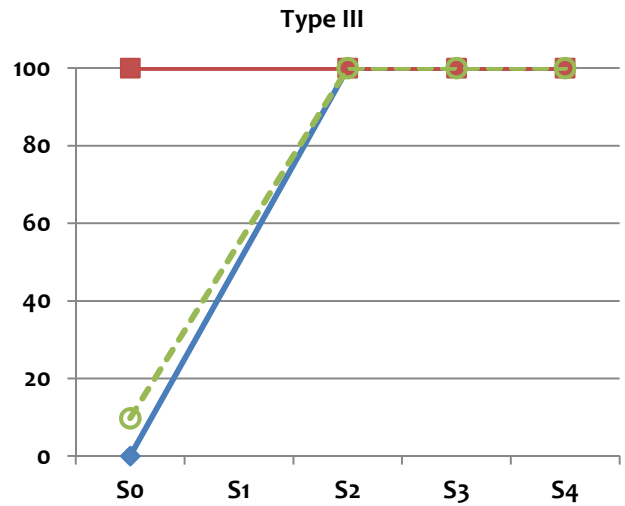
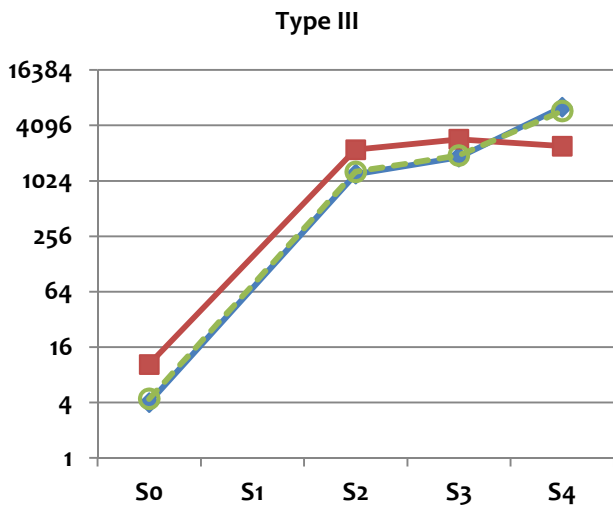
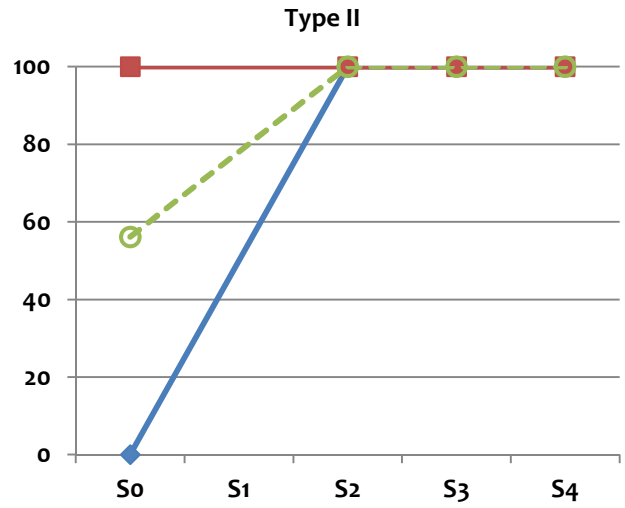
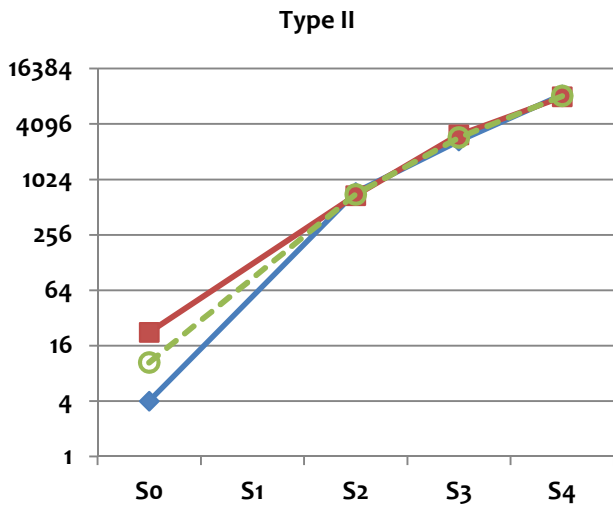
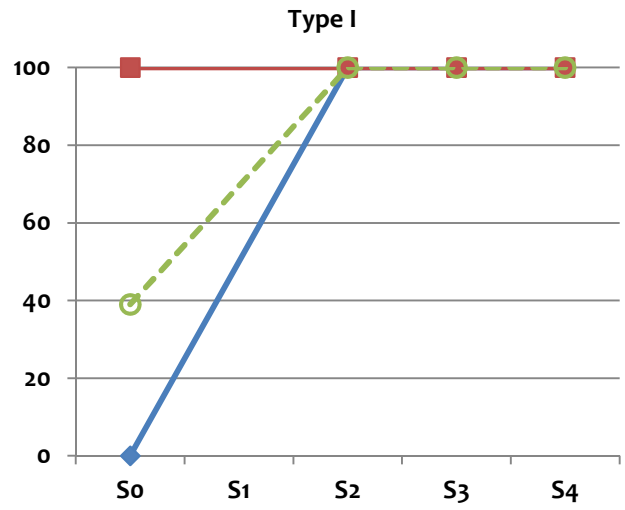
解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

幾何平均抗体価



抗体保有割合(%)



○ : Entier;    ◆ : So titer < 1:8;    ■ : ≥ 1:8.

図4-2  
Group D

解析データ : Polio\_Ab\_Ver3(130517).xls

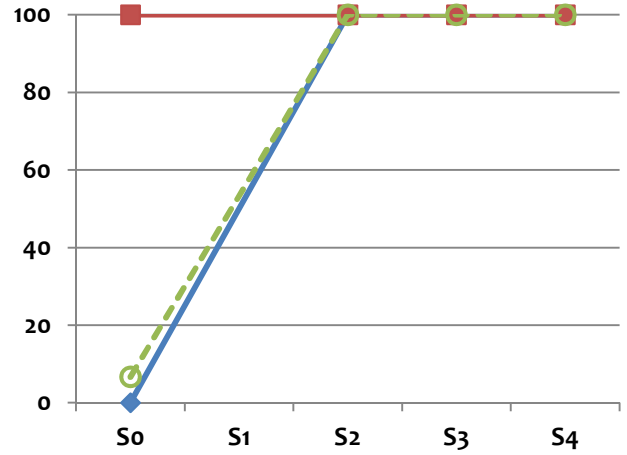
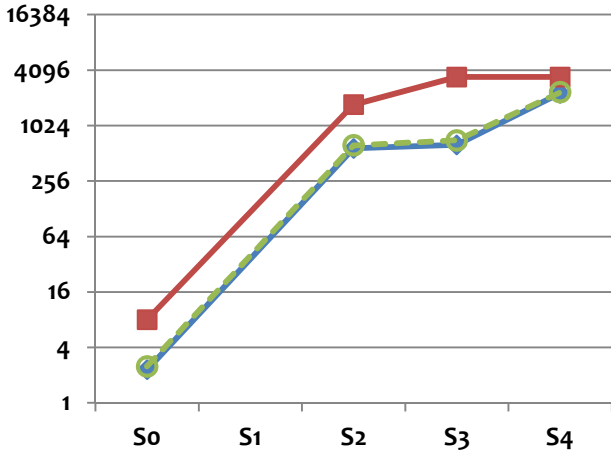
Wild Strain

幾何平均抗体価

抗体保有割合(%)

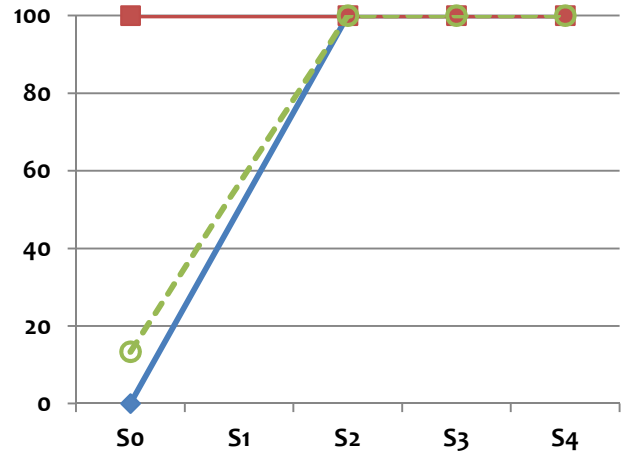
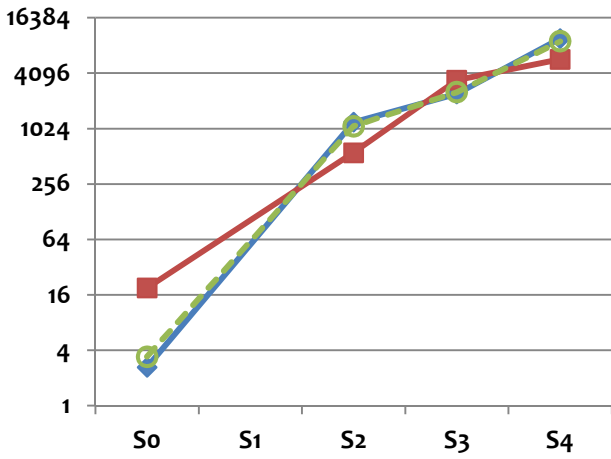
Type I

