

從ProCyte Dx的點狀圖看世界

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IDEXX Laboratories

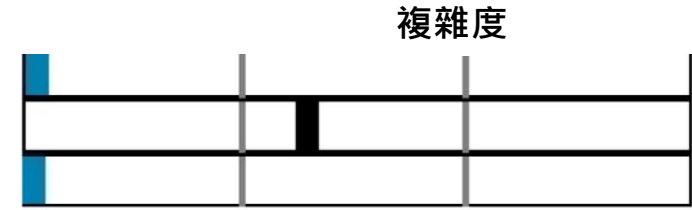
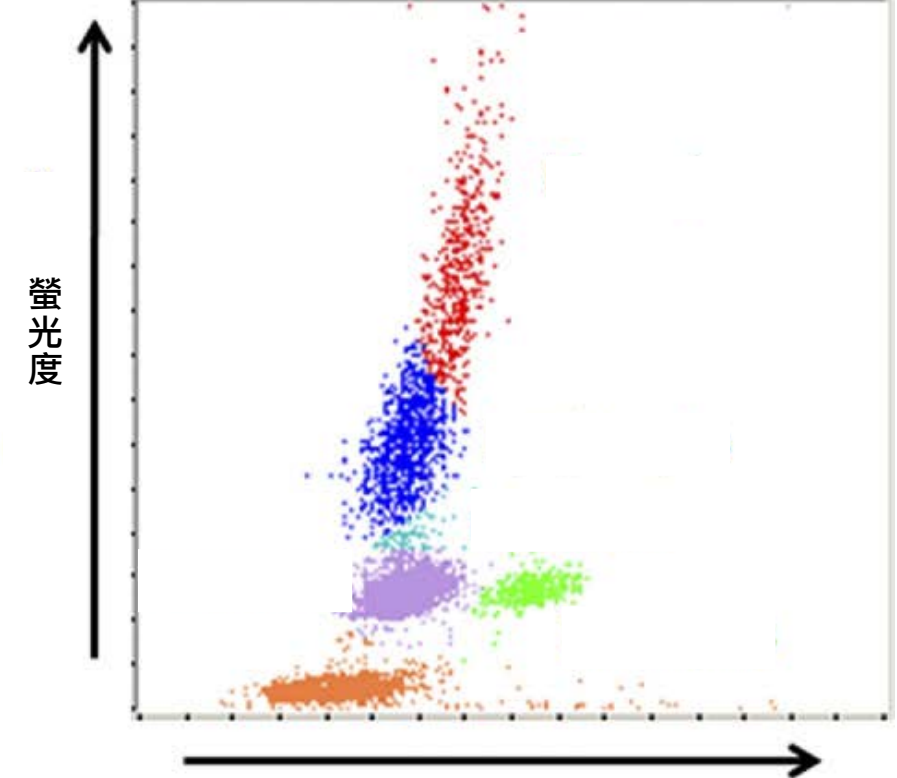
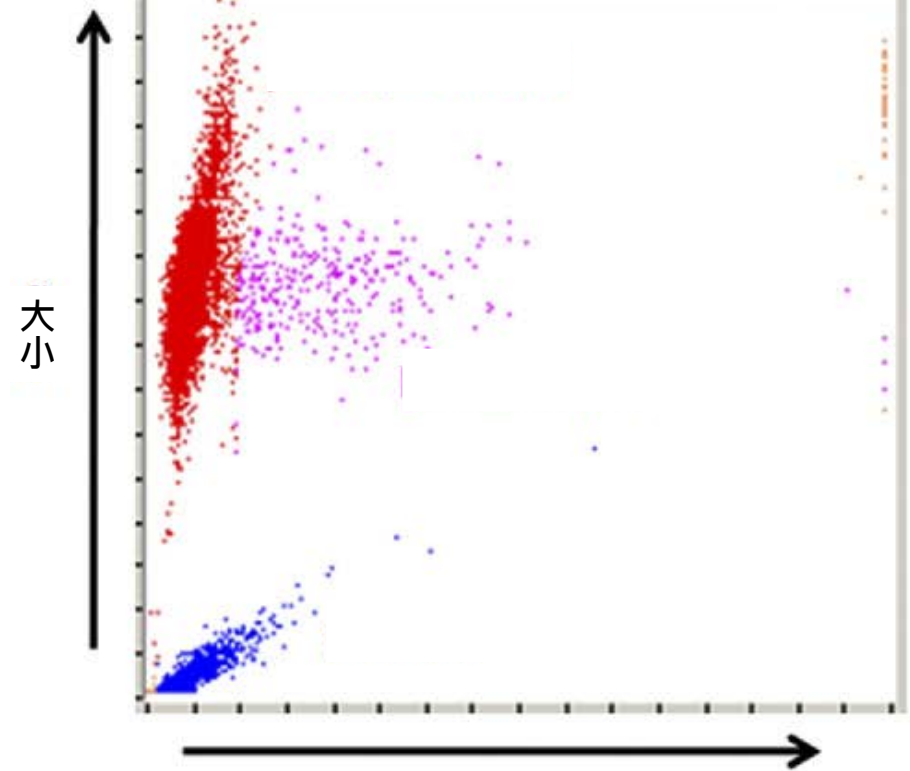
小笠原犬貓醫院

