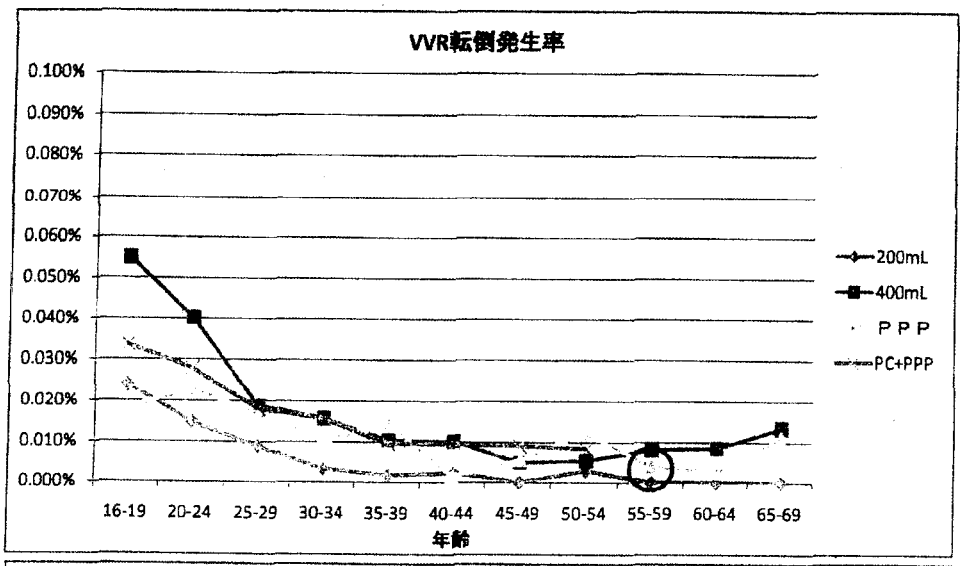
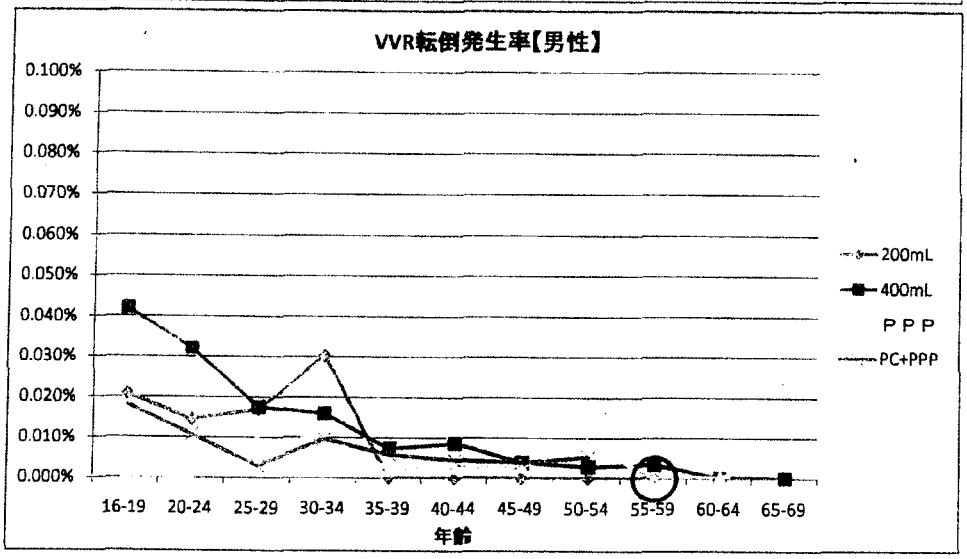
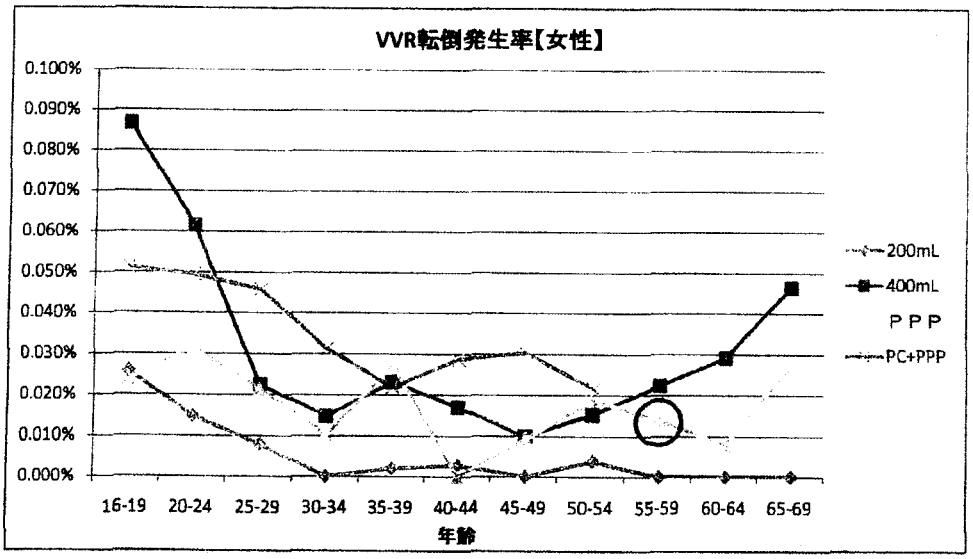
採血副作用発生率(年齢別・性別・採血種類別:平成19年度)





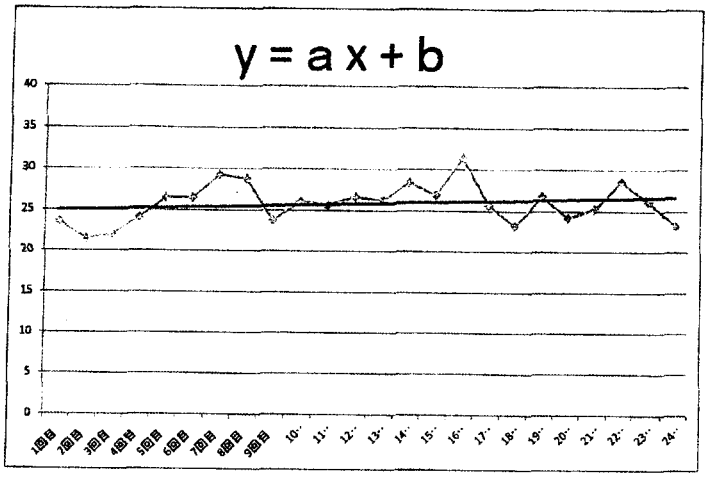


血小板数の推移

対象献血者　　：血小板献血を4年間で24回以上実施した献血者
対象データ　　：追跡開始から24回分のデータ(24回以上でも最初の24回分)

各対象献血者の24回分のデータから回帰直線を作成し、傾き(a)を求めた。

献血回数による血小板数の変化(全献血者)