Type I



Type II

Type II



Type III

Type III

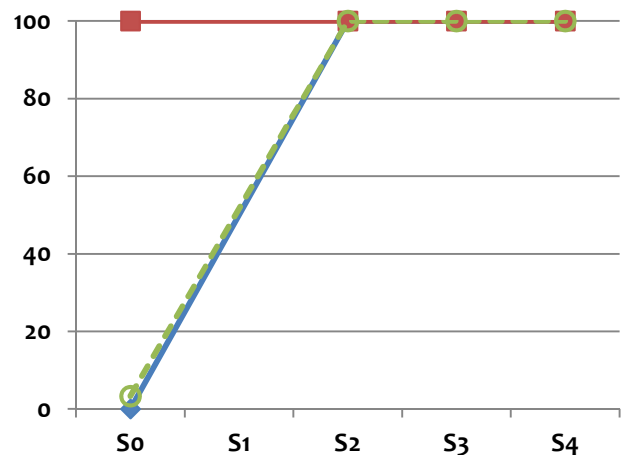
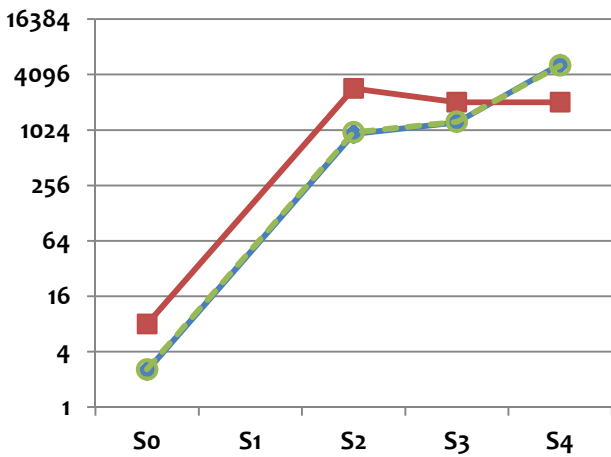


表 3-1 月齢別 幾何平均値 (Geometric Mean Titer) および平均上昇倍数 (Mean Fold Rise)

Group	Virus Type	N	Sabin Strain									
			GMT					MFR				
			S0	S1	S2	S3	S4	S2/S0,1	S3/S2	S3/S0,1	S4/S3	S4/S0,1
<b>Group A</b>												
<b>Type I</b>												
Entire		11		619	3285	3846	4948	5 **	1	6 **	1	8 *
Age (month)												
< 8		4		558	5793	7512	4871	10	1	13	0.6	9
8 - 10		3		323	2580	2048	11585	8	0.8	6	6	36
≥ 10		4		1117	2233	3158	2656	2	1	3	0.8	2
<b>Type II</b>												
Entire		11		2181	4646	5439	6781	2	1	2 *	1	3 *
Age (month)												
< 8		4		4871	5312	9742	6889	1	2	2	0.7	1
8 - 10		3		1149	5161	4096	13004	4	0.8	4	3	11
≥ 10		4		1579	3756	3756	4096	2	1	2	1	3
<b>Type III</b>												
Entire		11		37	351	1199	3969	9 **	3	32 **	3	106 **
Age (month)												
< 8		4		15	166	1878	4871	11	11	128	3	332
8 - 10		3		40	287	813	8192	7	3	20	10	203
≥ 10		4		91	861	1024	1878	10	1	11	2	21
<b>Group B</b>												
<b>Type I</b>												
Entire		48		1557	4978	4978	6644	3 **	1	3 **	1	4 **
Age (month)												
< 10		18		1290	3941	4257	6502	3 *	1	3 *	2	5 *
10 - 13		15		1588	3911	4598	8780	2 *	1	3	2 *	6 **
≥ 13		15		1911	8383	6502	5161	4 **	0.8	3 *	0.8	3 *
<b>Type II</b>												
Entire		48		2332	4340	6226	6317	2 **	1 **	3 **	1	3 **
Age (month)												
< 10		18		2580	3866	5793	6378	1 **	1 **	2 **	1	2 **
10 - 13		15		2246	2964	5281	6208	1	2 *	2 **	1	3 **
≥ 13		15		2145	7298	8005	6353	3 **	1	4 **	0.8	3 **
<b>Type III</b>												
Entire		48		13	186	1149	6271	14 **	6 **	86 **	5 **	470 **
Age (month)												
< 10		18		43	316	1689	9931	7 **	5 **	40 **	6 **	233 **
10 - 13		15		6	79	1176	5793	13 **	15 **	199 **	5 **	978 **
≥ 13		15		7	233	708	3911	31 **	3 **	95 **	6 **	524 **
<b>Group C</b>												
<b>Type I</b>												
Entire		48	10		932	2814	5919	95 **	3 **	285 **	2 **	600 **
Age (month)												
< 3		18	16		1315	3128	6378	81 **	2 **	192 **	2 *	391 **
3 - 4		7	7		1131	4522	4304	164 *	4 *	656 *	1	624 *
≥ 4		23	7		672	2242	6152	91 **	3 **	302 **	3 **	829 **
<b>Type II</b>												
Entire		48	8		1469	2282	6989	186 **	2 **	289 **	3 **	886 **
Age (month)												
< 3		18	10		1756	3010	10124	168 **	2	287 **	3 **	967 **
3 - 4		7	8		1076	2048	4096	134 *	2	256 *	2	512 *
≥ 4		23	6		1405	1899	6152	224 **	1	302 **	3 **	979 **
<b>Type III</b>												
Entire		48	4		654	2794	10701	159 **	4 **	679 **	4 **	2599 **
Age (month)												
< 3		18	4		1004	4018	14318	233 **	4 **	930 **	4 **	3314 **
3 - 4		7	4		1949	2756	7061	487 *	1	689 *	3	1765 *
≥ 4		23	4		336	2111	9669	84 **	6 **	528 **	5 **	2417 **
<b>Group D</b>												
<b>Type I</b>												
Entire		41	8		665	990	1658	85 **	1 **	126 **	2 **	211 **
Age (month)												
< 3		14	13		905	1280	1560	67 **	1	95 **	1	116 **
3 - 4		14	7		565	905	1522	86 **	2	138 **	2	232 **
≥ 4		13	5		570	827	1942	106 **	1	154 **	2 **	362 **
<b>Type II</b>												
Entire		41	10		706	2921	8262	67 **	4 **	279 **	3 **	788 **
Age (month)												
< 3		14	23		780	3198	6396	34 **	4 **	138 **	2 **	276 **
3 - 4		14	9		565	2825	8192	62 **	5 **	312 **	3 **	905 **
≥ 4		13	5		806	2746	10984	154 **	3 **	526 **	4 **	2103 **
<b>Type III</b>												
Entire		41	4		1287	1930	5891	293 **	2 *	440 **	3 **	1342 **
Age (month)												
< 3		14	5		1855	2756	5651	371 **	1 *	551 **	2 *	1131 **
3 - 4		14	4		1103	2048	6396	276 **	2	512 **	3 **	1599 **
≥ 4		13	4		1024	1234	5640	243 **	1	293 **	5 **	1337 **

全ての時点で抗体価が得られたものを解析対象。  
 階級間の比較: Wilcoxon rank sum test (†: p<0.05, ‡: p<0.01);  
 階級内の比較: Wilcoxon signed rank test (\*: p<0.05, \*\*: p<0.01)

表 3-2

Group	Virus Type	N	Wild Strain									
			GMT					MFR				
			S0	S1	S2	S3	S4	S2/S0,1	S3/S2	S3/S0,1	S4/S3	S4/S0,1
<b>Group A</b>												
<b>Type I</b>												
Entire		11		48	212	240	374	4 **	1	5 **	2	8 *
Age (month)												
<8		4		38	279	362	558	7	1	10	2	15
8-10		3		13	81	81	256	6	1	6	3	20
≥10		4		166	332	362	332	2	1	2	0.9	2
<b>Type II</b>												
Entire		11		581	1695	2397	3611	3 *	1	4 **	2	6 **
Age (month)												
<8		4		1448	2436	4467	4467	2	2	3	1	3
8-10		3		287	1448	2299	6502	5	2	8	3	23
≥10		4		395	1328	1328	1878	3	1	3	1	5
<b>Type III</b>												
Entire		11		14	106	451	1984	8 **	4 **	32 **	4 *	141 **
Age (month)												
<8		4		8	76	790	3756	10	10	99	5	470
8-10		3		14	72	256	2896	5	4	18	11	203
≥10		4		25	198	395	790	8	2	16	2	32
<b>Group B</b>												
<b>Type I</b>												
Entire		37		171	1331	1763	3035	8 **	1	10 **	2 *	18 **
Age (month)												
<10		11		80	1024	1448	4227	13 **	1	18 **	3 *	53 **
10-13		12		209	790	1491	2981	4 *	2 **	7 *	2 *	14 **
≥13		14		262	2559	2376	2376	10 **	0.9	9 **	1	9 **
<b>Type II</b>												
Entire		37		881	2313	2869	3765	3 **	1	3 **	1	4 **
Age (month)												
<10		11		1592	2719	3183	3727	2 *	1	2 **	1	2 *
10-13		12		592	1290	2299	3756	2	2 *	4 **	2	6 **
≥13		14		780	3360	3198	3803	4 **	1	4 **	1	5 **
<b>Type III</b>												
Entire		37		6	99	502	4541	17 **	5 **	86 **	9 **	773 **
Age (month)												
<10		11		18	113	619	5793	6 **	5 **	34 **	9 **	319 **
10-13		12		3	59	527	4732	18 **	9 **	161 **	9 **	1448 **
≥13		14		4	141	410	3619	35 **	3 **	102 **	9 **	905 **
<b>Group C</b>												
<b>Type I</b>												
Entire		36	3		48	493	2841	18 **	10 **	186 **	6 **	1074 **
Age (month)												
<3		16	3		52	523	2543	15 **	10 **	155 **	5 **	756 **
3-4		7	3		25	927	2756	10 *	37 *	362 *	3	1076 *
≥4		13	2		61	325	3309	30 **	5 *	163 **	10 **	1655 **
<b>Type II</b>												
Entire		36	3		465	895	4018	144 **	2 **	276 **	4 **	1241 **
Age (month)												
<3		16	4		609	1244	4277	137 **	2 **	279 **	3 **	959 **
3-4		7	4		345	975	3531	91 *	3 *	256 *	4 *	928 *
≥4		13	2		392	570	3988	196 **	1	285 **	7 **	1994 **
<b>Type III</b>												
Entire		36	2		447	1520	5682	194 **	3 **	657 **	4 **	2459 **
Age (month)												
<3		16	2		459	1614	7194	185 **	4 **	650 **	4 **	2896 **
3-4		7	3		840	2261	3898	328 *	3	882 *	2	1520 *
≥4		13	2		309	1139	5207	154 **	4 *	570 **	5 **	2603 **
<b>Group D</b>												
<b>Type I</b>												
Entire		30	2		623	708	2353	250 **	1	284 **	3 **	944 **
Age (month)												
<3		9	3		813	724	2483	246 **	0.9	219 **	3 *	752 **
3-4		13	2		485	764	2103	207 **	2	325 **	3 *	896 **
≥4		8	2		693	609	2656	347 **	0.9	304 **	4 **	1328 **
<b>Type II</b>												
Entire		30	3		1085	2551	9090	319 **	2 **	749 **	4 **	2669 **
Age (month)												
<3		9	5		948	2896	6757	181 **	3 *	553 **	2 *	1289 **
3-4		13	3		1024	2896	8874	325 **	3 **	919 **	3 **	2815 **
≥4		8	2		1387	1798	13193	583 **	1	756 **	7 **	5547 **
<b>Type III</b>												
Entire		30	3		967	1261	5161	375 **	1	489 **	4 **	2000 **
Age (month)												
<3		9	3		1064	1341	4598	310 **	1	390 **	3 *	1339 **
3-4		13	2		873	1611	4806	353 **	2	651 **	3 **	1942 **
≥4		8	2		1024	790	6597	512 **	0.8	395 **	8 **	3298 **