IDEXX ProCyte Dx

- 測定時間短（2分鐘）
- 能夠更正確地呈現
 - 網織球數
 - 貓的血小板總數
 - 正常犬·貓的白血球百分比
- 可經由點狀圖觀察到血球型態學上的變化

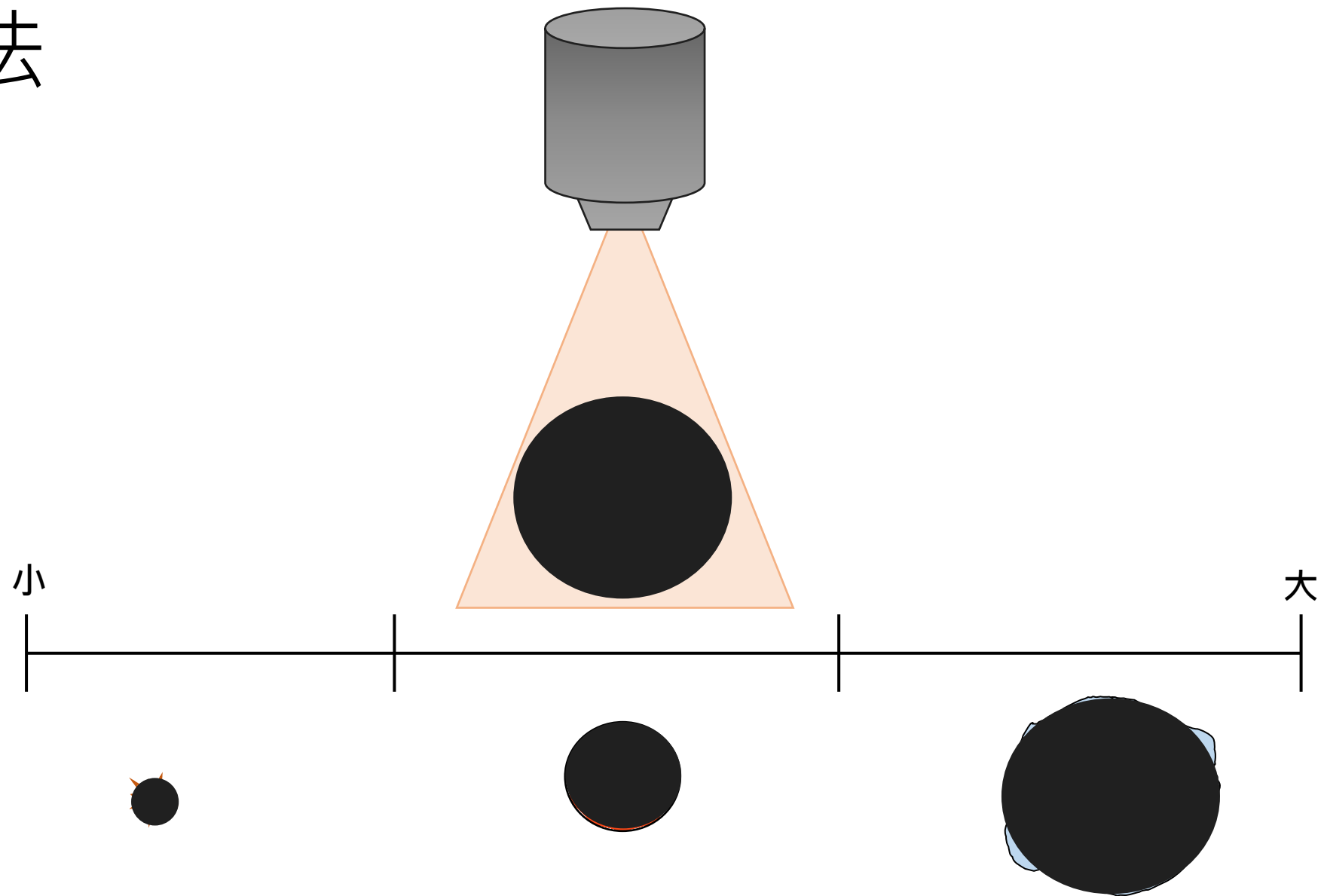


RBC	6.5 x10 ¹² /L	6.5 - 12.2	LOW
HCT	40.5 %	30.3 - 52.3	
HGB	14.8 g/dL	9.8 - 16.2	
MCV	68.0 fl	85.0 - 103.1	HIGH

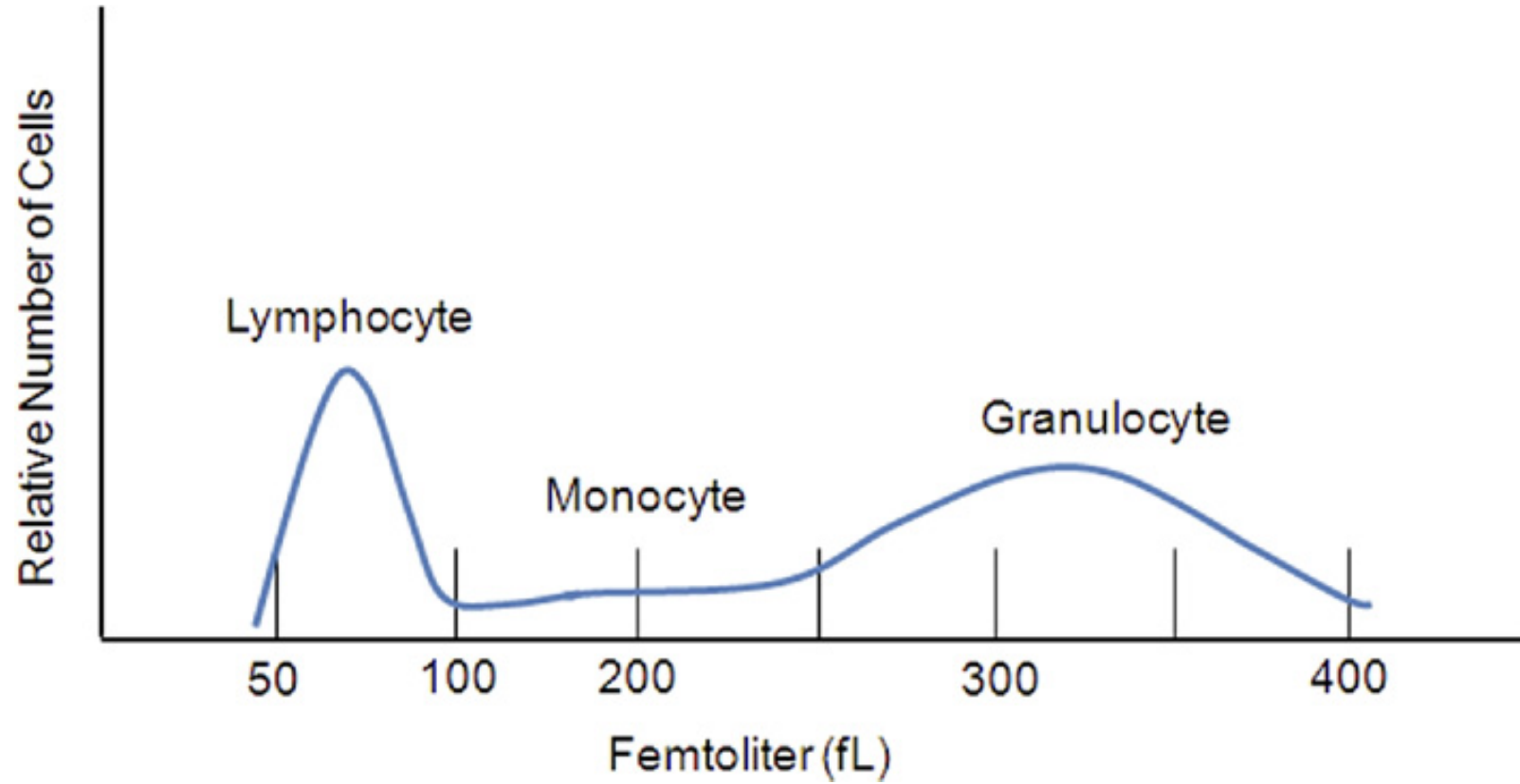


BASO	0.00 x10 ⁹ /L	0.01 - 0.26	LOW
PLT	280 K/ μ L	151 - 600	
MPV	8.8 fL	11.2 - 18.4	LOW
PDW	62.0 %		
PCT	0.2 %		

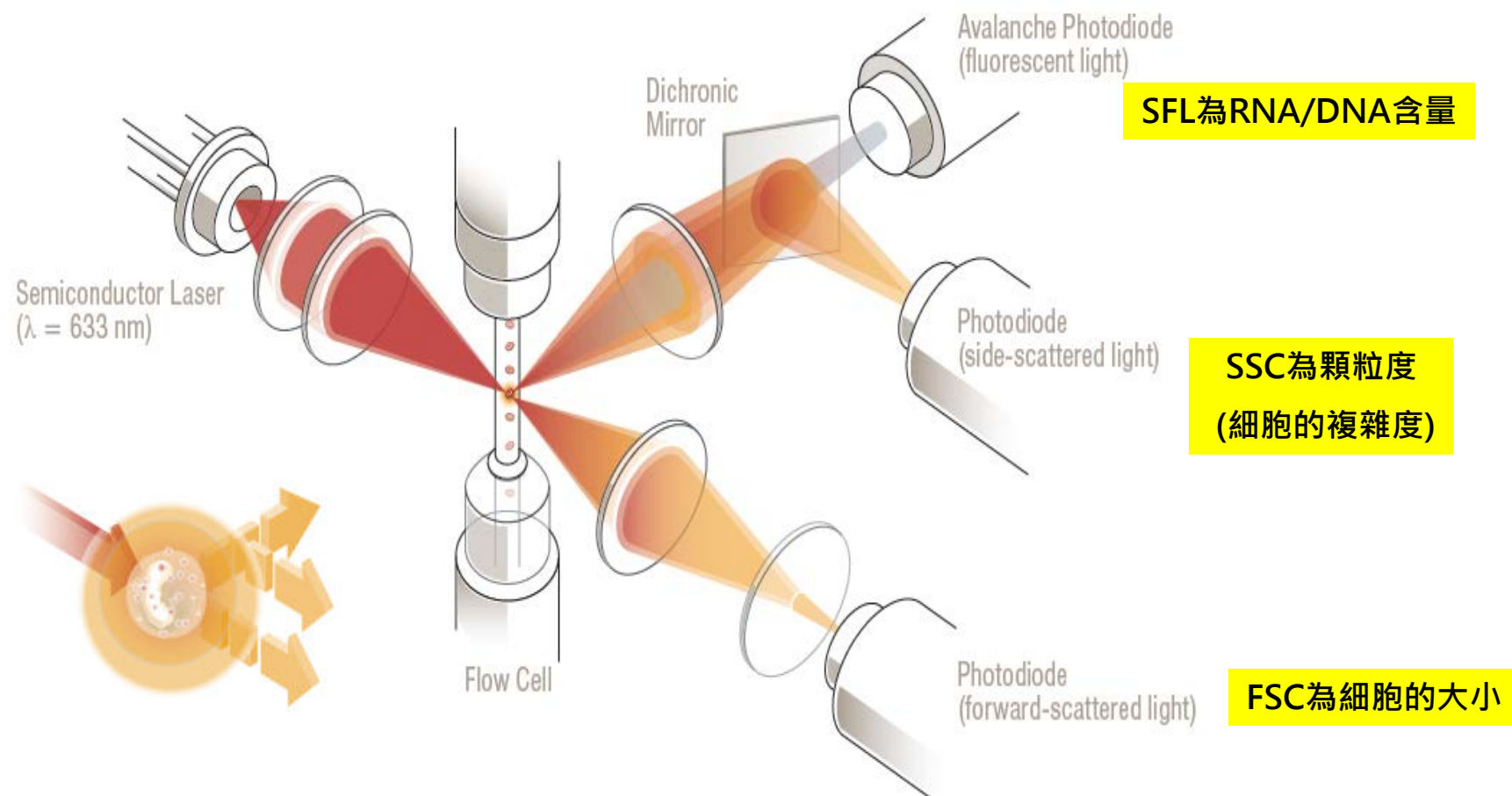
電阻抗法

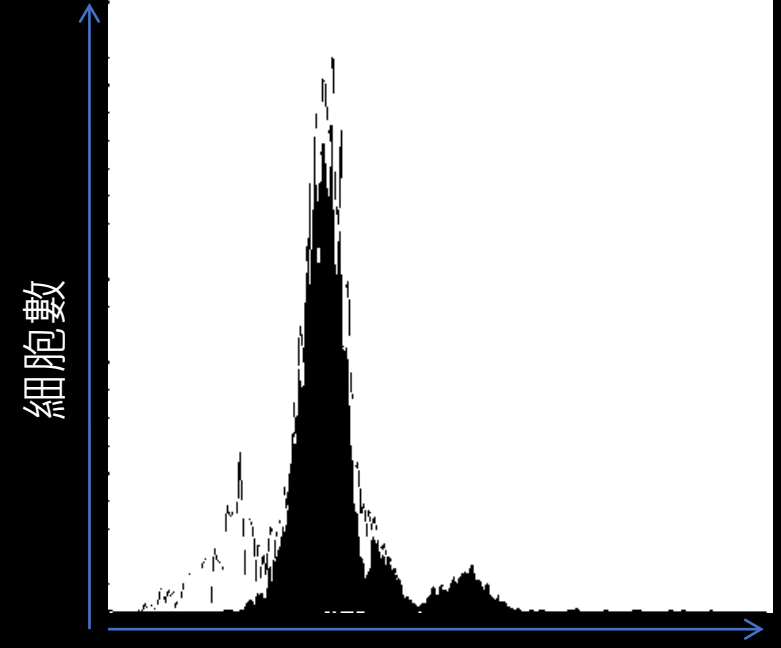
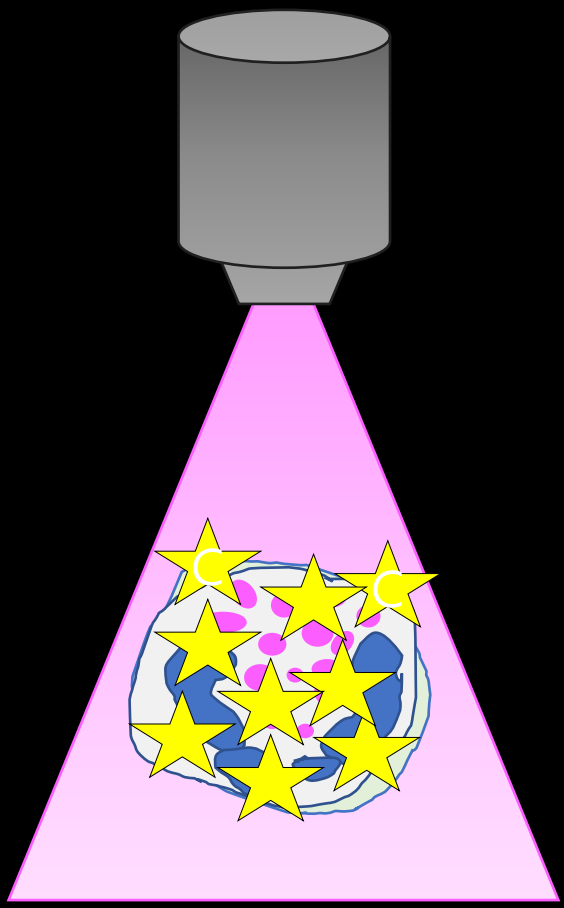