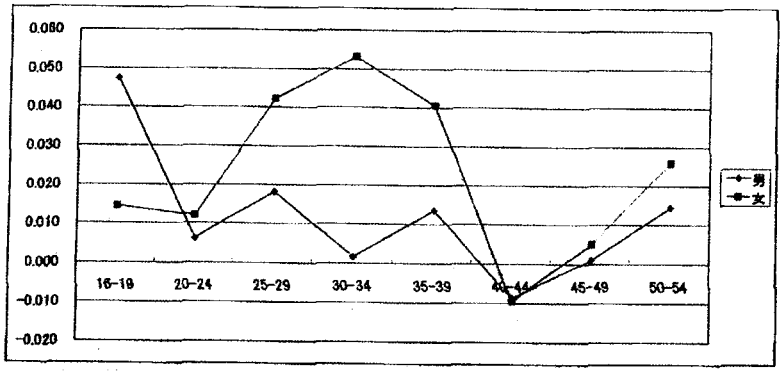


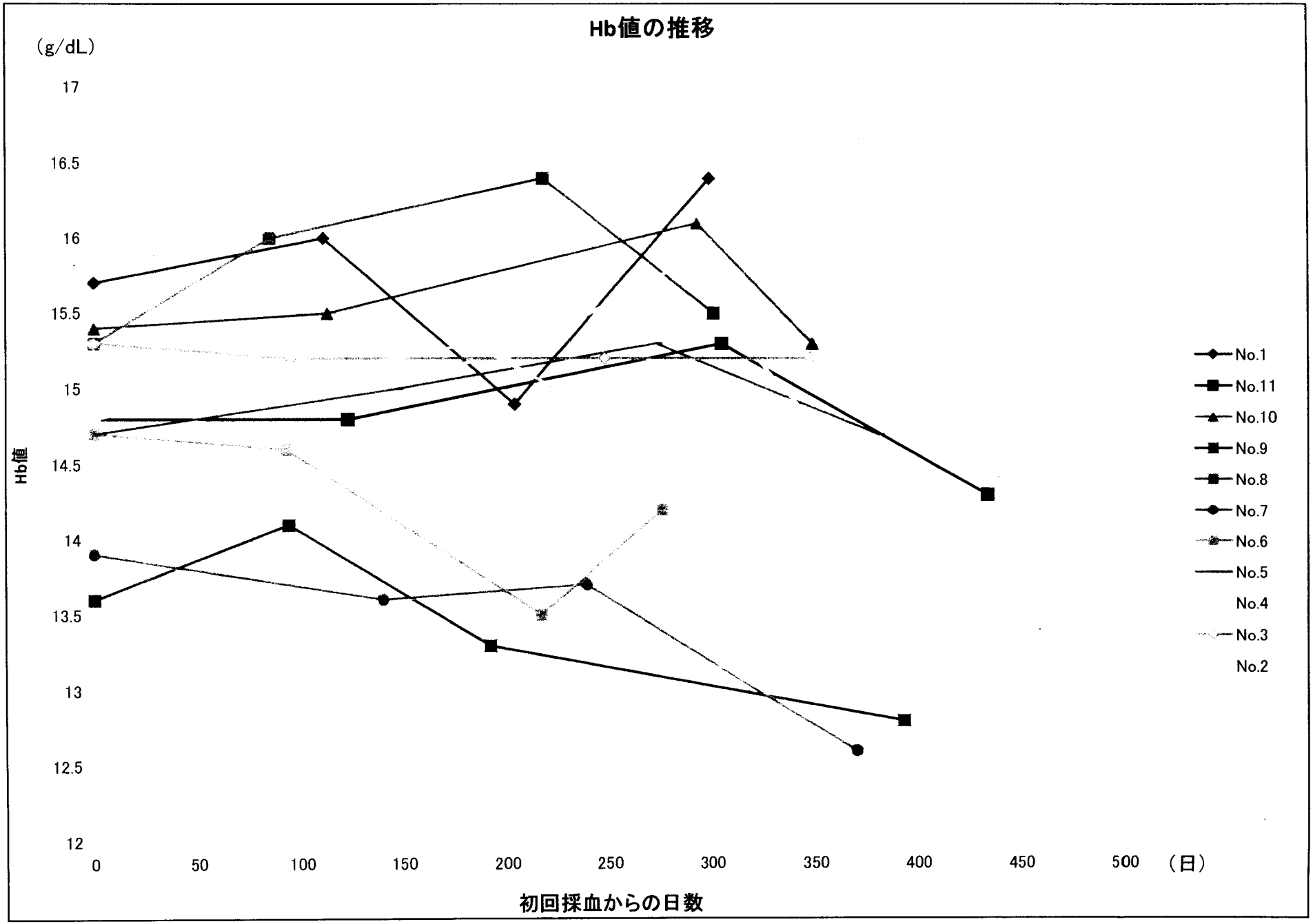
傾きaの加齢による変化

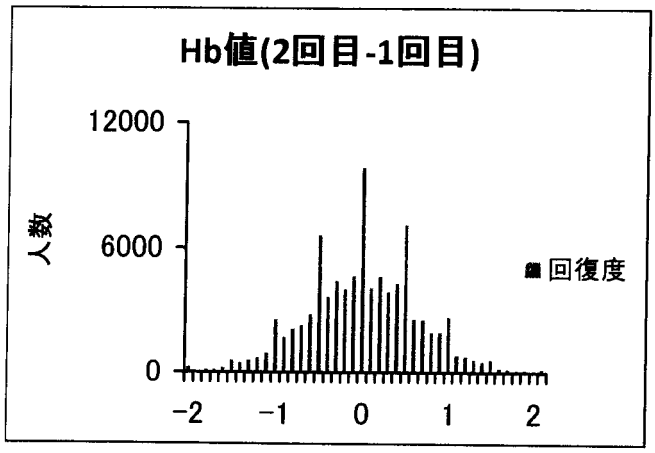
傾き(a)

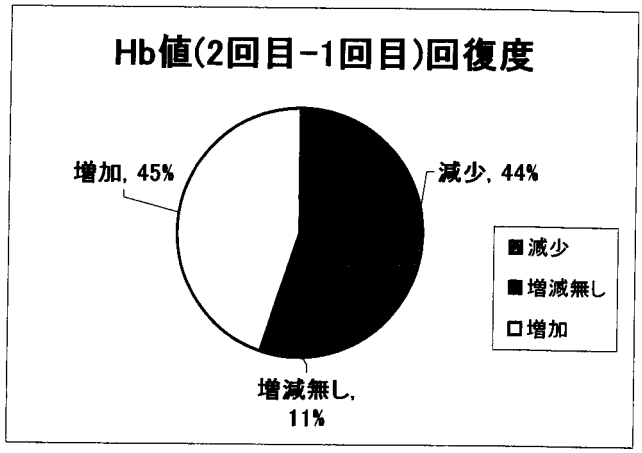
		PT(計)	16-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
合計	n	2737	88	324	479	538	467	410	321	110
	平均	0.010	0.042	0.007	0.021	0.008	0.016	-0.009	0.001	0.016
	SD	0.102	0.121	0.101	0.099	0.106	0.102	0.096	0.105	0.085
男	n	2403	73	270	414	473	425	364	289	95
	平均	0.007	0.047	0.006	0.018	0.002	0.014	-0.009	0.001	0.014
	SD	0.101	0.117	0.104	0.096	0.102	0.101	0.093	0.106	0.083
女	n	334	15	54	65	65	42	46	32	15
	平均	0.027	0.014	0.012	0.042	0.053	0.041	-0.010	0.005	0.026
	SD	0.111	0.140	0.088	0.110	0.124	0.106	0.116	0.100	0.100