全ての時点で抗体価が得られたものを解析対象。  
 階級間の比較: Wilcoxon rank sum test (†: p<0.05, ‡: p<0.01);  
 階級内の比較: Wilcoxon signed rank test (\*: p<0.05, \*\*: p<0.01)

表 4  
月齢別 抗体保有割合

group Virus Type Baseline Titer Level	Sabin Strain						Wild Strain					
	N	So	S1	S2	S3	S4	N	So	S1	S2	S3	S4
		n (%)	n (%)	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	n (%)	n (%)
<b>Group A</b>												
<b>Type I</b>												
Entire	11		11 (100)	11 (100)	11 (100)	11 (100)	11		10 (91)	11 (100)	11 (100)	11 (100)
Age (month)												
<8	4		4 (100)	4 (100)	4 (100)	4 (100)	4		4 (100)	4 (100)	4 (100)	4 (100)
8 - 10	3		3 (100)	3 (100)	3 (100)	3 (100)	3		2 (67)	3 (100)	3 (100)	3 (100)
≧10	4		4 (100)	4 (100)	4 (100)	4 (100)	4		4 (100)	4 (100)	4 (100)	4 (100)
<b>Type II</b>												
Entire	11		11 (100)	11 (100)	11 (100)	11 (100)	11		11 (100)	11 (100)	11 (100)	11 (100)
Age (month)												
<8	4		4 (100)	4 (100)	4 (100)	4 (100)	4		4 (100)	4 (100)	4 (100)	4 (100)
8 - 10	3		3 (100)	3 (100)	3 (100)	3 (100)	3		3 (100)	3 (100)	3 (100)	3 (100)
≧10	4		4 (100)	4 (100)	4 (100)	4 (100)	4		4 (100)	4 (100)	4 (100)	4 (100)
<b>Type III</b>												
Entire	11		5 (45)	11 (100)	11 (100)	11 (100)	11		5 (45)	9 (82)	11 (100)	11 (100)
Age (month)												
<8	4		1 (25)	4 (100)	4 (100)	4 (100)	4		1 (25)	4 (100)	4 (100)	4 (100)
8 - 10	3		1 (33)	3 (100)	3 (100)	3 (100)	3		1 (33)	2 (67)	3 (100)	3 (100)
≧10	4		3 (75)	4 (100)	4 (100)	4 (100)	4		3 (75)	3 (75)	4 (100)	4 (100)
<b>Group B</b>												
<b>Type I</b>												
Entire	48		44 (92)	48 (100)	48 (100)	48 (100)	37		31 (84)	37 (100)	37 (100)	37 (100)
Age (month)												
<10	18		16 (89)	18 (100)	18 (100)	18 (100)	11		7 (64)	11 (100)	11 (100)	11 (100)
10 - 13	15		14 (93)	15 (100)	15 (100)	15 (100)	12		11 (92)	12 (100)	12 (100)	12 (100)
≧13	15		14 (93)	15 (100)	15 (100)	15 (100)	14		13 (93)	14 (100)	14 (100)	14 (100)
<b>Type II</b>												
Entire	48		48 (100)	48 (100)	48 (100)	48 (100)	37		37 (100)	37 (100)	37 (100)	37 (100)
Age (month)												
<10	18		18 (100)	18 (100)	18 (100)	18 (100)	11		11 (100)	11 (100)	11 (100)	11 (100)
10 - 13	15		15 (100)	15 (100)	15 (100)	15 (100)	12		12 (100)	12 (100)	12 (100)	12 (100)
≧13	15		15 (100)	15 (100)	15 (100)	15 (100)	14		14 (100)	14 (100)	14 (100)	14 (100)
<b>Type III</b>												
Entire	48		10 (21)	47 (98)	48 (100)	48 (100)	37		7 (19)	35 (95)	37 (100)	37 (100)
Age (month)												
<10	18		7 (39)	18 (100)	18 (100)	18 (100)	11		4 (36)	10 (91)	11 (100)	11 (100)
10 - 13	15		1 (7)	15 (100)	15 (100)	15 (100)	12		1 (8)	12 (100)	12 (100)	12 (100)
≧13	15		2 (13)	14 (93)	15 (100)	15 (100)	14		2 (14)	13 (93)	14 (100)	14 (100)
<b>Group C</b>												
<b>Type I</b>												
Entire	48	19 (40)		48 (100)	48 (100)	48 (100)	36	5 (14)		34 (94)	36 (100)	36 (100)
Age (month)												
<3	18	10 (56)		18 (100)	18 (100)	18 (100)	16	4 (25)		15 (94)	16 (100)	16 (100)
3 - 4	7	3 (43)		7 (100)	7 (100)	7 (100)	7	1 (14)		6 (86)	7 (100)	7 (100)
≧4	23	6 (26)		23 (100)	23 (100)	23 (100)	13	0 (0)		13 (100)	13 (100)	13 (100)
<b>Type II</b>												
Entire	48	18 (38)		48 (100)	48 (100)	48 (100)	36	8 (22)		36 (100)	36 (100)	36 (100)
Age (month)												
<3	18	11 (61)		18 (100)	18 (100)	18 (100)	16	6 (38)		16 (100)	16 (100)	16 (100)
3 - 4	7	3 (43)		7 (100)	7 (100)	7 (100)	7	2 (29)		7 (100)	7 (100)	7 (100)
≧4	23	4 (17) †		23 (100)	23 (100)	23 (100)	13	0 (0) †		13 (100)	13 (100)	13 (100)
<b>Type III</b>												
Entire	48	1 (2)		47 (98)	48 (100)	48 (100)	36	1 (3)		36 (100)	36 (100)	36 (100)
Age (month)												
<3	18	1 (6)		18 (100)	18 (100)	18 (100)	16	1 (6)		16 (100)	16 (100)	16 (100)
3 - 4	7	0 (0)		7 (100)	7 (100)	7 (100)	7	0 (0)		7 (100)	7 (100)	7 (100)
≧4	23	0 (0)		22 (96)	23 (100)	23 (100)	13	0 (0)		13 (100)	13 (100)	13 (100)
<b>Group D</b>												
<b>Type I</b>												
Entire	41	16 (39)		41 (100)	41 (100)	41 (100)	30	2 (7)		30 (100)	30 (100)	30 (100)
Age (month)												
<3	14	9 (64)		14 (100)	14 (100)	14 (100)	9	1 (11)		9 (100)	9 (100)	9 (100)
3 - 4	14	3 (21)		14 (100)	14 (100)	14 (100)	13	1 (8)		13 (100)	13 (100)	13 (100)
≧4	13	4 (31)		13 (100)	13 (100)	13 (100)	8	0 (0)		8 (100)	8 (100)	8 (100)
<b>Type II</b>												
Entire	41	23 (56)		41 (100)	41 (100)	41 (100)	30	4 (13)		30 (100)	30 (100)	30 (100)
Age (month)												
<3	14	11 (79)		14 (100)	14 (100)	14 (100)	9	3 (33)		9 (100)	9 (100)	9 (100)
3 - 4	14	9 (64)		14 (100)	14 (100)	14 (100)	13	1 (8)		13 (100)	13 (100)	13 (100)
≧4	13	3 (23) †		13 (100)	13 (100)	13 (100)	8	0 (0)		8 (100)	8 (100)	8 (100)
<b>Type III</b>												
Entire	41	4 (10)		41 (100)	41 (100)	41 (100)	30	1 (3)		30 (100)	30 (100)	30 (100)
Age (month)												
<3	14	3 (21)		14 (100)	14 (100)	14 (100)	9	1 (11)		9 (100)	9 (100)	9 (100)
3 - 4	14	0 (0)		14 (100)	14 (100)	14 (100)	13	0 (0)		13 (100)	13 (100)	13 (100)
≧4	13	1 (8)		13 (100)	13 (100)	13 (100)	8	0 (0)		8 (100)	8 (100)	8 (100)

全ての時点で抗体価が得られたものを解析対象。

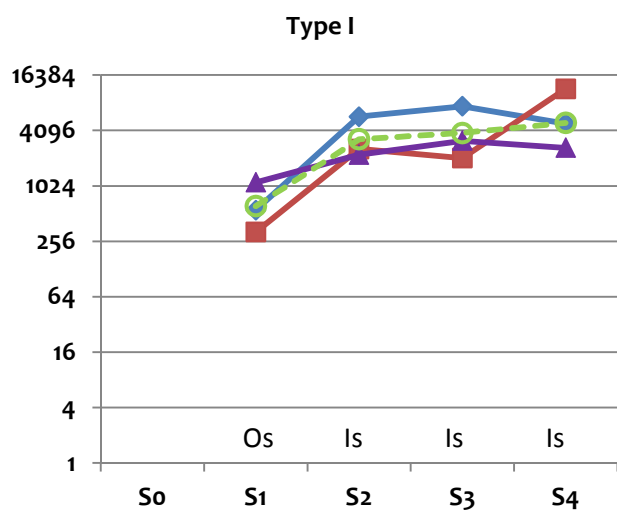
階級間の比較: Fisher's Exact Test (†: p&lt;0.05, ‡: p&lt;0.01)