電阻抗法

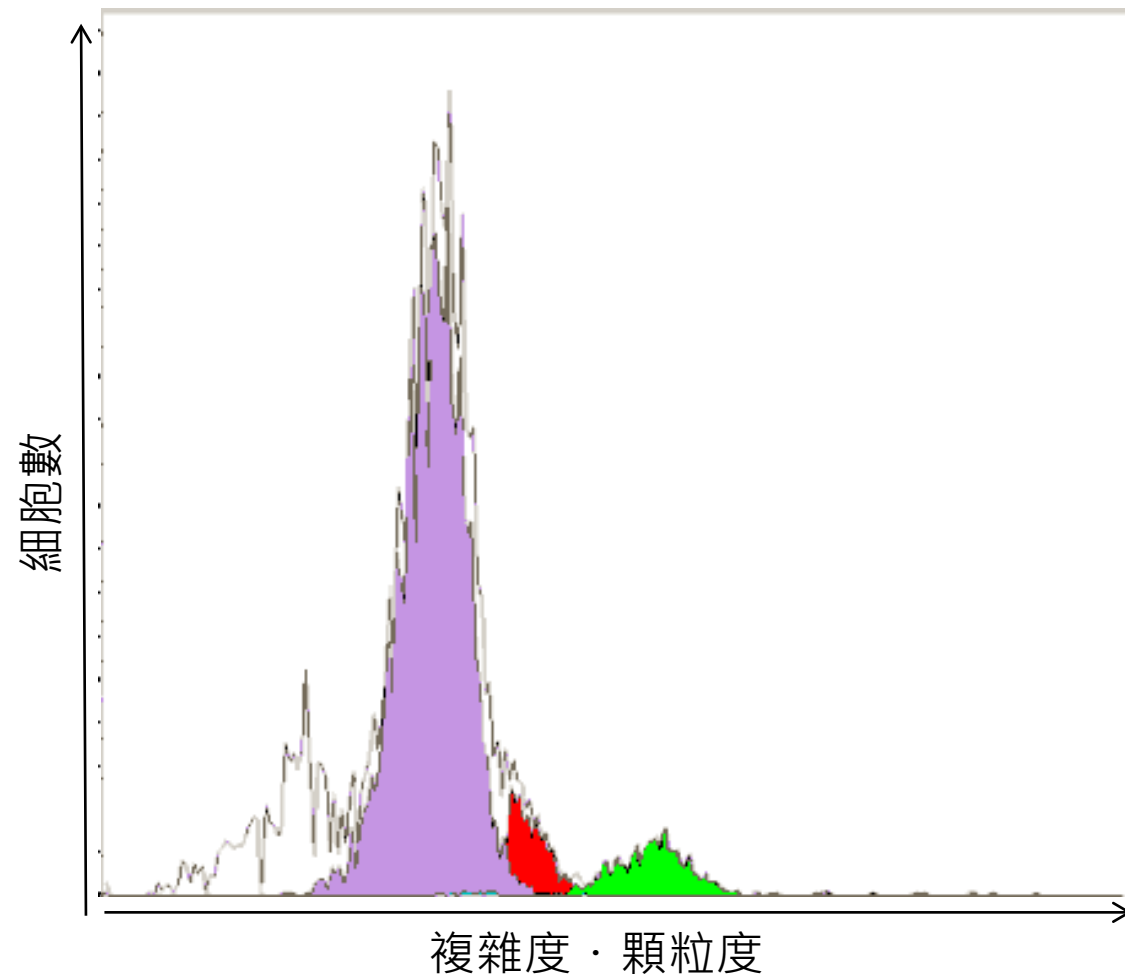


流式細胞分析法





複雜度 · 顆粒度



■嗜中性球

■單核球

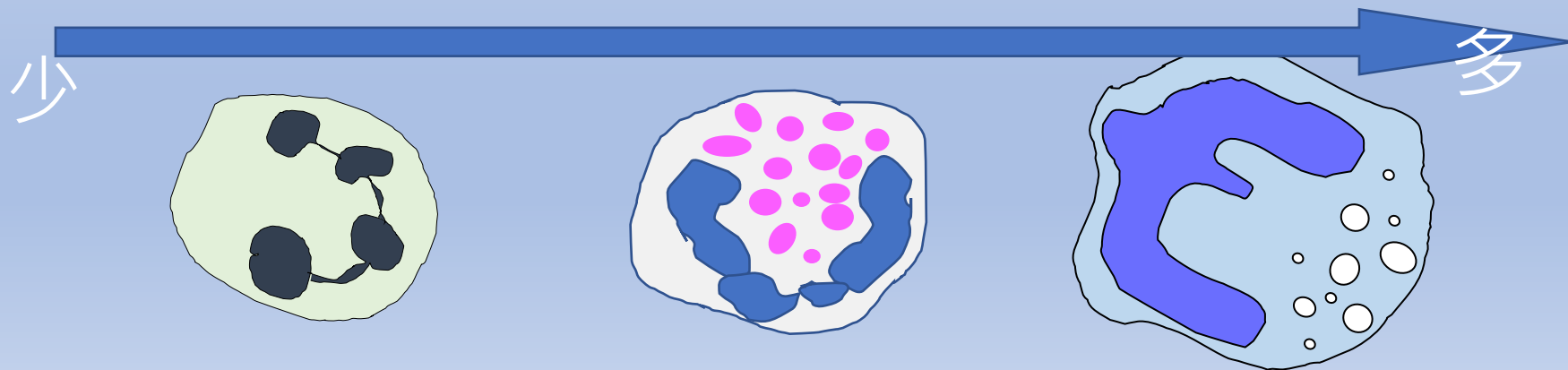
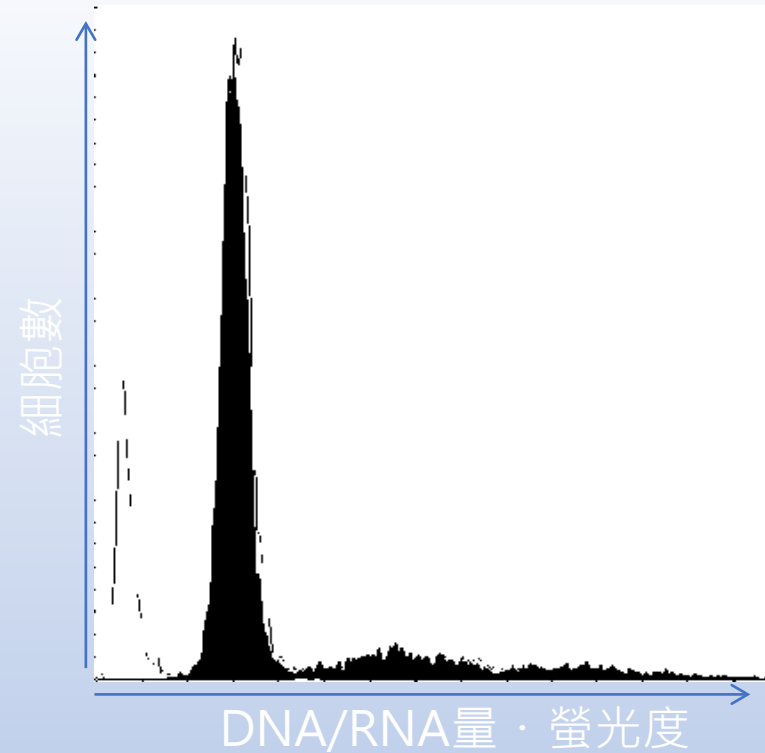
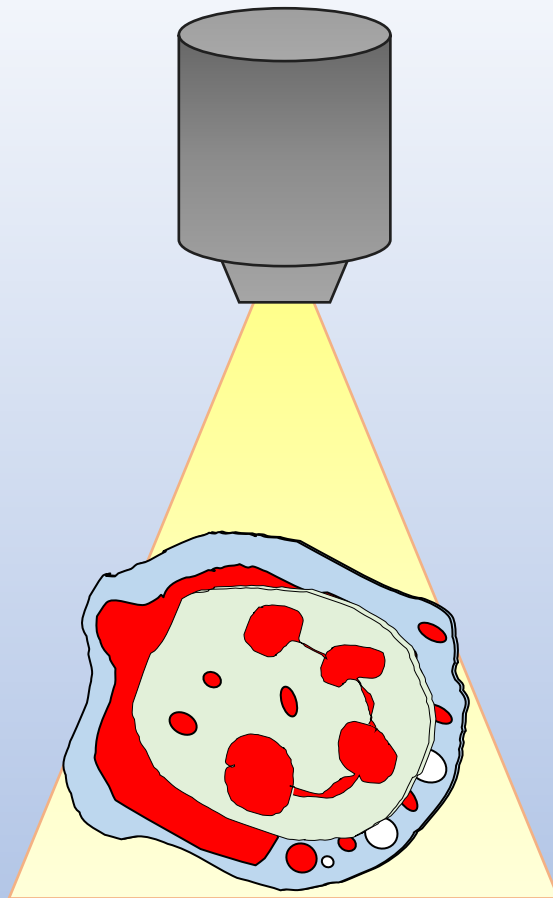
■淋巴球