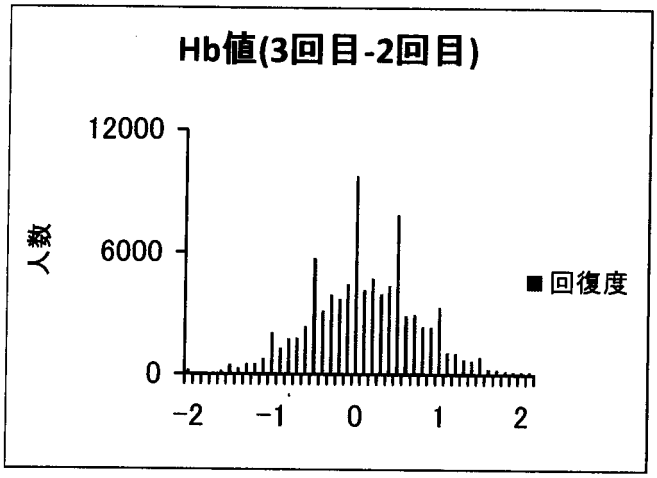
年齢	16-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
男	0.047	0.006	0.018	0.002	0.014	-0.009	0.001	0.014
女	0.014	0.012	0.042	0.053	0.041	-0.010	0.005	0.026

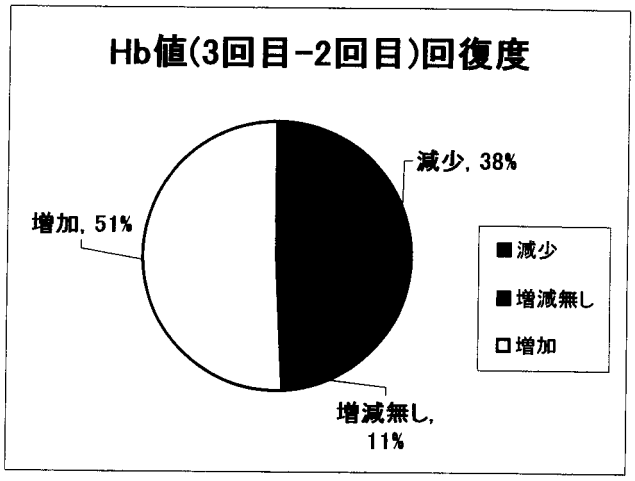


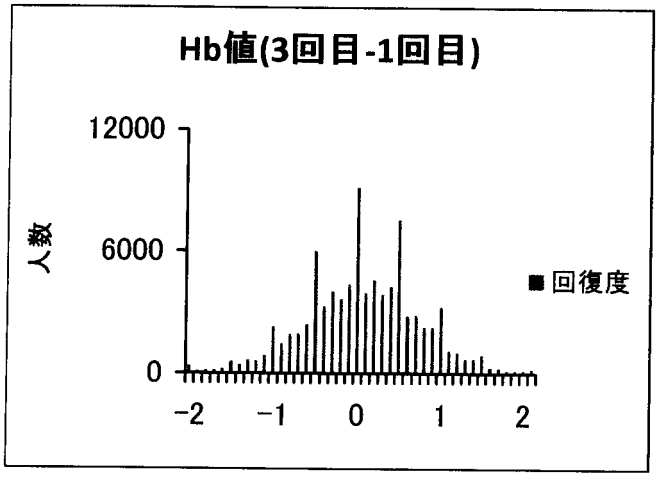

Hb値の推移
(g/dL)
17
16.5
16
15.5
15
14.5
14
13.5
13
12.5
12
Hb値
0
50
100
150
200
250
300
350
400
450
500
(日)
初回採血からの日数
No.1
No.11
No.10
No.9
No.8
No.7
No.6
No.5
No.4
No.3
No.2

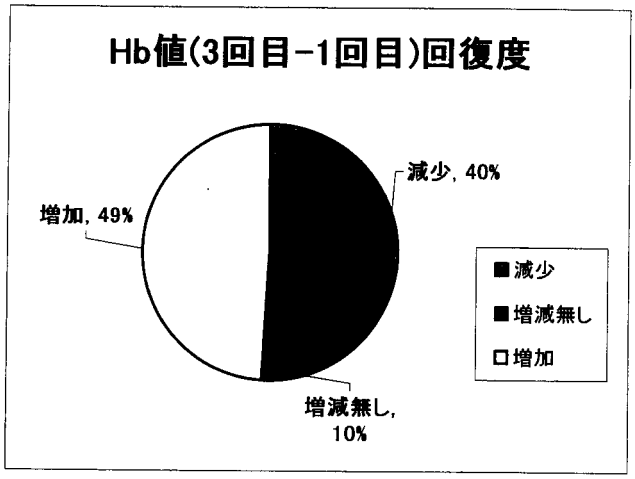

Hb値(2回目-1回目)
12000
6000
0
人数
-2
-1
0
1
2
回復度


Hb値(2回目−1回目)回復度
増加, 45%
減少, 44%
増減無し,
11%
減少
増減無し
増加


Hb値(3回目-2回目)
12000
6000
0
人数
-2
-1
0
1
2
回復度


Hb値(3回目−2回目)回復度
減少, 38%
増加, 51%
増減無し,
11%
減少
増減無し
増加


Hb値(3回目-1回目)
12000
6000
0
人数
-2
-1
0
1
2
回復度


Hb値(3回目−1回目)回復度
減少, 40%
増加, 49%
増減無し,
10%
減少
増減無し
増加

ⅱ　副作用の発生状況については，表４－ａの各事項について，採血前，中，後（センター内に留まっている間）について問診し，さらに帰宅時調査用紙（表４－ｂ）を配付して１週間の身体状況について返答を求めた。また，対照として200ml採血者についても同様の調査を行った。

採血前所見の有無と採血中，後，１週間の副作用発生率との関係を男女別にみると，男性群では前所見有りの群でいずれもが，また女性群では前所見有り群の１週間の発生率のみが有意に高率であった。

400ml採血後にみられた副作用を，200ml採血（主に移動採血車）後のそれと比較すると，両者間には有意差が認められなかった（表５）。また，母体での200ml採血例に限って検討すると，採血中，１週間の所見には差がみられず，採血後の所見ではむしろ200ml採血例の方が有意に高率であり，また，初回400ml採血例と初回200ml採血例の比較でも採血中，直後の所見は初回200ml採血例の方が有意に高率にみられた。

ⅲ　Hb値の回復状況について検討した結果は下記のごとくである。

約３か月間隔（３か月±２週間）の採血群中の男性群では，初回採血前値に比して12か月後（４回採血後３か月目）の値は有意（$P<0.001$）に低下していた。また，女性群では初回前値と６か月後（２回採血前），初回前値と９か月後（３回採血前）との比較では，それぞれ後者が有意（$P<0.001$）に低下していた（図1,2）。約４か月間隔（４か月±２週間）の採血群においては，男女両群ともに採血前値と4か月後(2回採血前）あるいは８か月後（３回採血前）との間には有意差は認められなかった。