図5-1 月齢別 幾何平均抗体価および抗体保有割合  
Group A

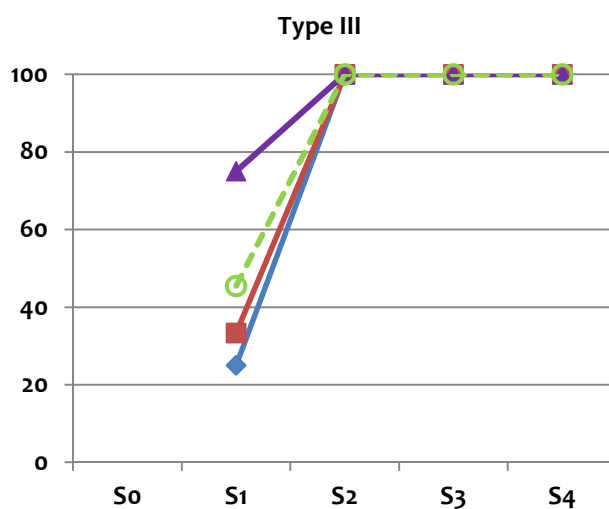
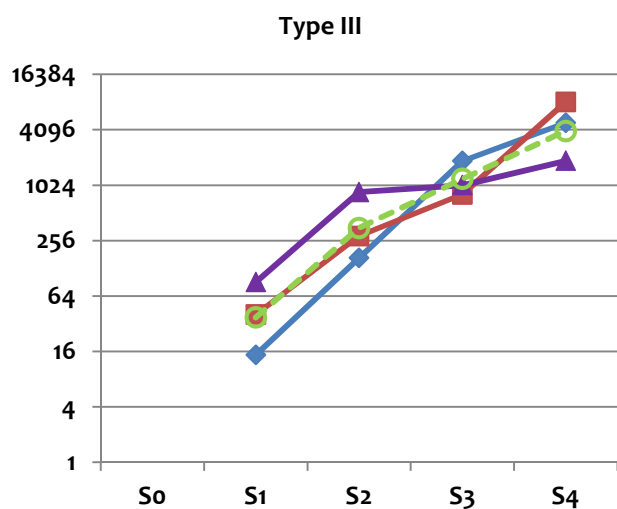
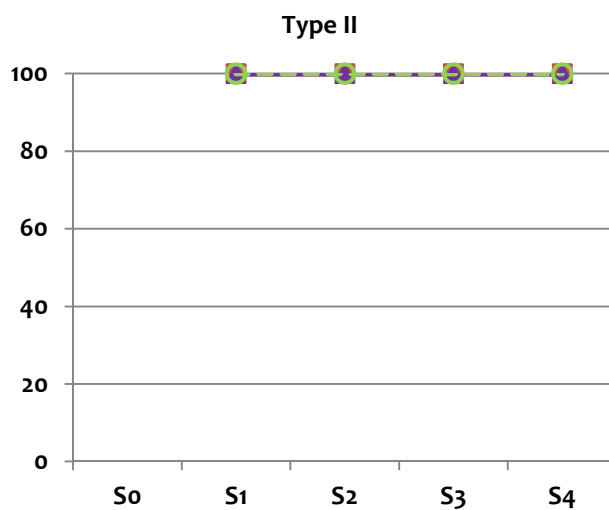
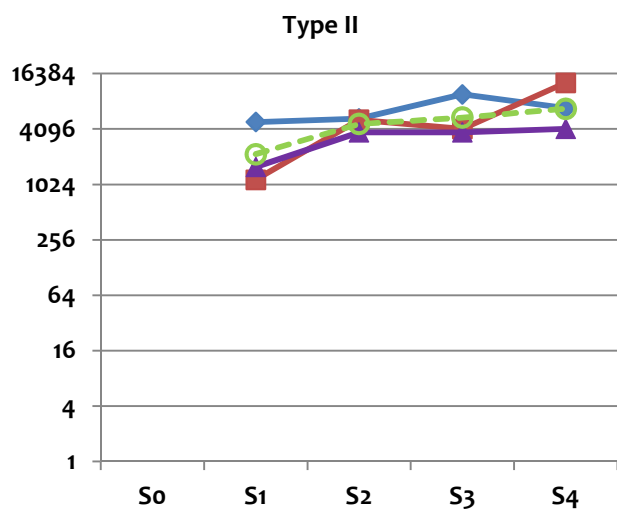
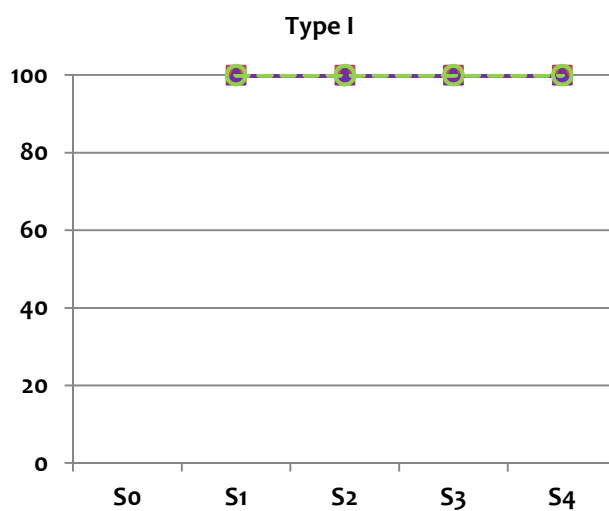
解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

幾何平均抗体価



抗体保有割合(%)



○ : Entier; ◆ : Age (month) < 8; ■ : 8 - 10; ▲ : ≥ 10.



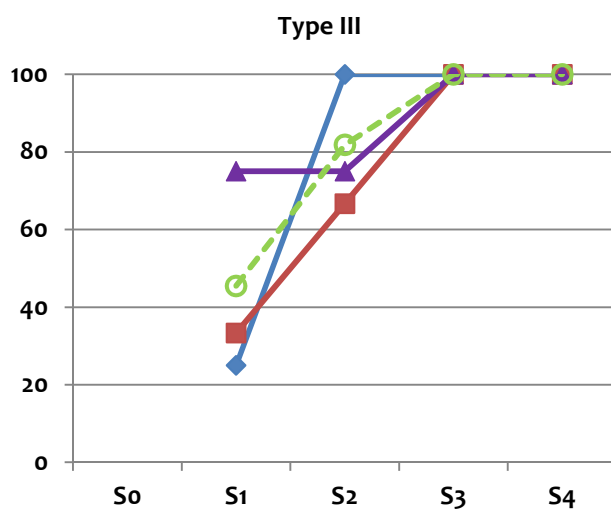
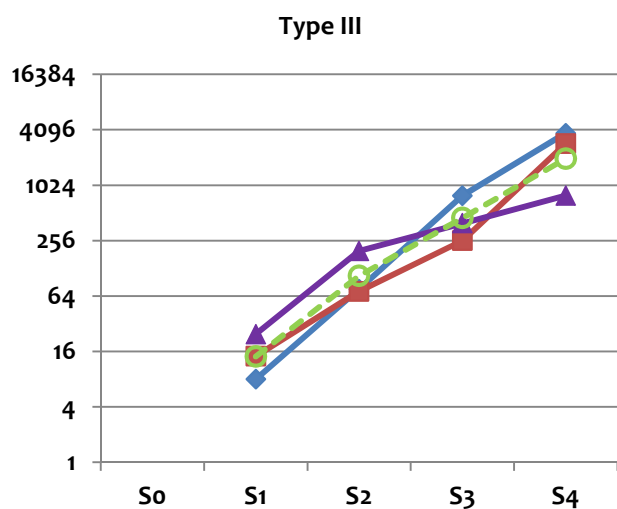
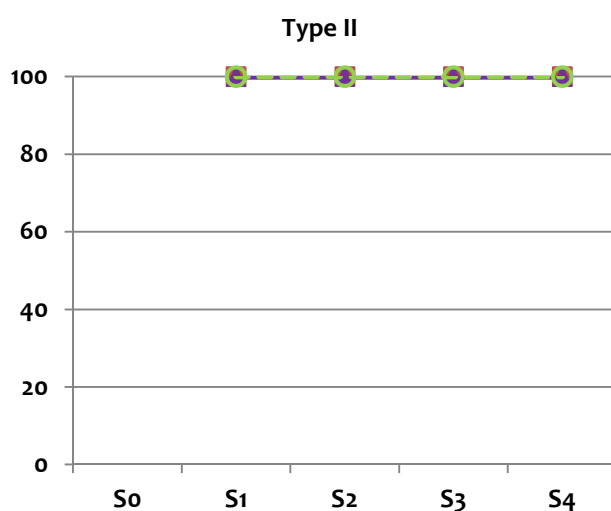
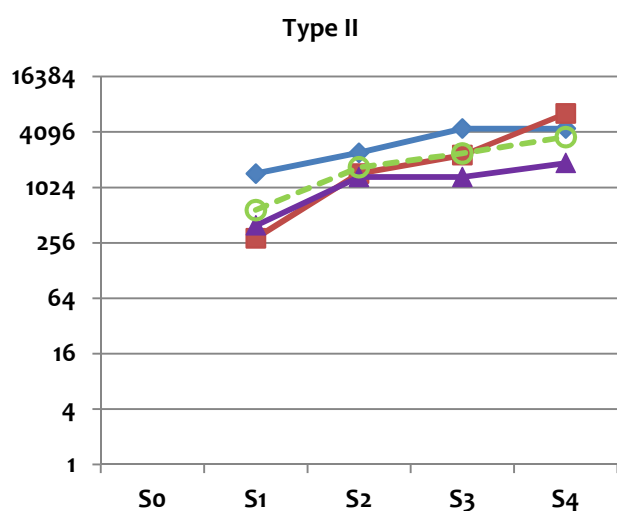
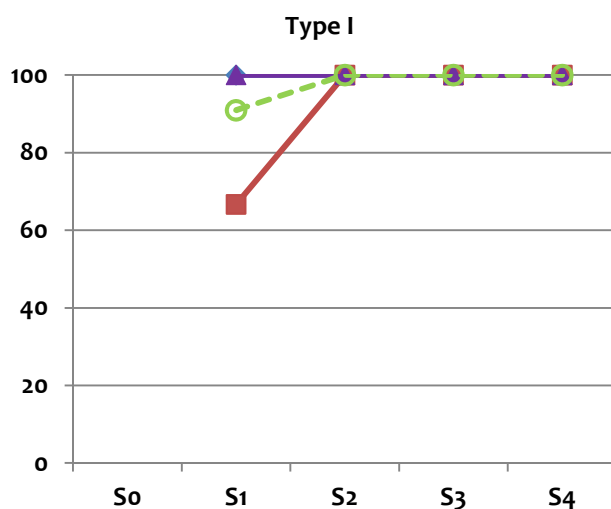
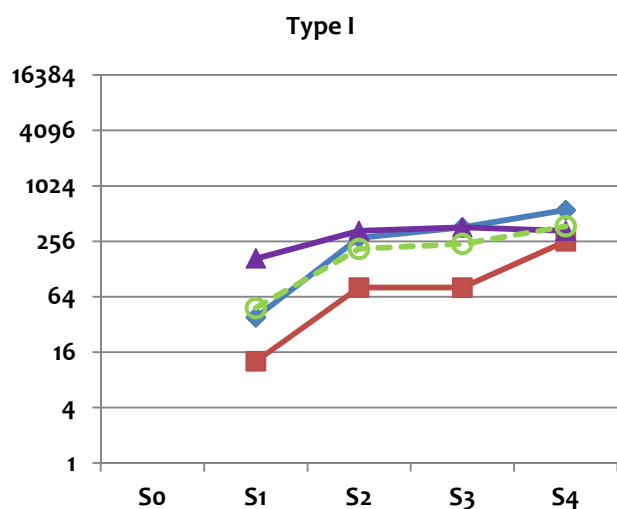
図5-2  
Group A