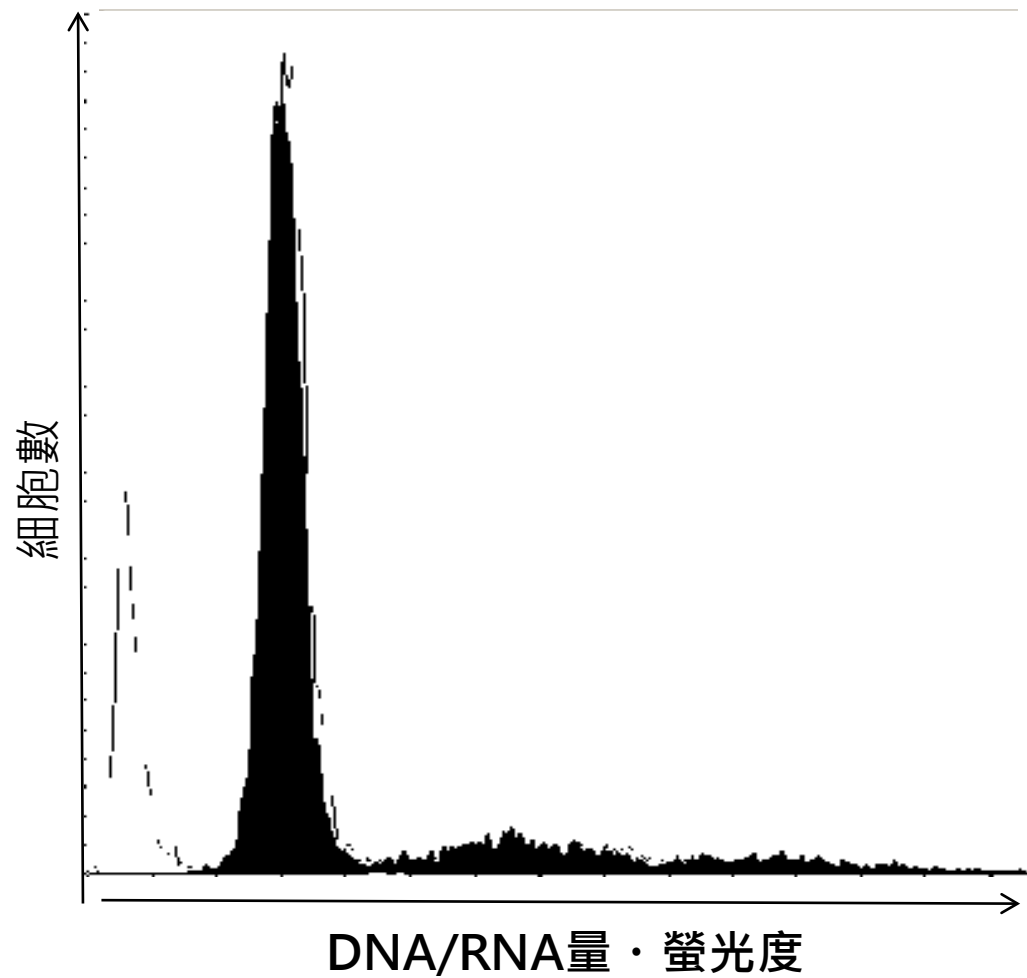
■嗜酸性球

■嗜鹼性球

■紅血球空殼







■ 嗜中性球

■ 單核球

■ 淋巴球

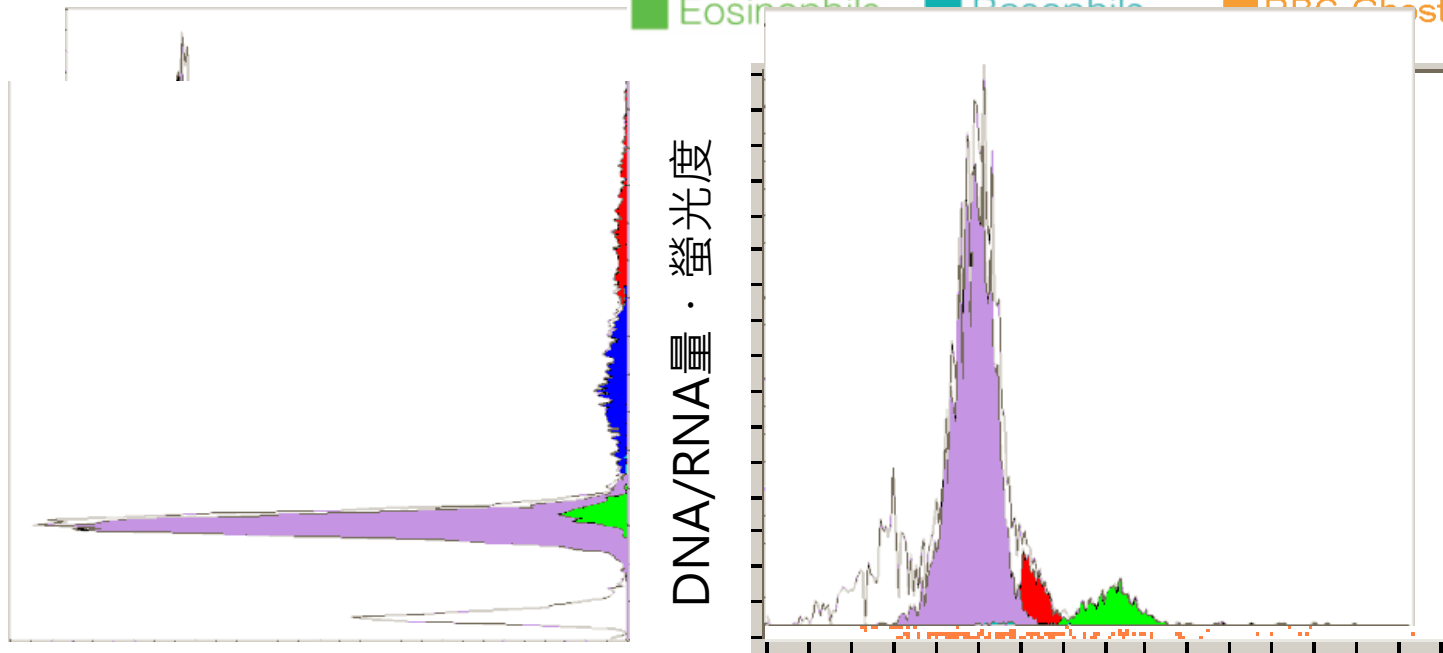
■ 嗜酸性球

■ 嗜鹼性球

■ 紅血球空殼

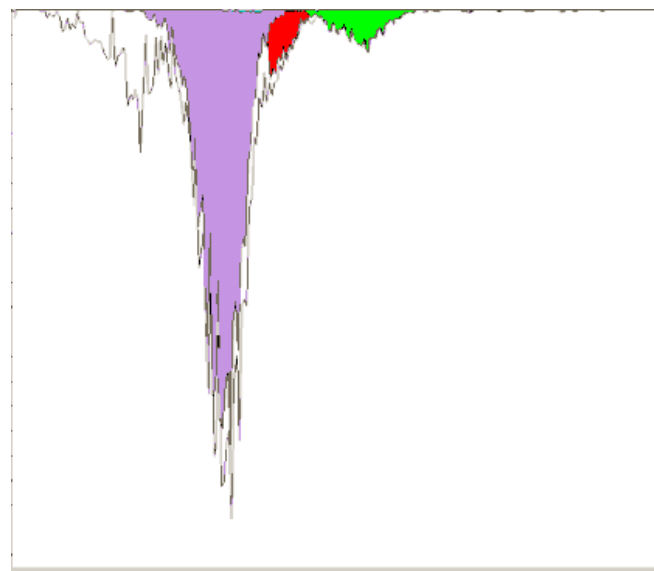


Neutrophils Monocytes Lymphocytes
Eosinophils Basophils RBC Clots

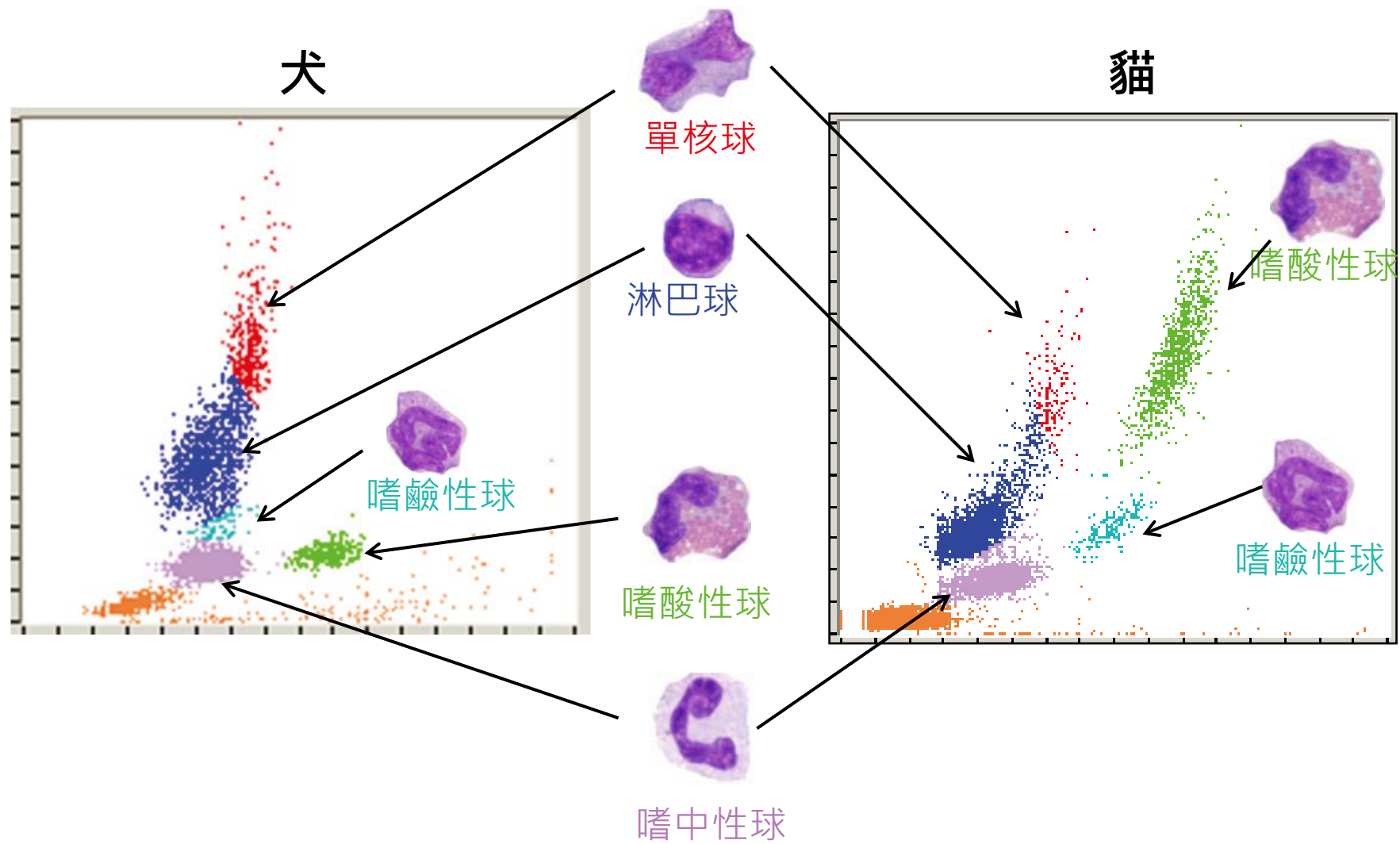


DNA/RNA量 · 螢光度

複雜度 · 顆粒度

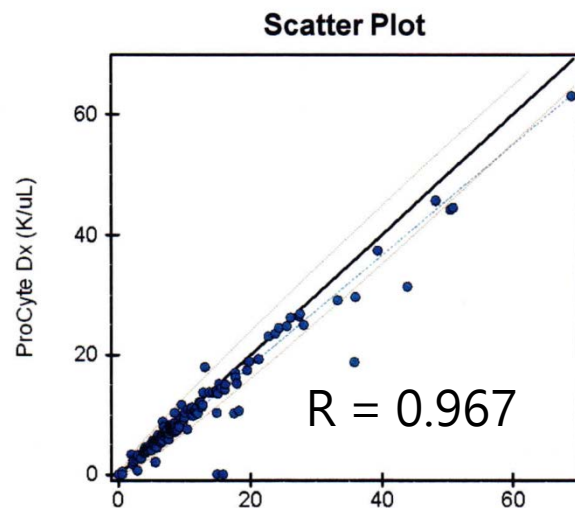


白血球點狀圖

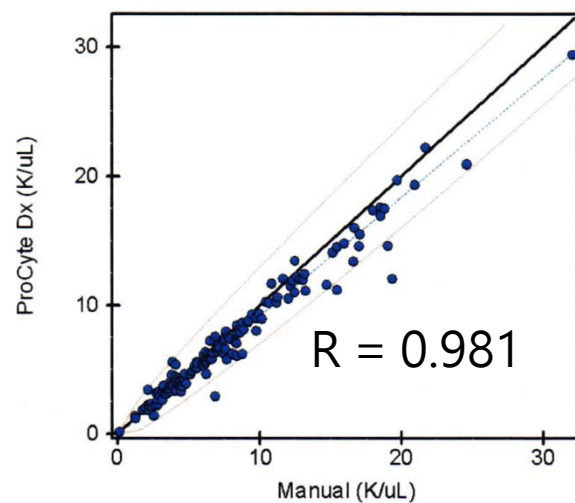


人工計算 vs ProCyte Dx

犬

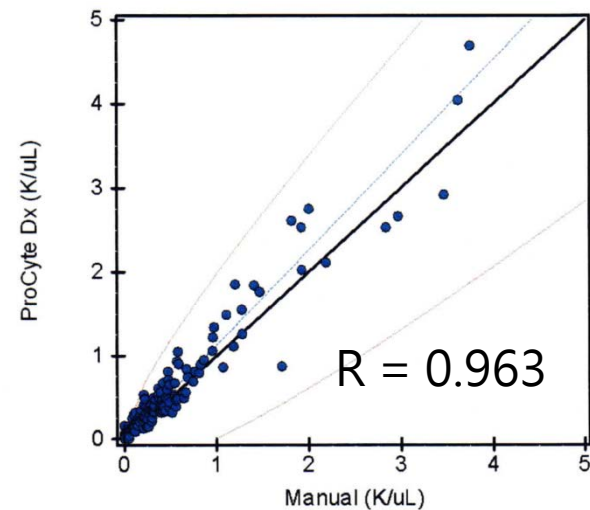
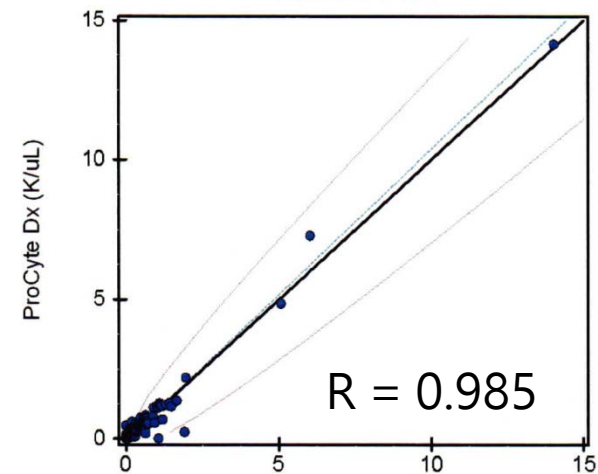