ⅳ　血清フェリチン値の回復状況について検討した成績は下記のごとくである。

約３か月間隔の採血群では，男女両群ともに前回

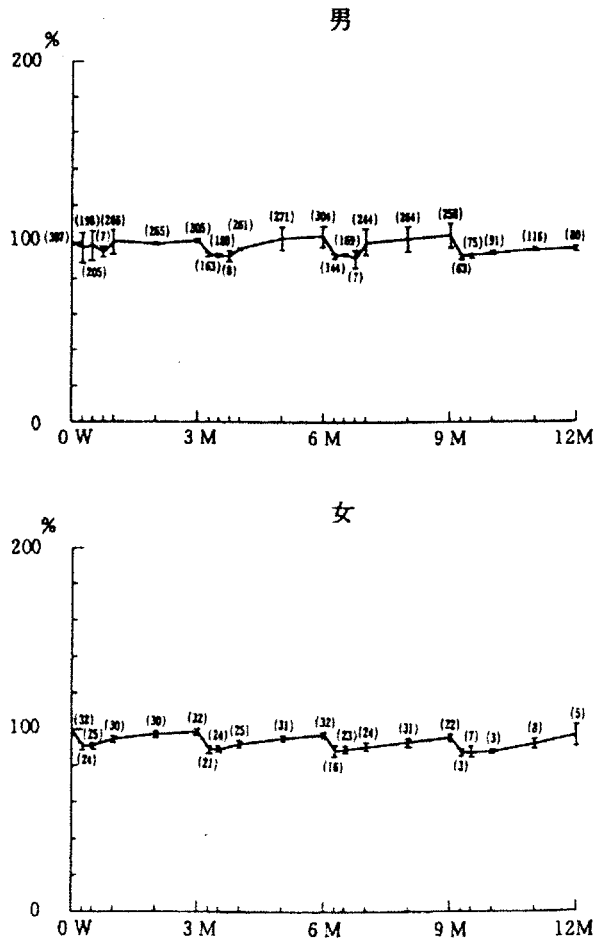


図１　３ヶ月間隔採取時のヘモグロビンの回復状況（％）

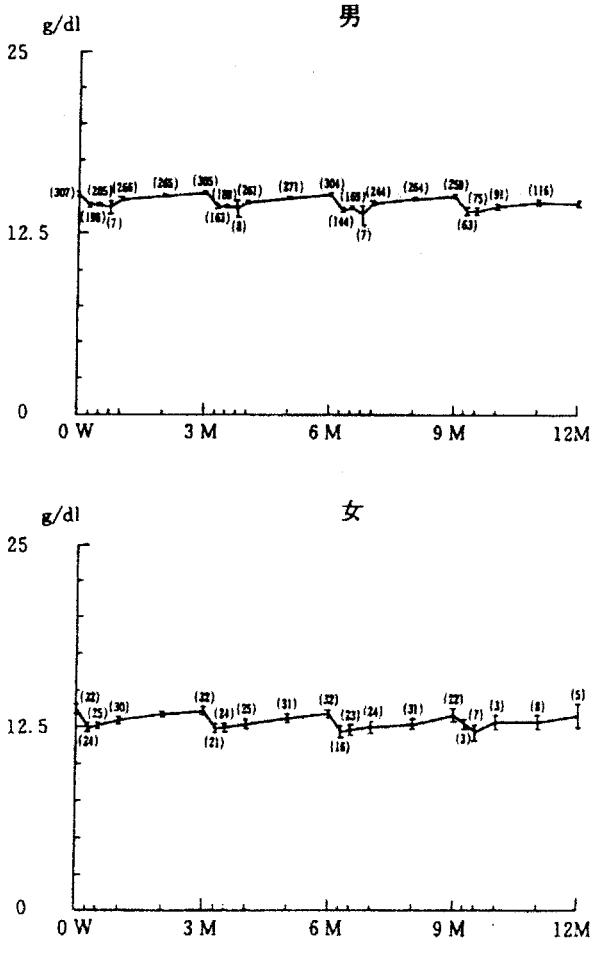


図２　３ヶ月間隔採取時のヘモグロビンの回復状況（g／dℓ）

採血前および採血後1か月毎の検査の平均値（n＝供血者数）

（M ± SD）

		n	RBC（×10⁴）	Ht（%）	Hb（g/dl）	WBC	Platelet（×10⁴）	Serum Fe（μg/dl）	Ferritin（ng/ml）
0	400 ml 採血前	16	520.6 ± 34.7	46.0 ± 2.7	[illegible]	6562 ± 2072	25.3 ± 5.7	153.5 ± 54.6	70.5 ± 41.2
1	1か月前	15	495.4 ± 30.7	45.3 ± 2.6	15.1 ± 0.7	6020 ± 1544	25.7 ± 4.8	114.8 ± 29.0	42.3 ± 27.6
2	2か月後	15	503.8 ± 27.2	46.1 ± 2.0	15.2 ± 0.5	6020 ± 1299	25.1 ± 4.9	137.0 ± 34.6	43.1 ± 24.3
3	400 ml採血3か月後	13	495.7 ± 35.4	45.3 ± 2.4	[illegible]	6738 ± 1448	22.5 ± 4.0	155.5 ± 29.4	50.4 ± 23.9
4	4か月後	11	485.4 ± 35.7	44.2 ± 1.5	15.0 ± 0.7	5563 ± 1254	22.0 ± 4.6	144.0 ± 37.8	35.0 ± 19.6
5	5か月後	9	498.7 ± 30.0	45.4 ± 2.4	15.5 ± 0.9	6044 ± 1045	21.7 ± 7.8	129.8 ± 32.4	57.1 ± 31.3
6	400ml採血6か月後	11	518.2 ± 25.2	47.0 ± 2.8	[illegible]	5900 ± 1238	25.1 ± 4.2	100.6 ± 18.2	42.3 ± 20.4
7	7か月後	7	496.1 ± 15.4	44.8 ± 2.2	14.9 ± 0.7	6300 ± 1800	23.7 ± 3.4	133.7 ± 51.0	43.5 ± 12.2
8	8か月後	8	518.5 ± 26.0	47.5 ± 2.8	15.5 ± 0.9	6025 ± 796	24.2 ± 7.3	157.3 ± 65.8	36.2 ± 16.0
9	9か月後	7	513.2 ± 17.8	45.8 ± 2.3	15.4 ± 0.7	7626 ± 1411	25.2 ± 4.1	153.4 ± 55.4	35.2 ± 21.0