解析データ : Polio\_Ab\_Ver3(130517).xls

Wild Strain

幾何平均抗体価

抗体保有割合(%)



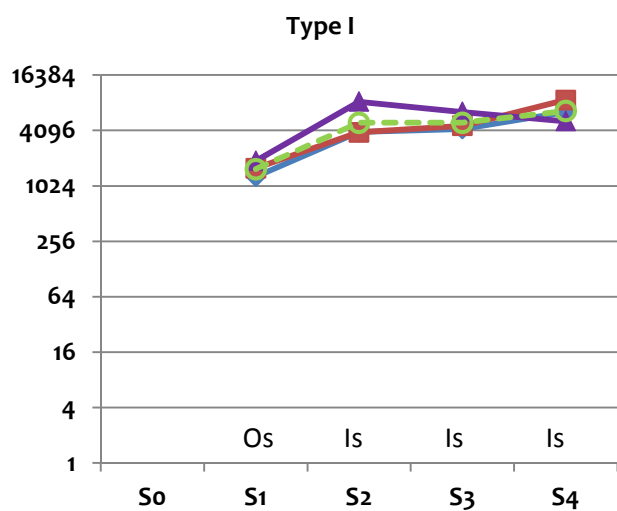
○ : Entier; ◆ : Age (month) < 8; ■ : 8 - 10; ▲ : ≥ 10.

図6-1  
Group B

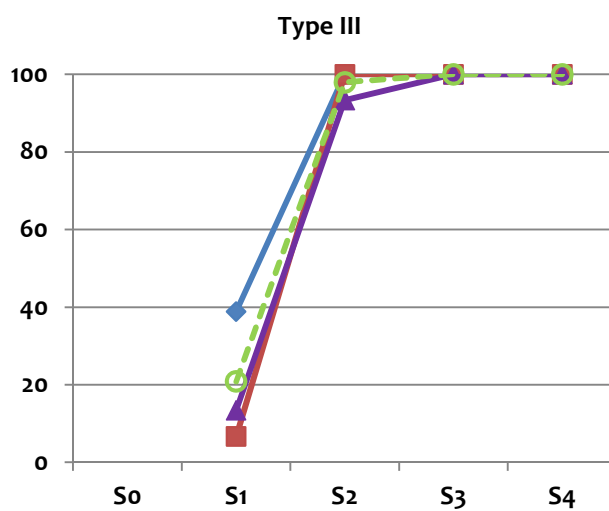
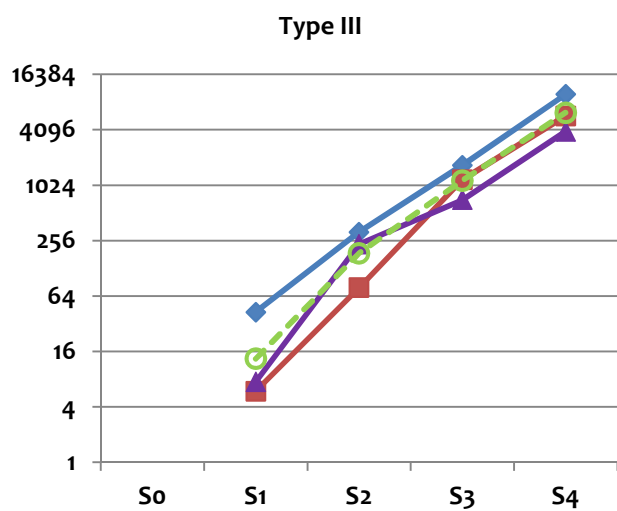
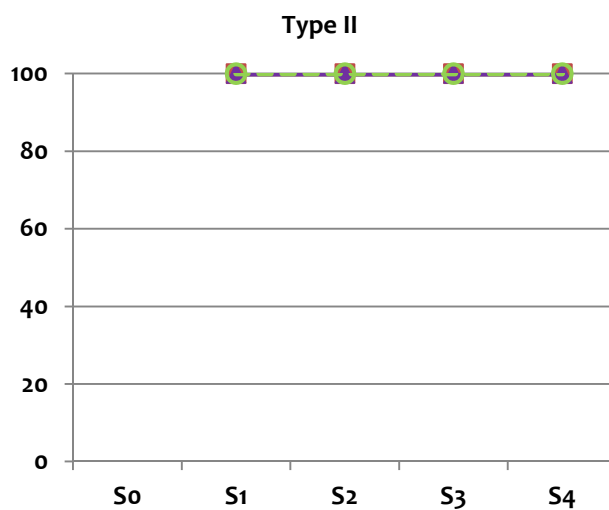
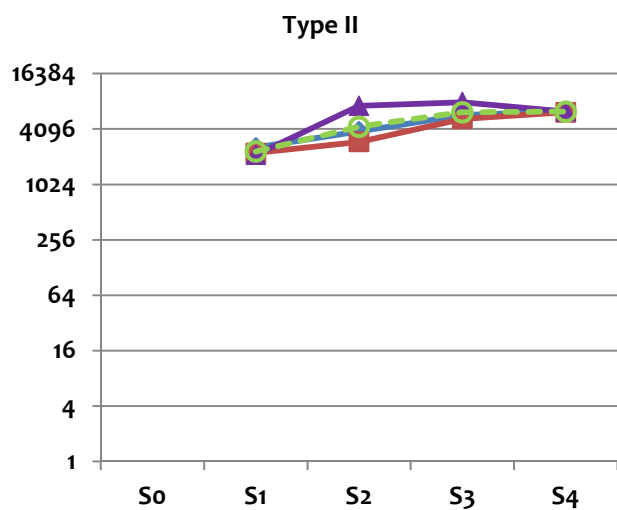
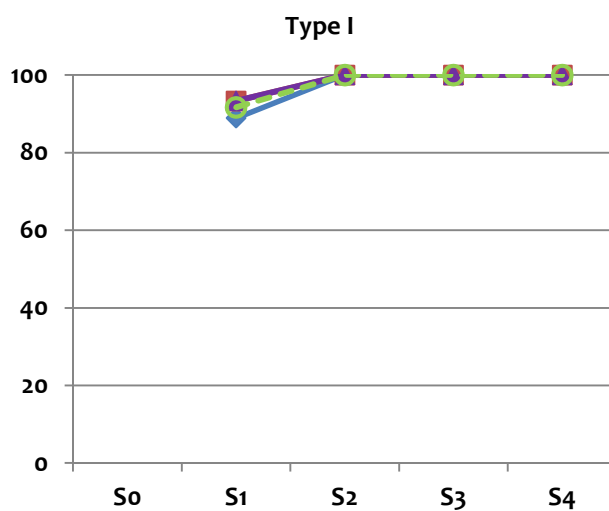
解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

幾何平均抗体価



抗体保有割合(%)



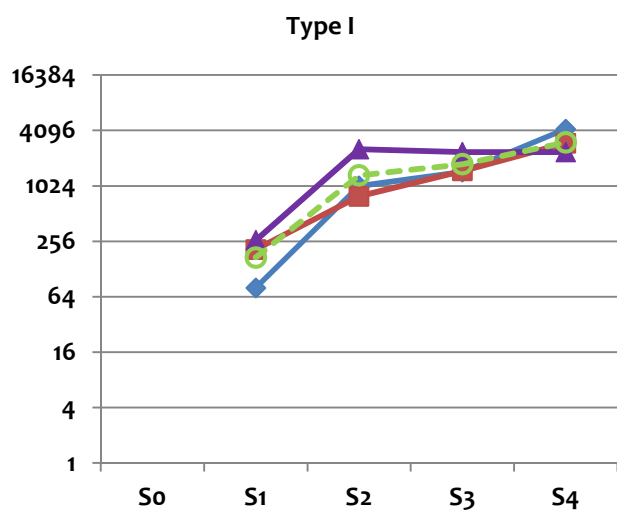
○ : Entier; ◆ : Age (month) < 10; ■ : 10 - 13; ▲ : ≥ 13.