貓



嗜中性球

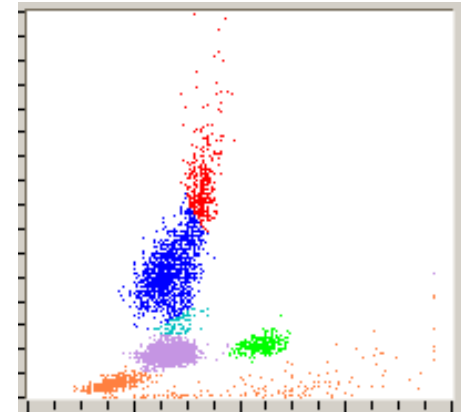
Scatter Plot



嗜酸性球

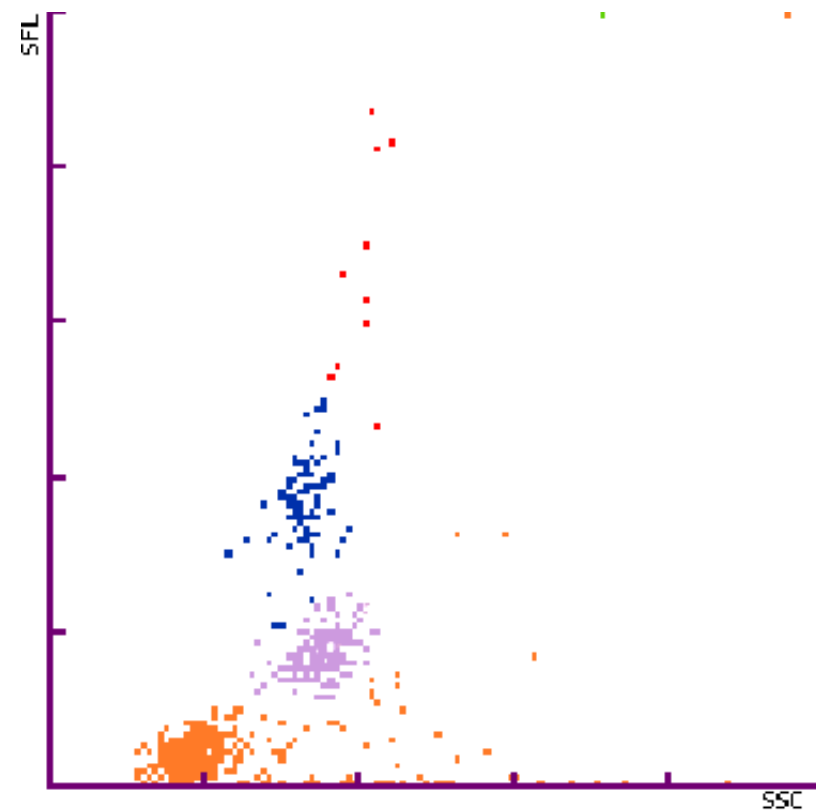
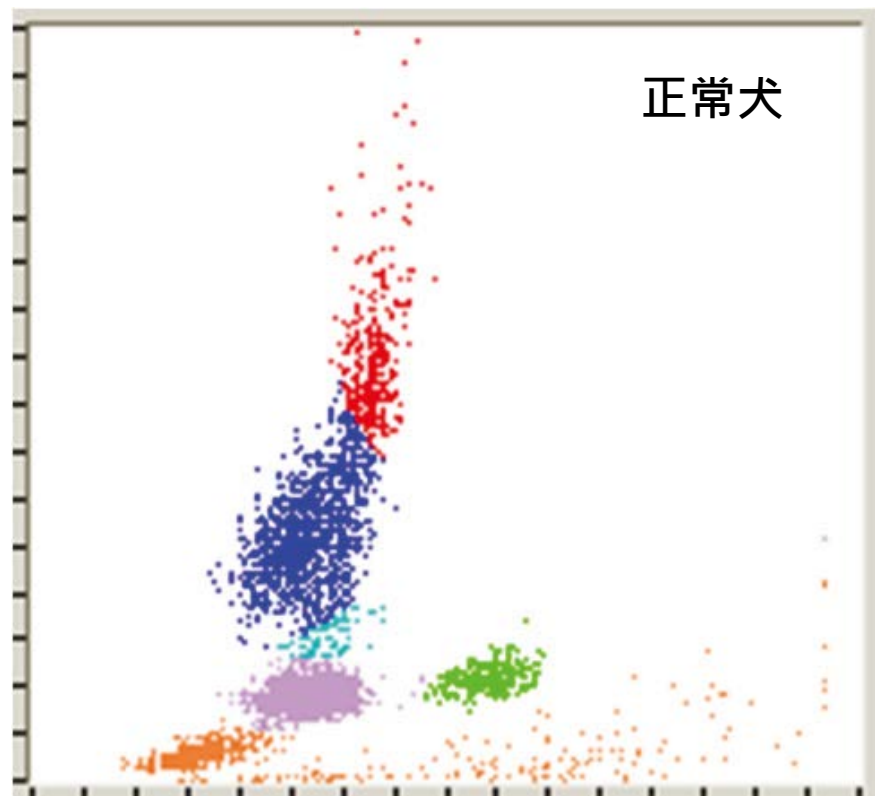
白血球 在ProCyte Dx的評估方法

- 確認白血球總數 & 各種白血球數
- 有無星號 (*)
- 與正常點狀圖的比較



- 掌握細胞集團的狀況
 - 數量的變化
 - 點分布位置的變化
- 是否與包含臨床症狀在內的整體病況一致？

白血球點狀圖



■嗜中性球

■單核球

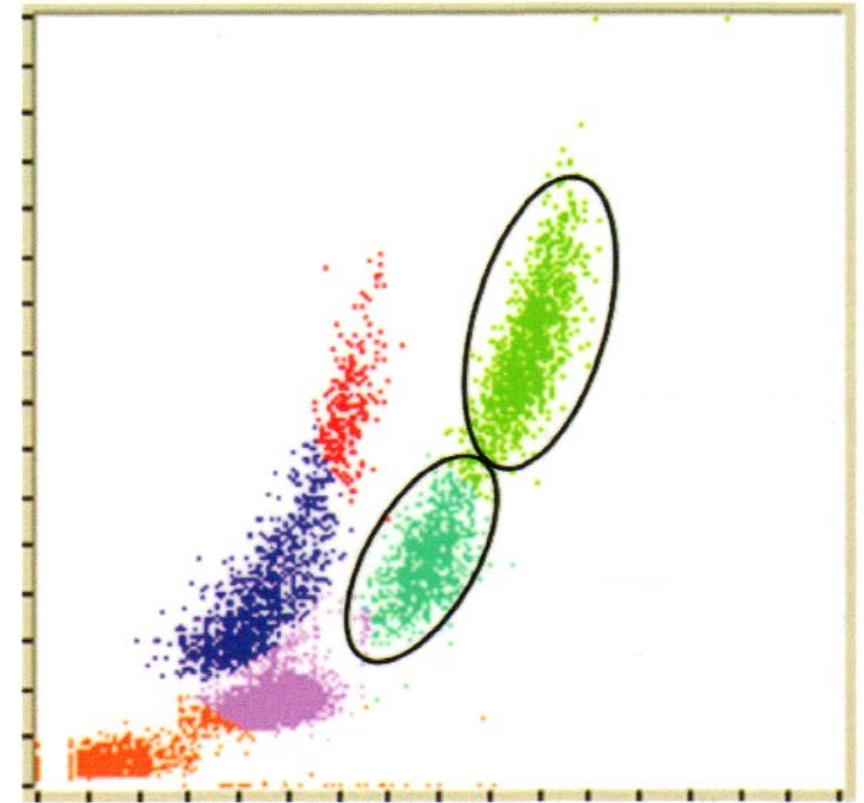
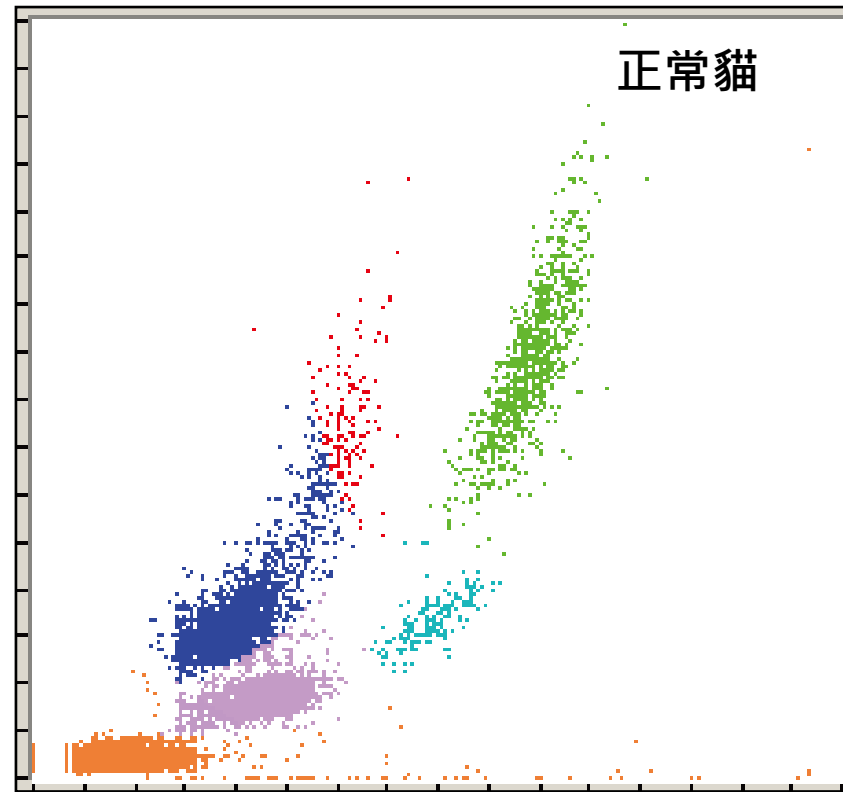
■淋巴球