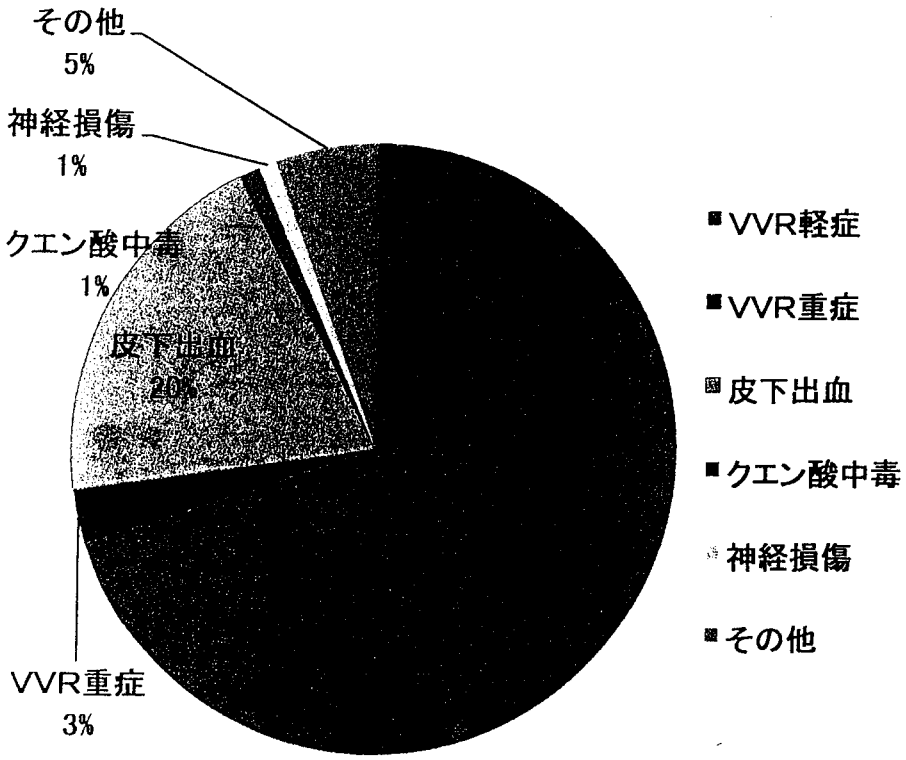
400 ml 採血平均値（男性）

★ P＜0.05

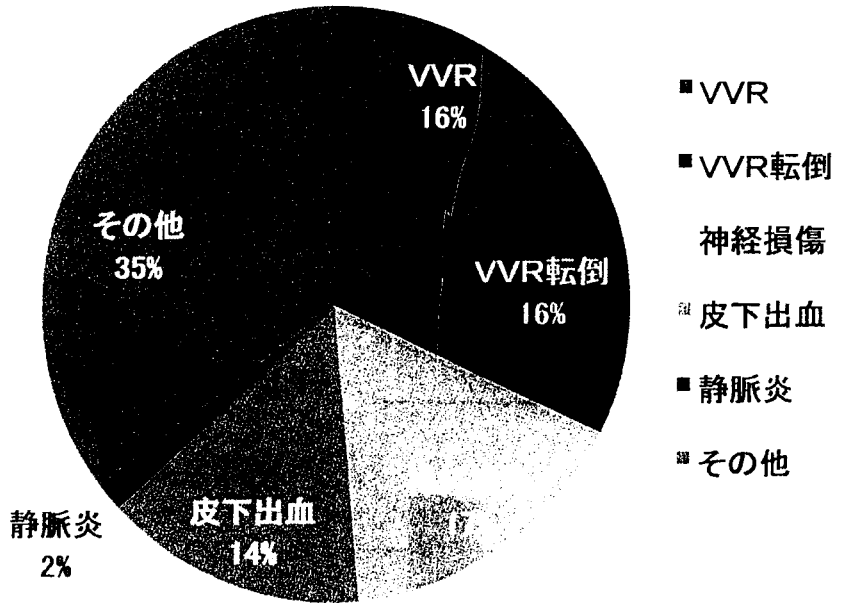
	1回目採血	1M後	2M後	2回目採血	1M後	2M後	3回目採血	1M後	2M後	3M後	6M後
血圧	124 ±10.2 / 72.5 ±5.3 n＝4	121.5 ±20.3 / 78.5 ±14.8 n＝4	134 ±14.5 / 94 ±9.9 n＝4	125 ±12.9 / 85.5 ±6.0 n＝4	140 ±17.8 / 87.3 ±9.1 n＝4	133 ±7.4 / 94.5 ±4.4 n＝4	133 ±9.3 / 85.5 ±9.6 n＝4	129 ±7.6 / 82 ±2.8 n＝4	123.5 ±7.9 / 77 ±11.9 n＝4	130 ±8.2 / 84 ±7.1 n＝4	129.5 ±11.5 / 87 ±12.1 n＝4
脈拍		81.8±7.5 n＝4	78±8.5 n＝4	70±10.6 n＝4	85.3±15.5 n＝4	79±6.8 n＝4	76.5±9.0 n＝4	72.5±5.7 n＝4	67.5±9.0 n＝4	73.8±10.0 n＝4	81.0±18.0 n＝4
比重	1.056 n＝4	1.058±0.0005 n＝4	1.057±0.001 n＝4	1.059＋0.0008 n＝4	1.058±0.001 n＝4	1.059 n＝4	1.058±0.001 n＝4	1.059±0.001 n＝4	1.059±0.002 n＝4	1.060 n＝4	1.057±0.0015 n＝4
WBC ×10³	5.45±1.5 n＝4	5.55±0.4 n＝4	5.30±0.4 n＝4	6.0±2.6 n＝4	8.03±1.9 n＝4	5.33±0.8 n＝4	5.88±0.7 n＝4	5.48±1.0 n＝4	5.6±1.2 n＝4	7.13±1.4 n＝4	5.2±0.8 n＝4
RBC ×10⁶	4.945±0.2 n＝4	5.08±0.2 n＝4	4.985±0.3 n＝4	5.12±0.4 n＝4	4.76±0.3 n＝4	5.058±0.3 n＝4	4.715±0.3 n＝4	4.908±0.2 n＝4	4.905±0.3 n＝4	5.18＋0.3 n＝4	5.298±0.3 n＝4
Hb g/dl	16.6±0.7 n＝4	15.7±0.8 n＝4	15.2±0.5 n＝4	15.8±1.1 n＝4	14.8±0.8 n＝4	15.7±0.4 n＝4	★14.5±0.4 n＝4	15.0±0.5 n＝4	15.2±0.1 n＝4	16.1±0.3 n＝4	16.4±0.5 n＝4
Ht %	44.7±2.0 n＝4	46.4±1.8 n＝4	46.1±0.9 n＝4	47.4±3.3 n＝4	45.1±1.5 n＝4	47.3±1.3 n＝4	44.0±0.6 n＝4	46.1±1.5 n＝4	45.6±0.8 n＝4	★47.5±0.5 n＝4	★49.1±2.3 n＝4
P.LT ×10⁴	25.0±2.5 n＝4	30.4±4.2 n＝4	26.9±1.0 n＝4	26.2±3.4 n＝4	25.4±1.6 n＝4	27.3±3.9 n＝4	28.7±4.0 n＝4	27.4±4.2 n＝4	27.9±3.6 n＝4	26.7±3.2 n＝4	28.1±2.4 n＝4
Fe μg/dl	167±37.9 n＝4	144±41.2 n＝4	167.5±51.0 n＝4	121±15.2 n＝4	177.5±32.6 n＝4	178.5±21.9 n＝4	★112.5±18.1 n＝4	172.8±89.7 n＝4	★107.8±26.7 n＝4	118.3±25.3 n＝4	114.5±21.5 n＝4
鉄結合能 mcg/dl	364±37.2 n＝4	386±30.9 n＝4	396±24.9 n＝4	410±35.4 n＝4	386±38.3 n＝4	416±23.6 n＝4	394±57.5 n＝4	399±51.4 n＝4	396±41.6 n＝4	411±44.7 n＝4	386±39.4 n＝4
フェリチン ng/ml	89.9±32.9 n＝4	59.2±34.7 n＝4	59.2±24.1 n＝4	55.2±22.9 n＝4	★34.6±15.8 n＝4	45.2±26.5 n＝4	★38.7±18.6 n＝4	★19.6±7.2 n＝4	★24.5±13.2 n＝4	★39.3±24.1 n＝4	★41.5±15.0 n＝4