図6-2  
Group B

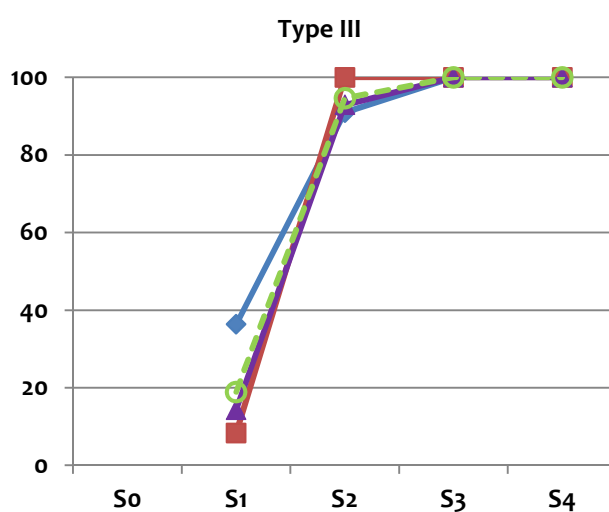
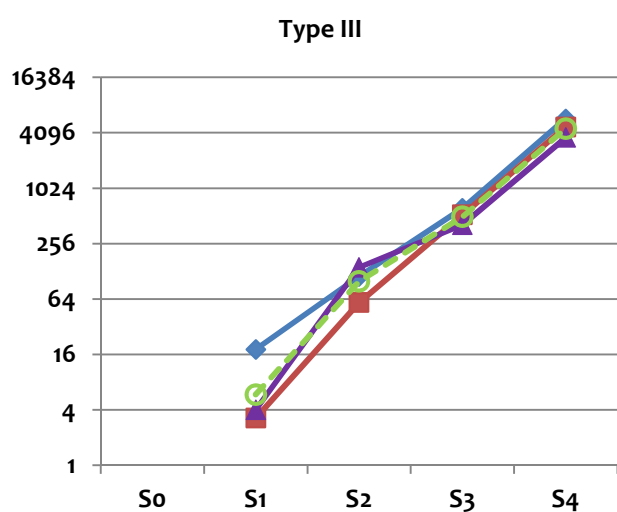
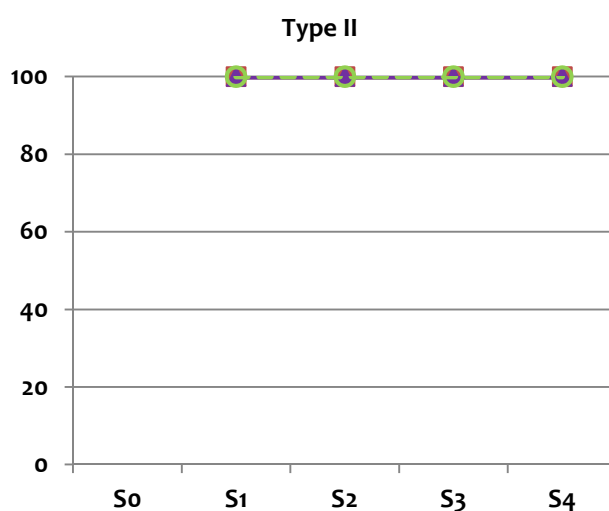
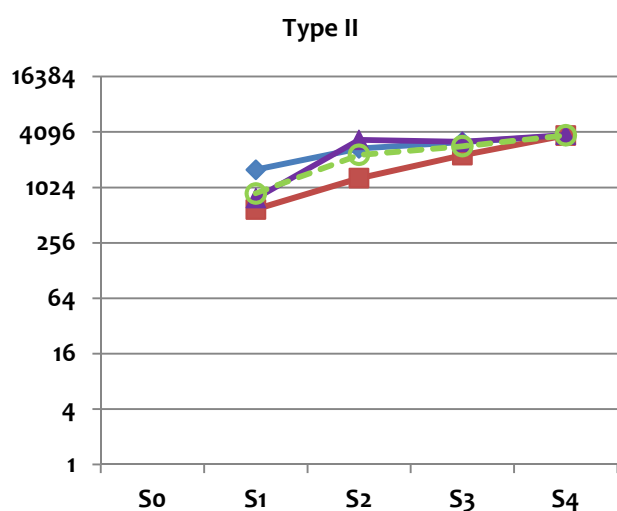
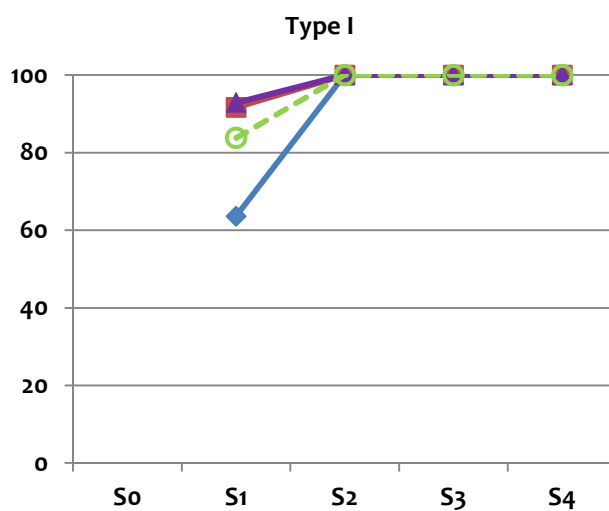
解析データ : Polio\_Ab\_Ver3(130517).xls

Wild Strain

幾何平均抗体価



抗体保有割合(%)



○ : Entier; ◆ : Age (month) < 10; ■ : 10 - 13; ▲ : ≥ 13.

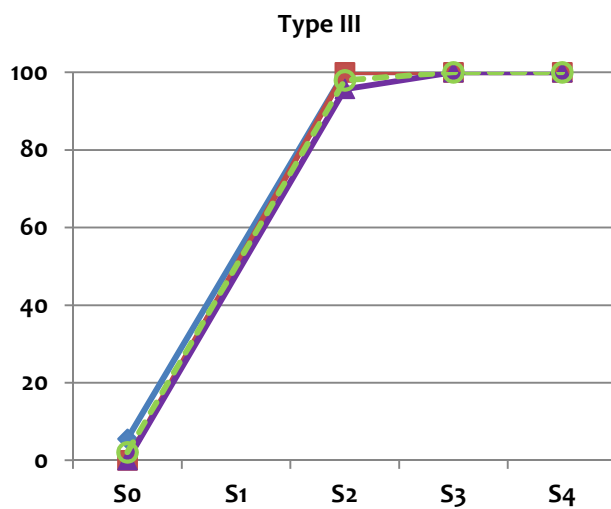
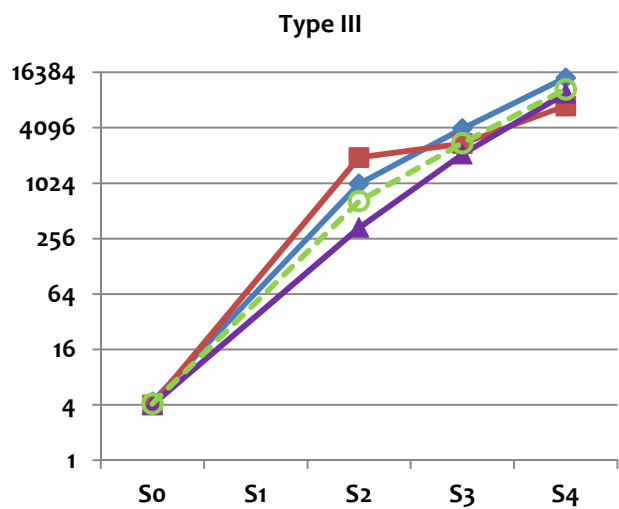
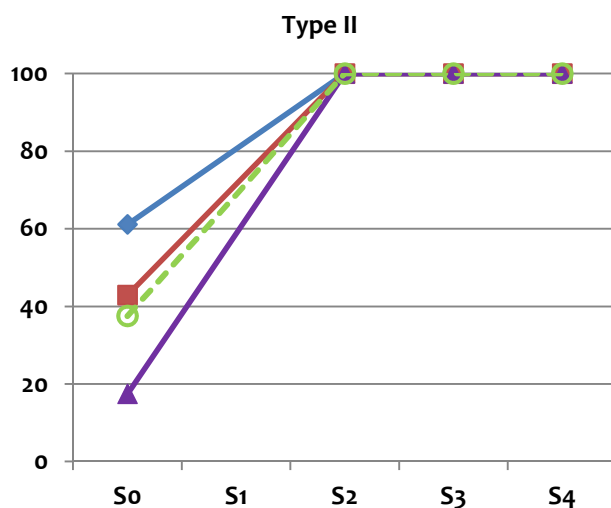
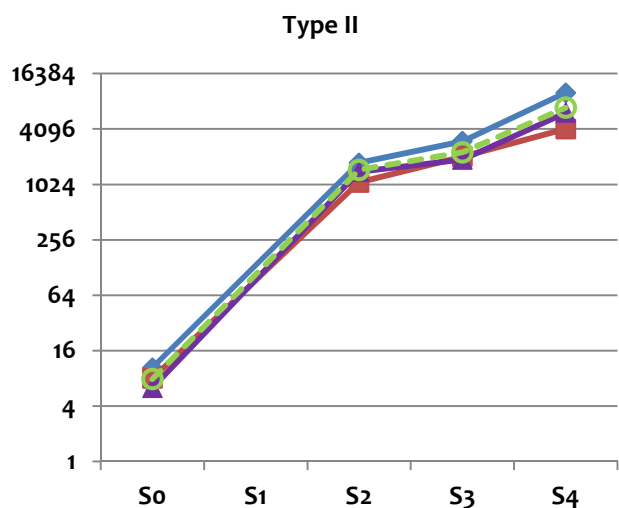
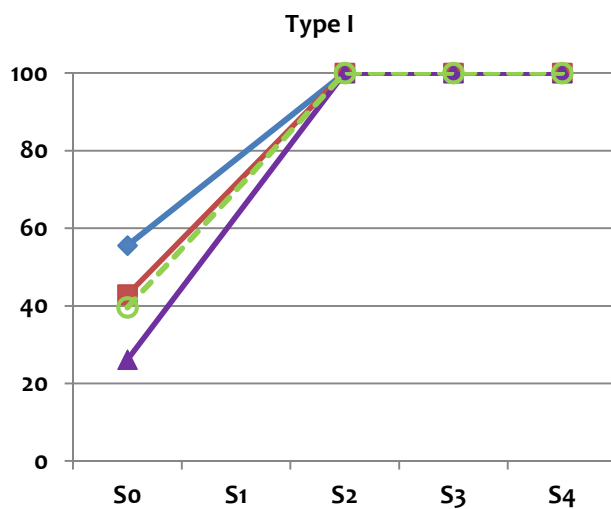
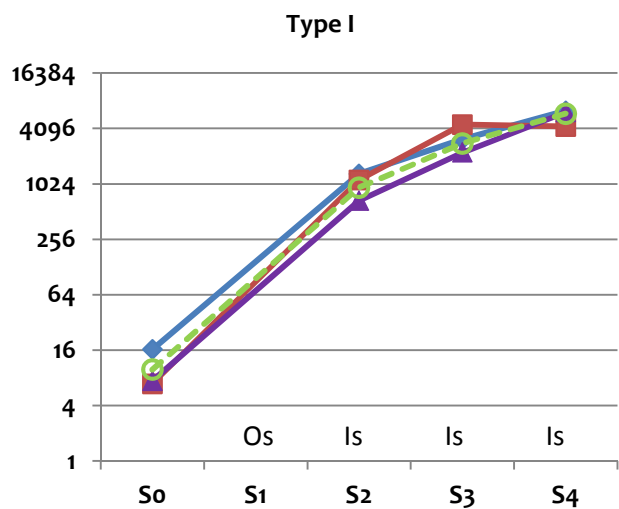
図7-1  
Group C

解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

幾何平均抗体価

抗体保有割合(%)



○ : Entier;   ◆ : Age (month) < 3;   ■ : 3 - 4;   ▲ : ≥ 4.