■嗜酸性球

■嗜鹼性球

■紅血球空殼

白血球點狀圖



■嗜中性球

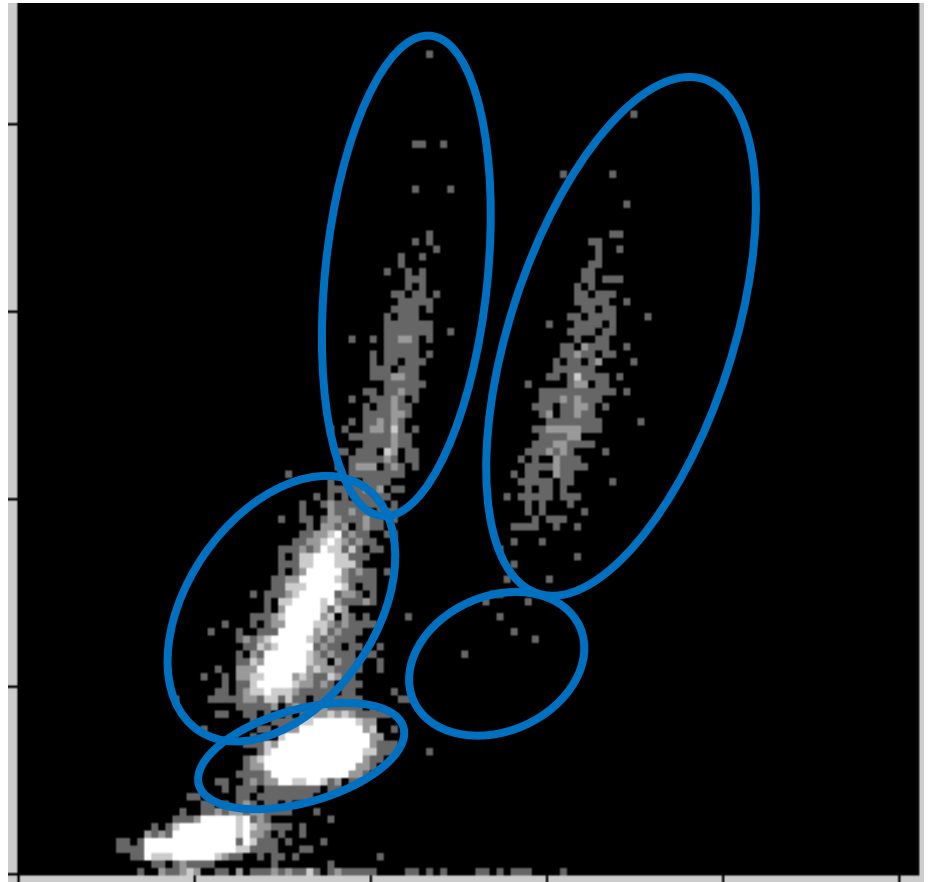
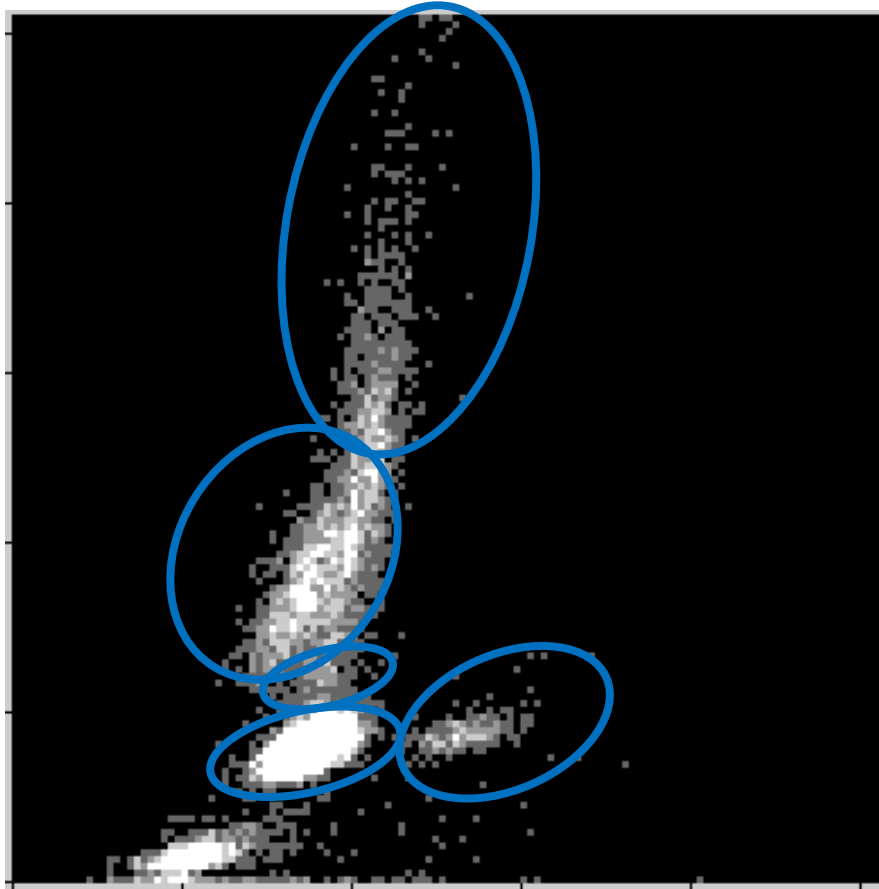
■單核球

■淋巴球

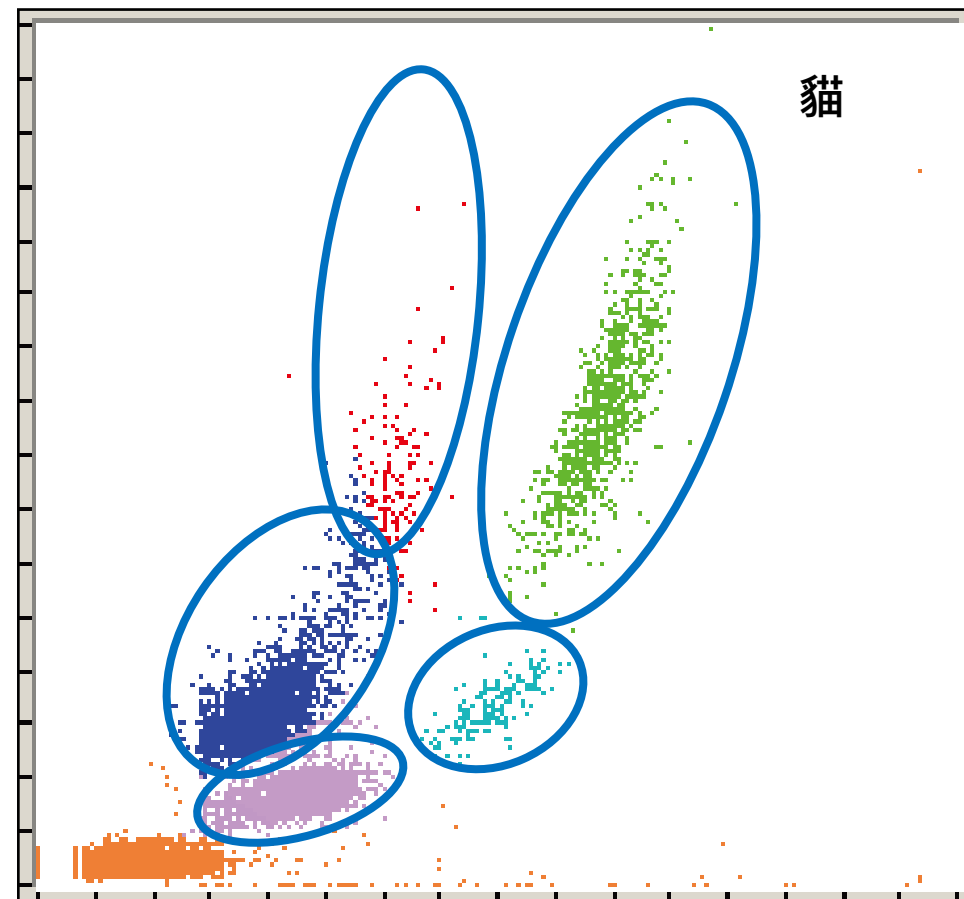
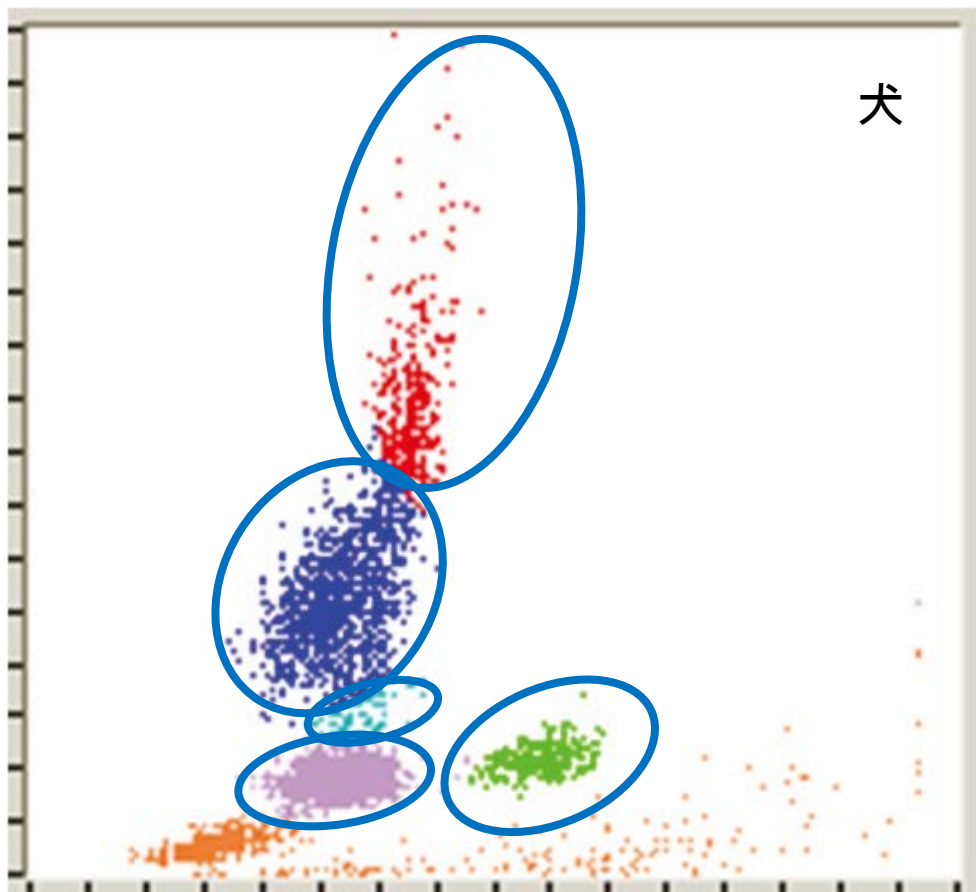
■嗜酸性球