年令　21.3±1.0 才
身長　172±2.0 cm
体重　60.3±1.7 kg

採血副作用件数
（平成18年度）



医療機関に受診した採血副作用件数
（平成18年度）



副作用種類	VVR軽症	VVR重症	皮下出血	クエン酸中毒	神経損傷	その他	合計
発生件数	37,257	1,553	10,433	581	469	2,953	53,246
発生率(%)	0.75	0.03	0.01	0.21	0.01	0.06	1.07

副作用種類	VVR	VVR転倒	神経損傷	皮下出血	静脈炎	その他	合計
発生件数	118	114	120	105	12	256	725
発生率(%)	0.002	0.002	0.002	0.002	0.000	0.005	0.015

＊副作用1～5

採血副作用には、本採血前（不採血）の副作用も含む。

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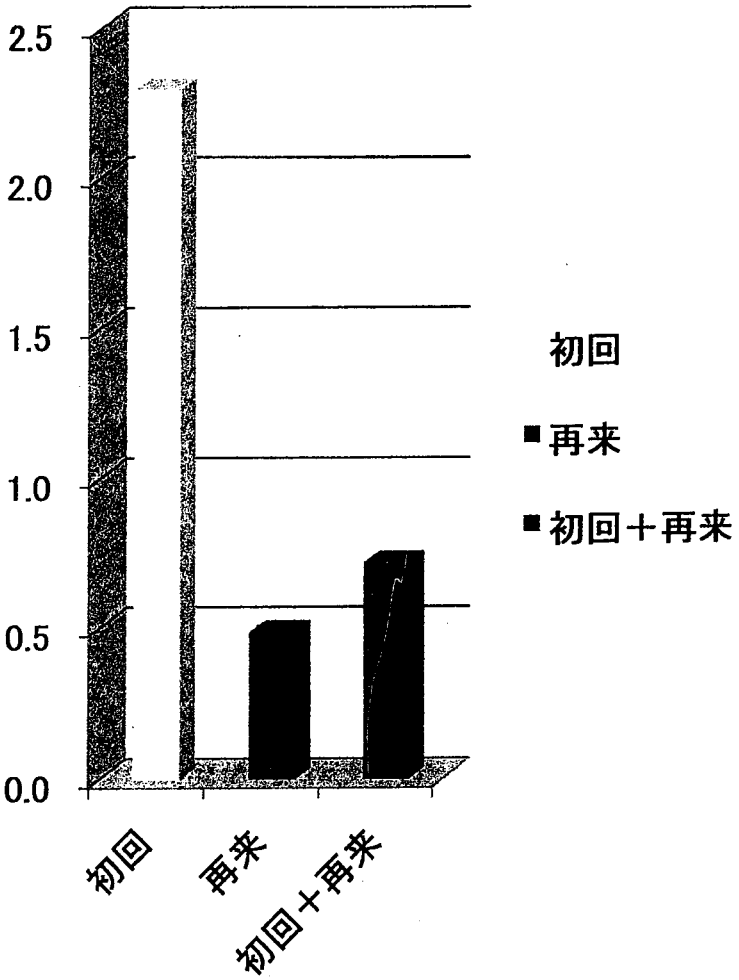
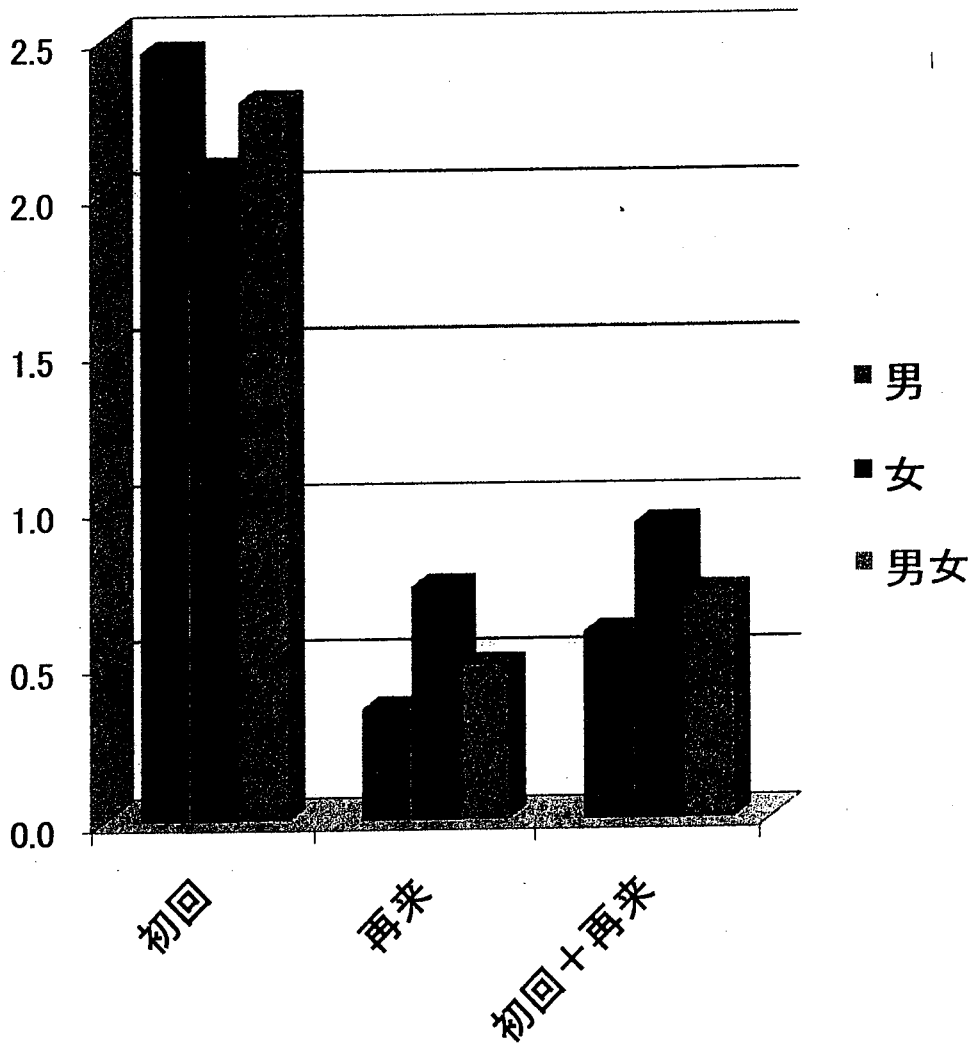
初回･再来とVVR発生率