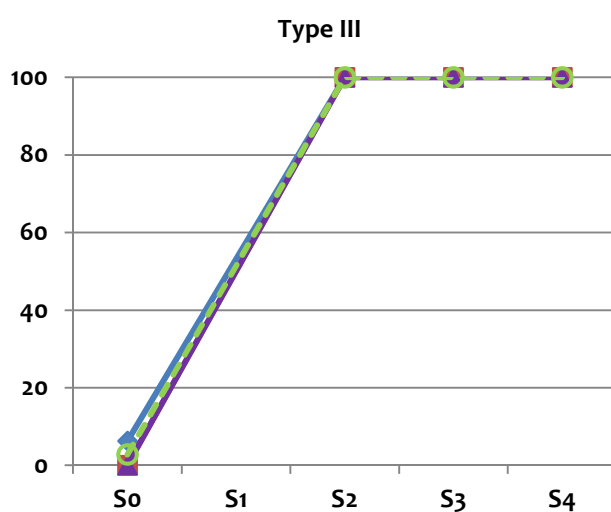
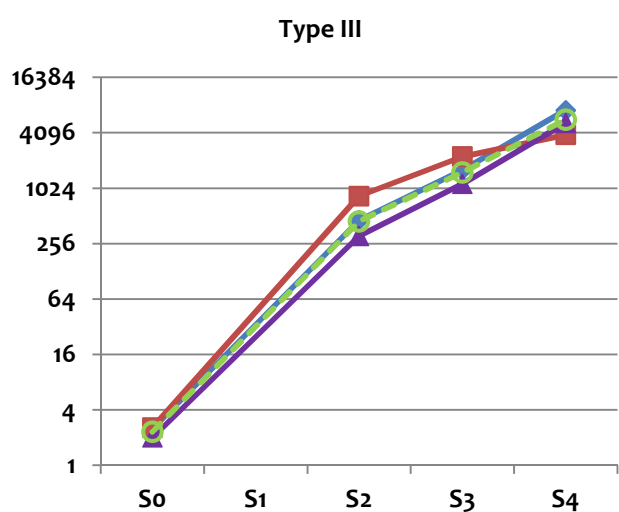
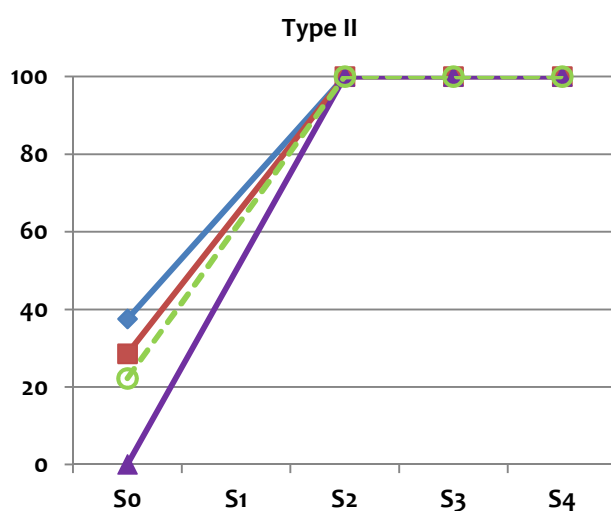
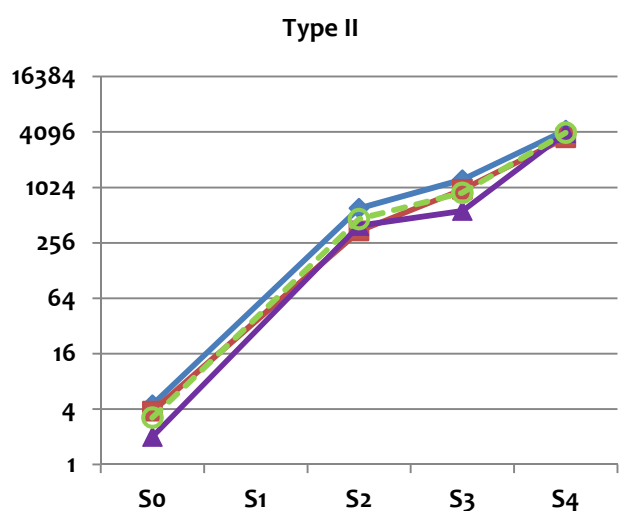
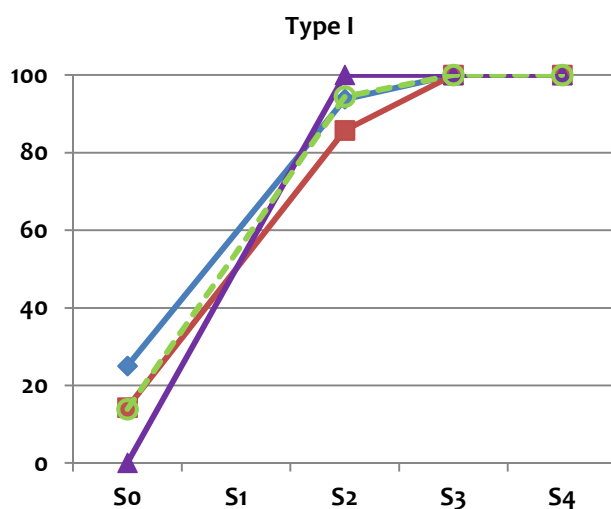
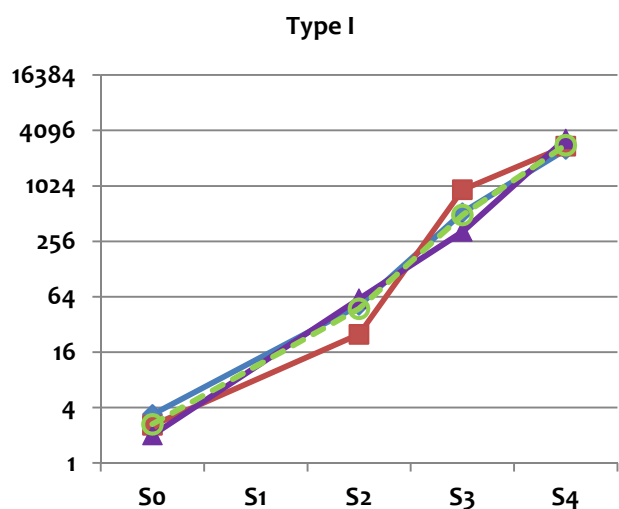
図7-2  
Group C

解析データ : Polio\_Ab\_Ver3(130517).xls

Wild Strain

幾何平均抗体価

抗体保有割合(%)



○ : Entier;   ◆ : Age (month) < 3;   ■ : 3 - 4;   ▲ : ≥ 4.