■嗜鹼性球

■紅血球空殼



白血球點狀圖



■嗜中性球

■單核球

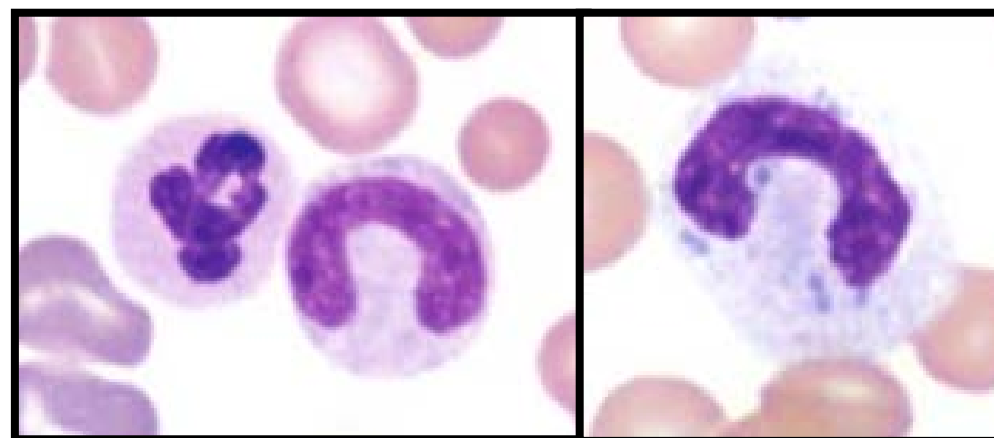
■淋巴球

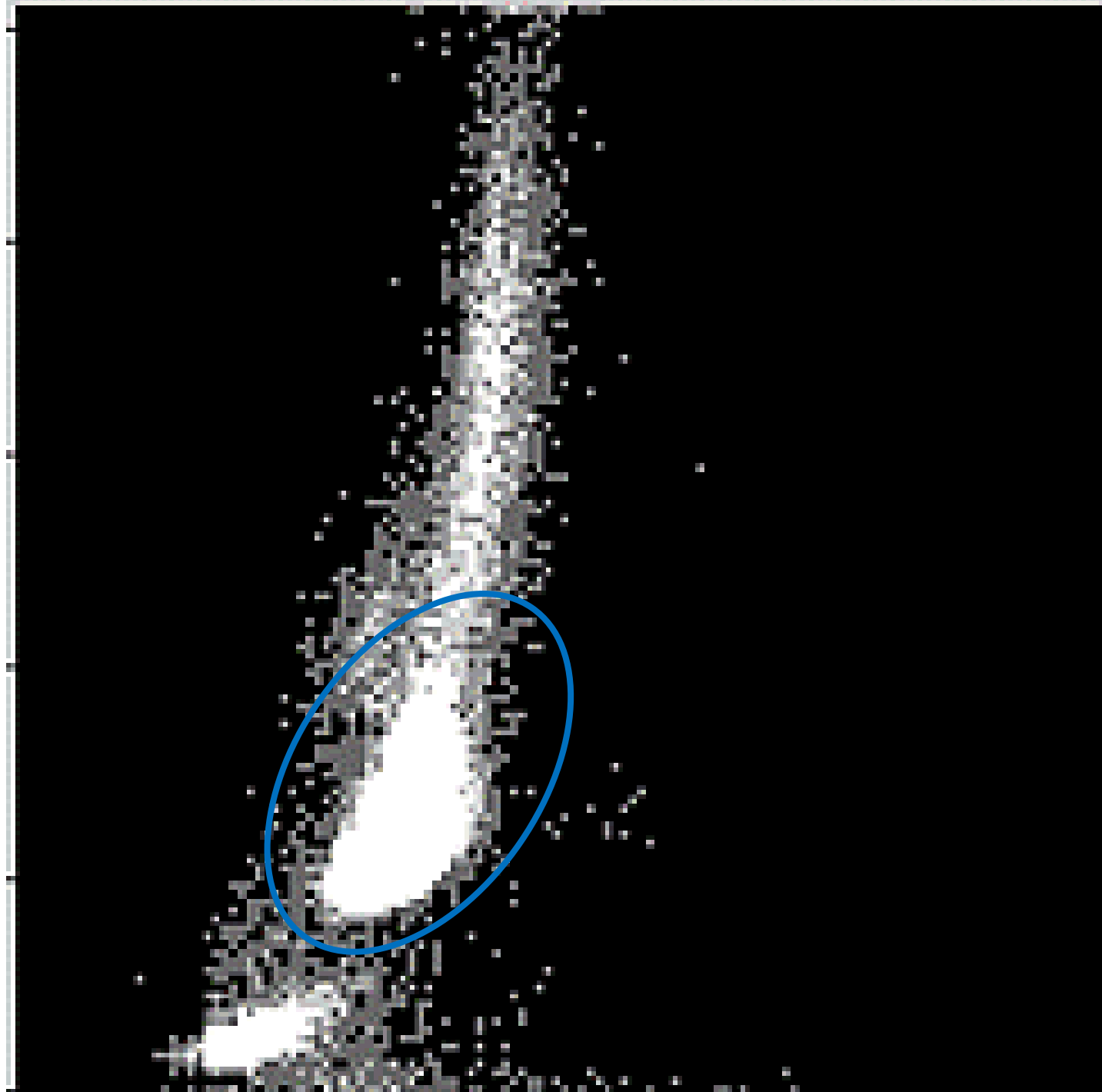
■嗜酸性球

■嗜鹼性球

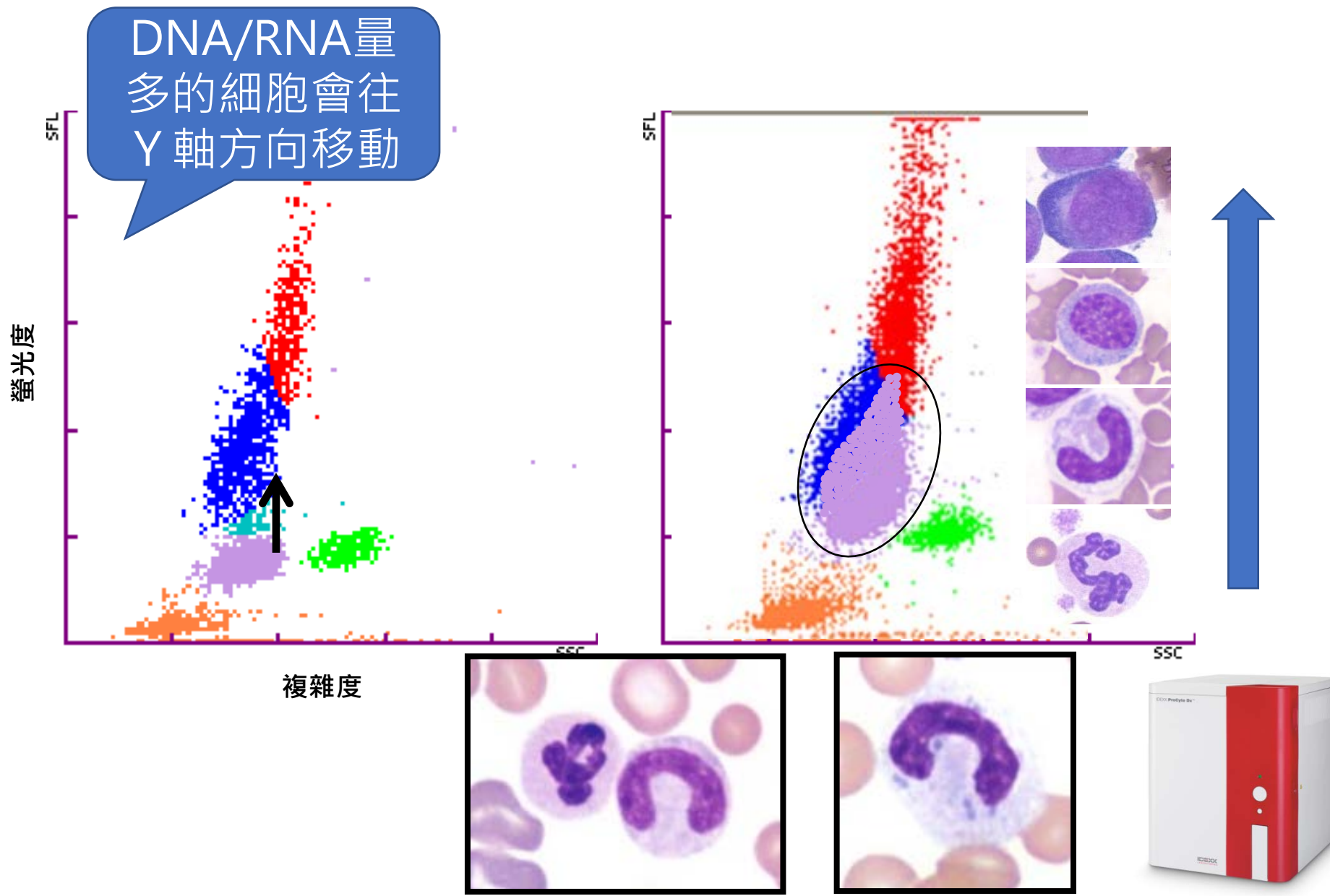
■紅血球空殼

嗜中性球核左轉 & 毒性變化





嗜中性球核左轉 & 毒性變化

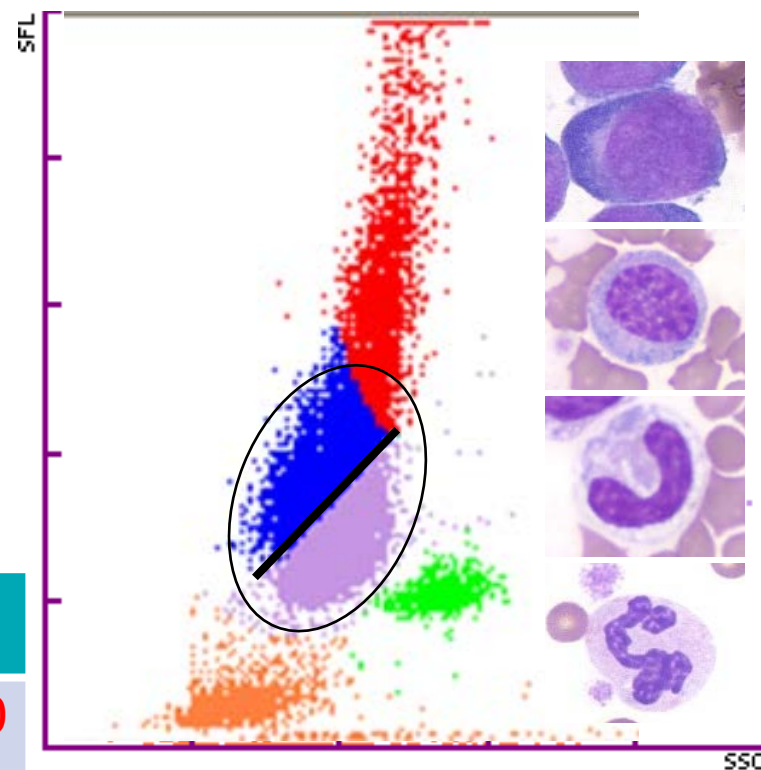


嗜中性球核左轉 & 毒性變化

淋巴球數
嗜中性球數

ProCyte Dx
偽性增加
偽性低下

	ProCyte	血液抹片
帶狀嗜中性球 (/μL)	-	7,610
節狀嗜中性球 (/μL)	*39,050	41,550
淋巴球 (/μL)	*10,320	1,860