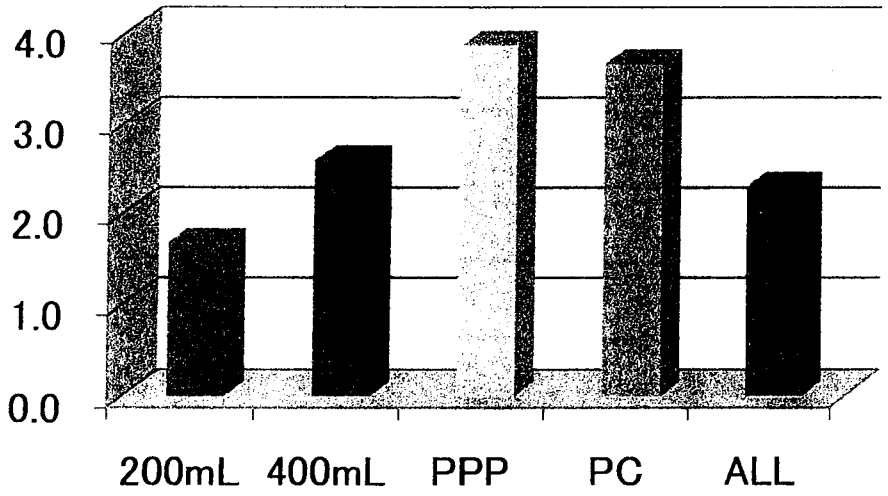




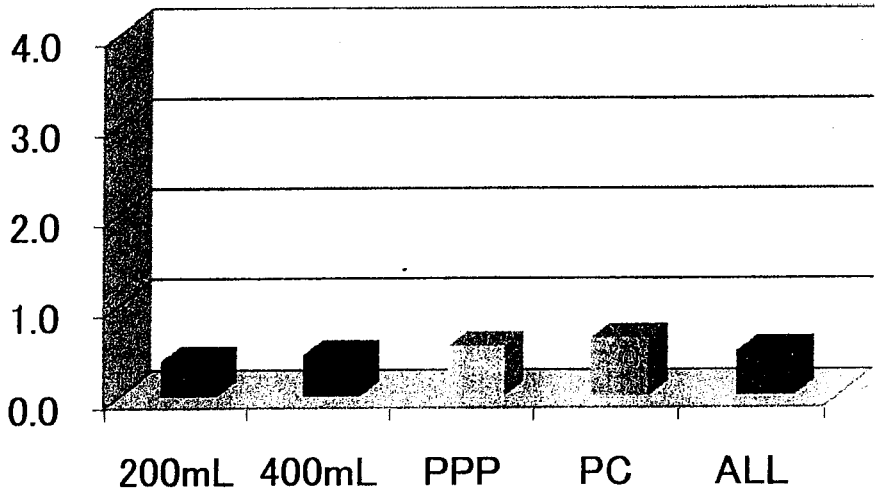
平成18年1月～平成18年12月

Japanese Red Cross Society

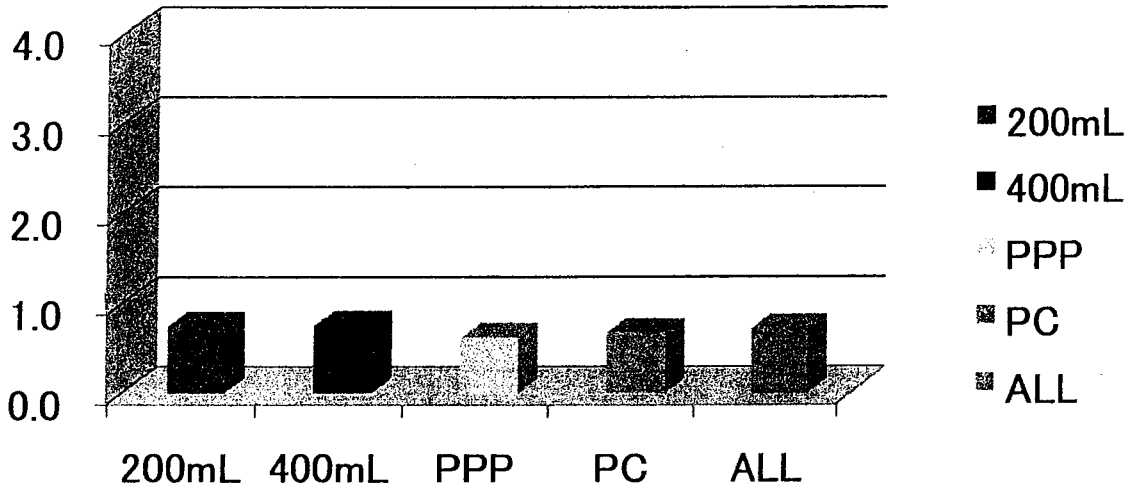
初回VVR発生率(%)



再来VVR発生率（%）



初回再来VVR発生率(%)



平成18年1月～平成18年12月

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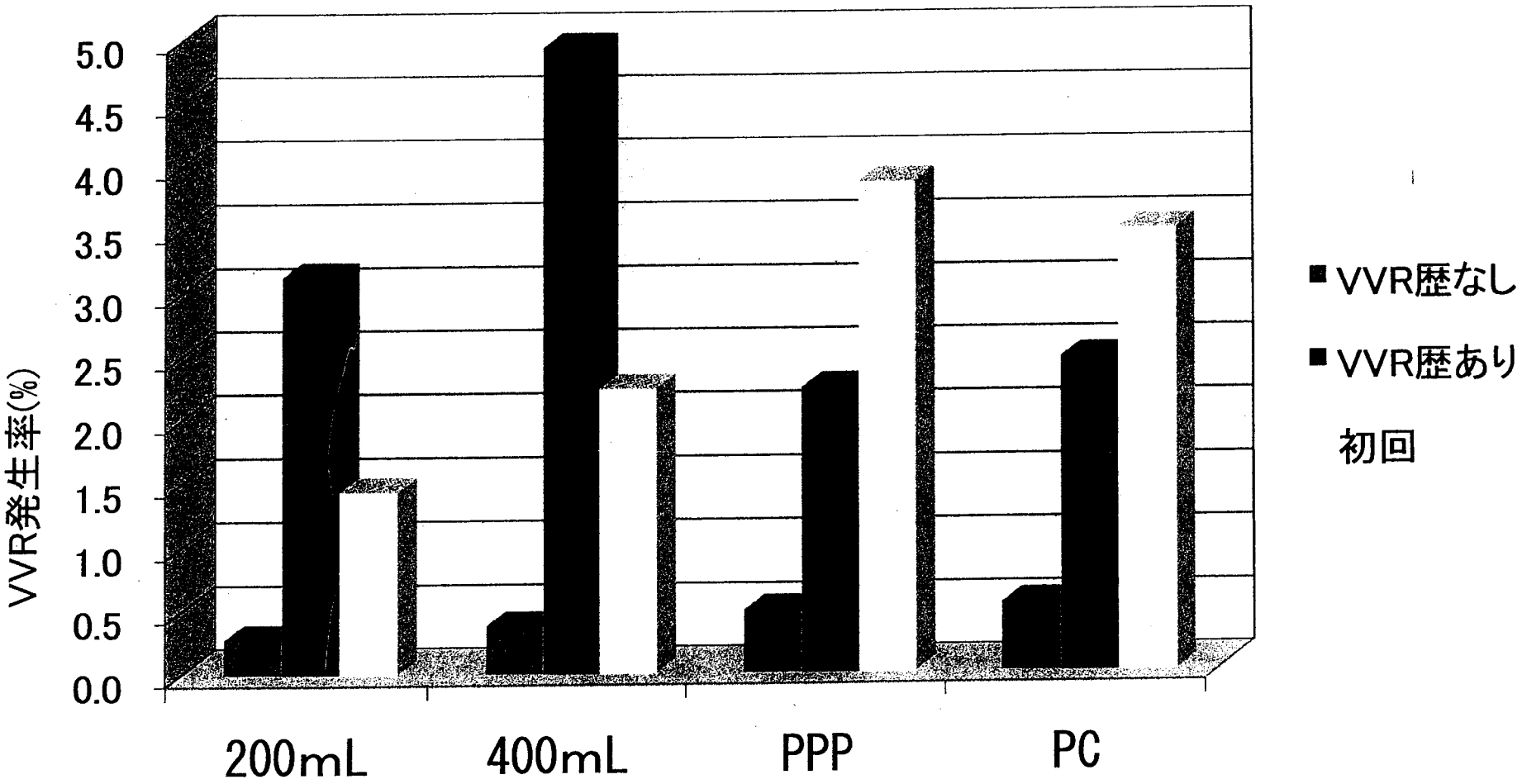
初回献血者、VVR歴あり献血者のVVR発生率(%)