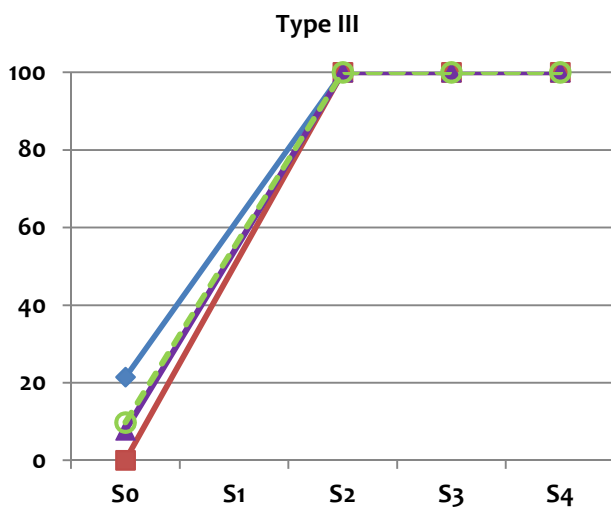
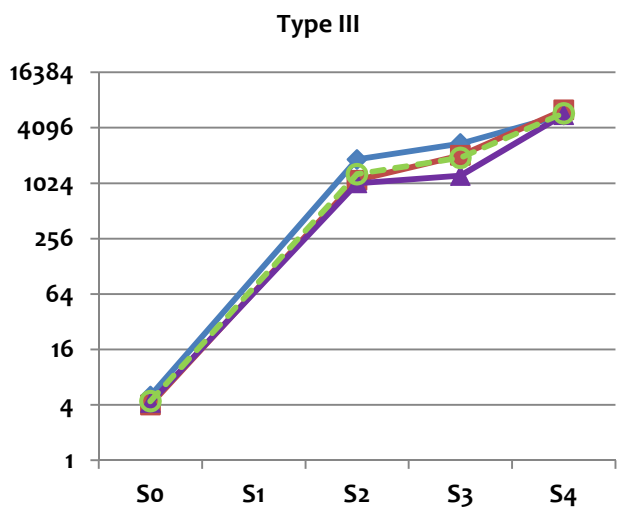
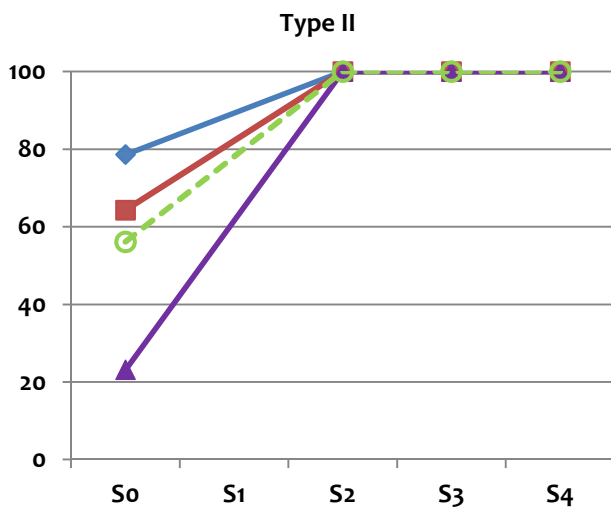
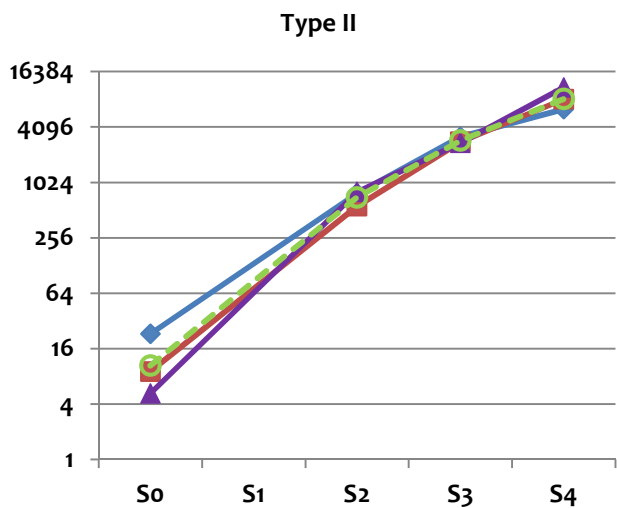
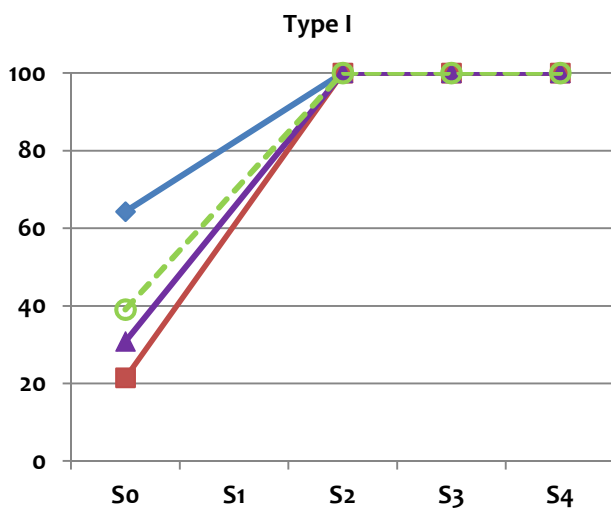
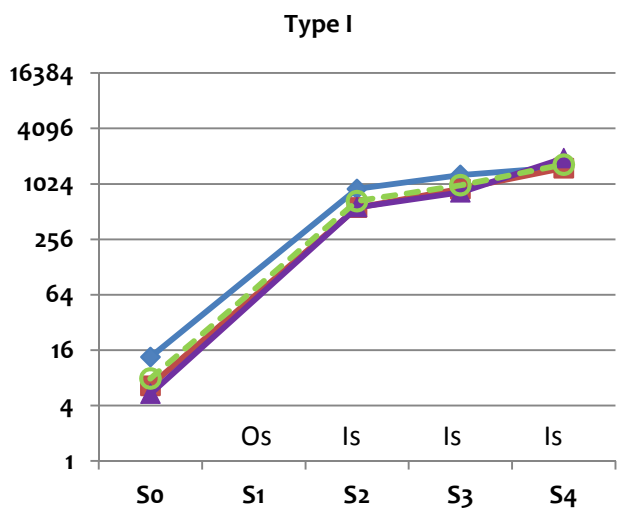
図8-1  
Group D

解析データ : Polio\_Ab\_Ver3(130517).xls

Sabin Strain

幾何平均抗体価

抗体保有割合(%)



○ : Entier;   ◆ : Age (month) < 3;   ■ : 3 - 4;   ▲ : ≥ 4.

図8-2  
Group D

解析データ : Polio\_Ab\_Ver3(130517).xls

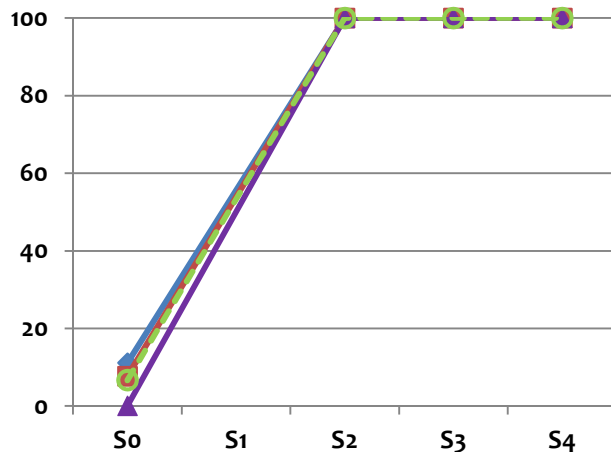
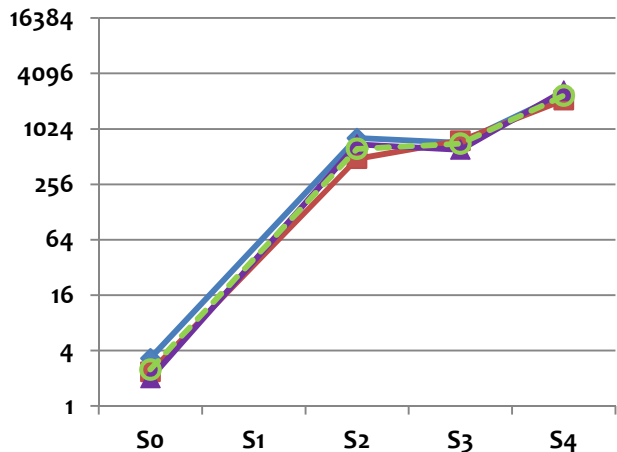
Wild Strain

幾何平均抗体価

抗体保有割合(%)

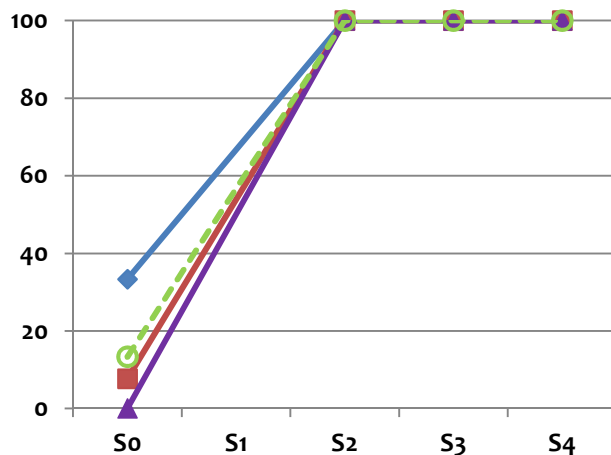
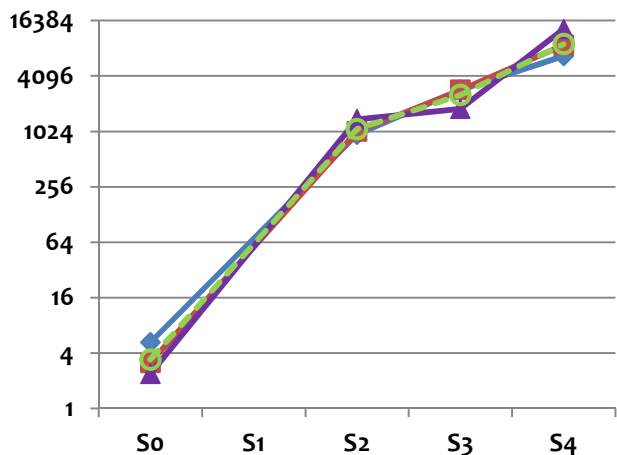
Type I

Type I



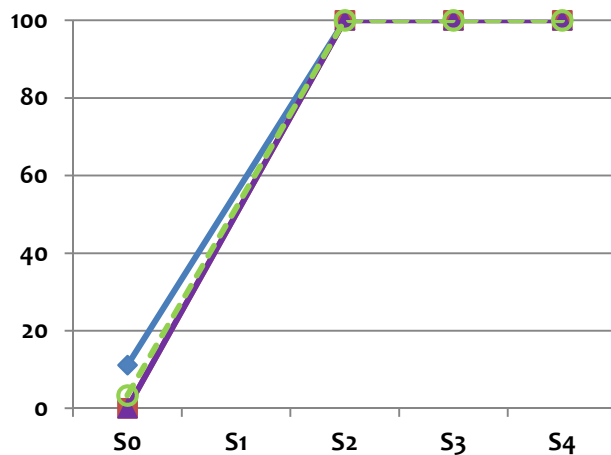
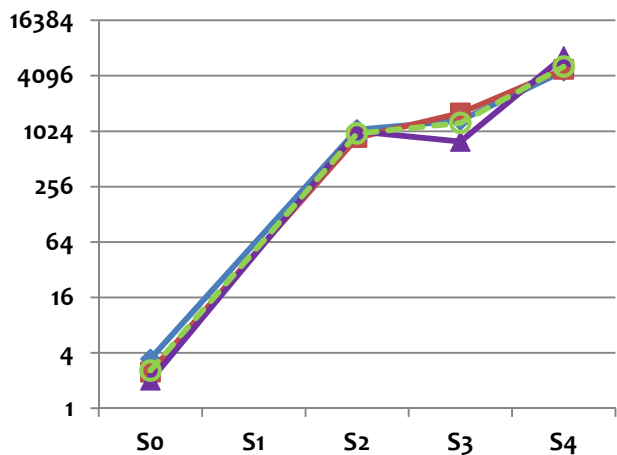
Type II

Type II



Type III

Type III



○ : Entier;   ◆ : Age (month) < 3;   ■ : 3 - 4;   ▲ : ≥ 4.