	VVR歴なし	VVR歴あり	初回
200mL	0.28	3.13	1.43
400mL	0.38	4.93	2.23
PPP	0.50	2.24	3.85
PC	0.54	2.46	3.48

平成16年10月～平成17年9月

Japanese
Red Cross Society

WHO Technical Report Series, No. 840, 1994

Annex 2
Requirements for the collection, processing and quality control of blood, blood components and plasma derivatives (Requirements for Biological Substances No. 27, revised 1992)

Introduction

In 1976, a WHO Working Group on the Standardization of Human Blood Products and Related Substances (*1*) considered the need for international requirements for the processing and control of whole human blood and blood products. It emphasized that, as the quality of the source material played an important part in determining the quality of the final products, such requirements should cover all the stages in the process, from the collection of the source materials to the quality control of the final product. In response to the Working Group's recommendations, the Requirements for the Collection, Processing and Quality Control of Human Blood and Blood Products were published in 1978 (*2*). These Requirements were updated and revised in 1988 (*3*), and WHO recommendations concerning testing for antibodies to human immunodeficiency virus (HIV, *4*) were taken into account. This Annex contains a further revision of the Requirements, applicable to the quality control of blood, blood components and plasma derivatives.

A number of other WHO publications have dealt with whole blood and its components, among them guidelines intended mainly for blood transfusion services (*5*). Guidelines of a more general nature, such as the Guidelines for National Authorities on Quality Assurance for Biological Products, have also been published (*6*). The latter call for a quality-assurance system based on the existence of a national structure that is independent of the manufacturer and is responsible for granting licences for biological products, defining procedures for product release and setting up a post-marketing surveillance system. These Guidelines should be followed by any country having or wishing to set up an organization for the collection and fractionation of blood and blood components.

The names of the many experts who provided advice and data taken into account in this revision of the Requirements are listed in the Acknowledgements section, page 96.

General considerations

The setting up of an organization for the collection and fractionation of human blood and blood components calls for a great deal of expertise and considerable investment. Any country contemplating the establishment of such an organization should carry out a careful cost-benefit analysis to determine whether the investment is justified. A logical developmental sequence for a comprehensive organization starts with the collection and distribution of whole blood, progressing later to the separation of whole blood into components and then the fractionation of plasma pools. It is not always possible to be specific about the details of the procedures employed, the in-process controls or the tests applied at each stage of production, in particular for whole blood and component cells. In addition, although the general principle of fractionation of plasma is well established, there are in practice numerous variations in the details of the various production steps. Therefore, any country wishing to begin the collection and fractionation of blood and blood components should send personnel for training to a plant that is operating successfully. WHO may be able to help in arranging such training.

One of the basic questions to be answered by a country considering whether to start fractionation of plasma is whether there is a suitable donor population of sufficient size to guarantee an adequate supply of source material. It is not possible to set a lower limit for the quantity of source material that would be necessary to make such an operation economic because too many factors are involved. However, in order to maintain competence in production and to avoid certain contamination risks, it is important to have sufficient source material to maintain the fractionation facility in continuous operation.

In a comprehensive organization, the greatest expense is that involved in setting up the fractionation plant, but it is also possible to regard the collection of source material and its fractionation as quite separate operations. A country may wish to establish collection centres for separating the cell components and then send the plasma to an established fractionation plant in another country, from where the products could be returned to the original country. The costs of such an operation might be less than those involved in establishing and operating a fractionation plant.

The general prevalence of certain infectious diseases, such as various forms of hepatitis and parasitic diseases, and of HIV infection differs so markedly in different geographical regions that each national authority must decide for itself whether it is cost-effective to apply the most sensitive test to each blood donation and whether it is feasible to collect suitable source material. A brief protocol for the collection of source material is in any case mandatory (see Appendix). Great emphasis should be placed on the production of fractions by a process that experience has shown results in the least risk of contamination. For example, immunoglobulin prepared by the cold ethanol fractionation method of Cohn has a well established

clinical record of being free from contamination with HIV and hepatitis B virus (HBV), as have albumin products prepared by the same method, stabilized and heated for 10 hours at 60 °C (*5*). Nevertheless, extreme care is required in manufacture to ensure that these products are free from infectious viruses, and it cannot be assumed that different fractionation methods will be equally effective. When a fractionation process is introduced or significant modifications are made to an existing production process, the process or the modifications should be validated or revalidated by appropriate procedures, including the use of marker viruses and, where applicable, special *in vitro* and *in vivo* testing.

Blood can harbour a number of different viruses, and the use of medicinal products derived from human blood has led to transmission of viruses such as HBV and HIV. The risk of virus transmission by blood and blood products can be diminished by the testing of all individual donations. Policies for mandatory testing shall be determined by the national control authority, and should be reviewed regularly and modified according to the current state of knowledge.

Special care and appropriate measures approved by the national control authority must be taken to protect the health of the staff of blood collection and fractionation facilities.

The transport of source materials from blood collecting centres and hospitals to fractionation facilities requires special consideration. Refrigeration at the temperature range appropriate for the product must be efficient and reliable and proved to be so by monitoring. Thermal insulation must provide an adequate safeguard against a temporary failure of refrigeration. Containers of liquid source material should be filled so as to minimize frothing due to shaking. Because of the potentially infective nature of these biological materials, suitable protection should be provided against breakage, spillage and leakage of containers.

In these Requirements, the word "human" has been omitted from the names of products derived from human blood. Products of animal origin are immunogenic, and their administration to humans should be avoided whenever equivalent products of human origin can be used instead. The proper name of any blood product of non-human origin should include the species of origin.

These Requirements consist of four parts:

- Part A. Requirements for the collection of source materials
- Part B. Requirements for single-donor and small-pool products
- Part C. Requirements for large-pool products
- Part D. National control requirements.

Each deals with a separate aspect of collection, processing and quality control, but all the parts are intended to be taken together to constitute a single document. It will not be possible to rely on any blood product unless the relevant requirements for each step are complied with, and any attempt