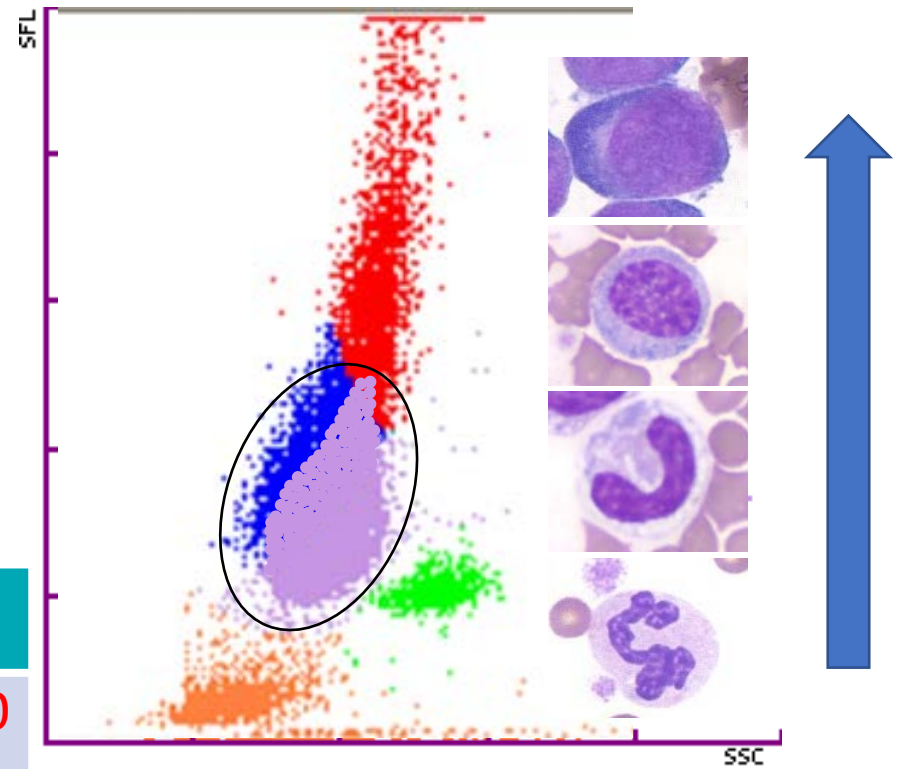


嗜中性球核左轉 & 毒性變化

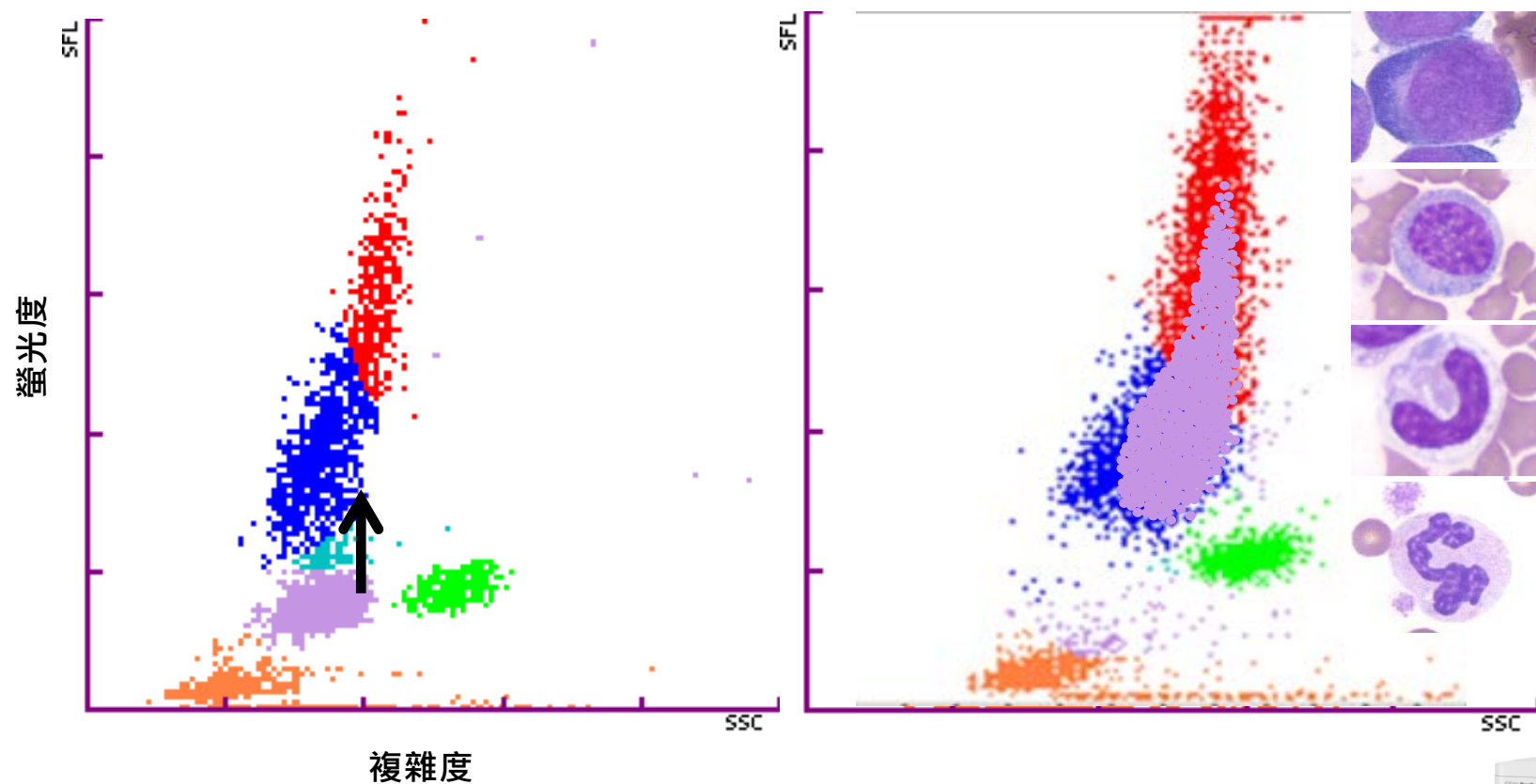
淋巴球數
嗜中性球數

ProCyte Dx
偽性增加
偽性低下

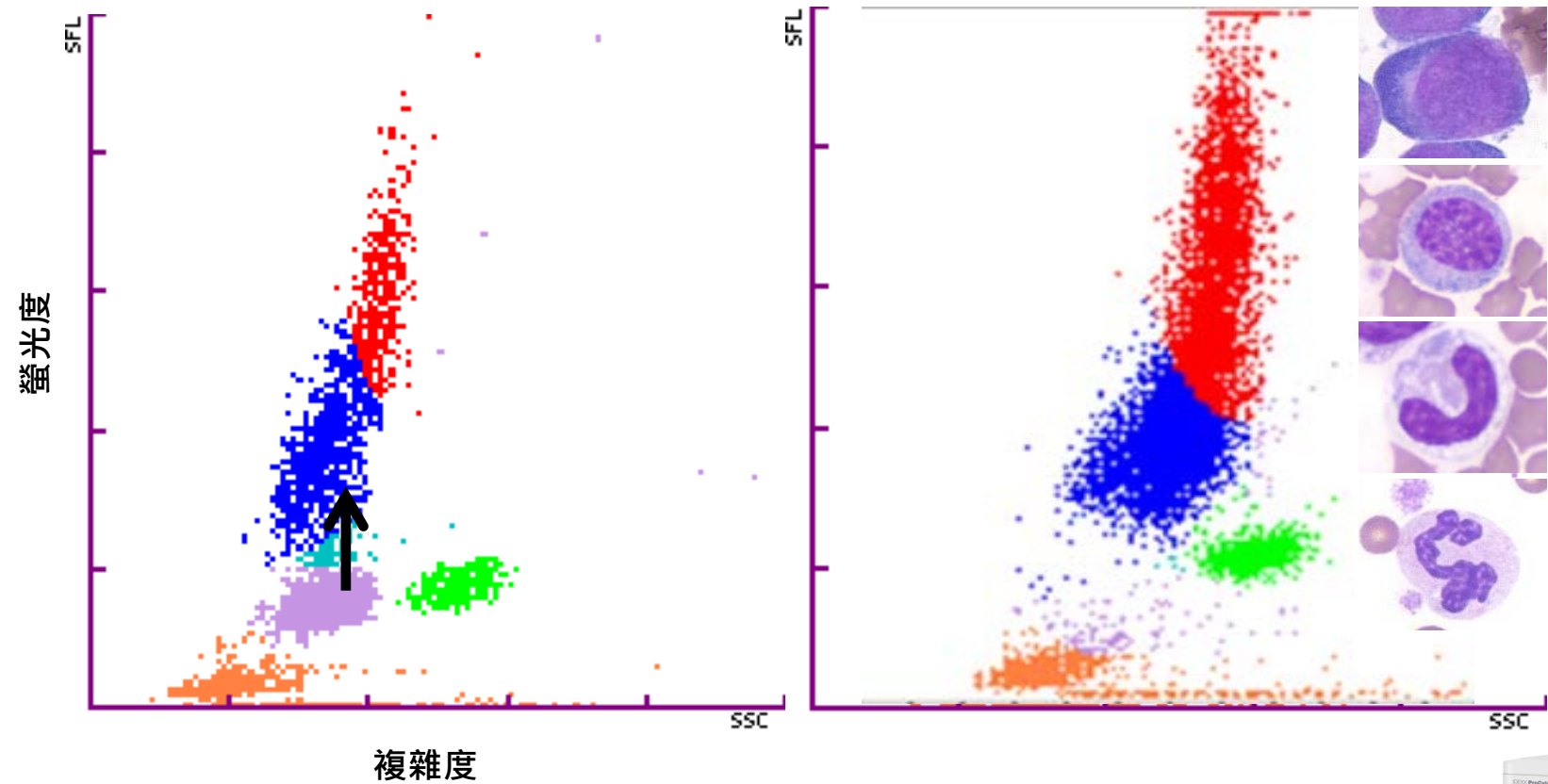
	ProCyte	血液抹片
帶狀嗜中性球 (/μL)	-	7,610
節狀嗜中性球 (/μL)	*39,050	41,550
淋巴球 (/μL)	*10,320	1,860



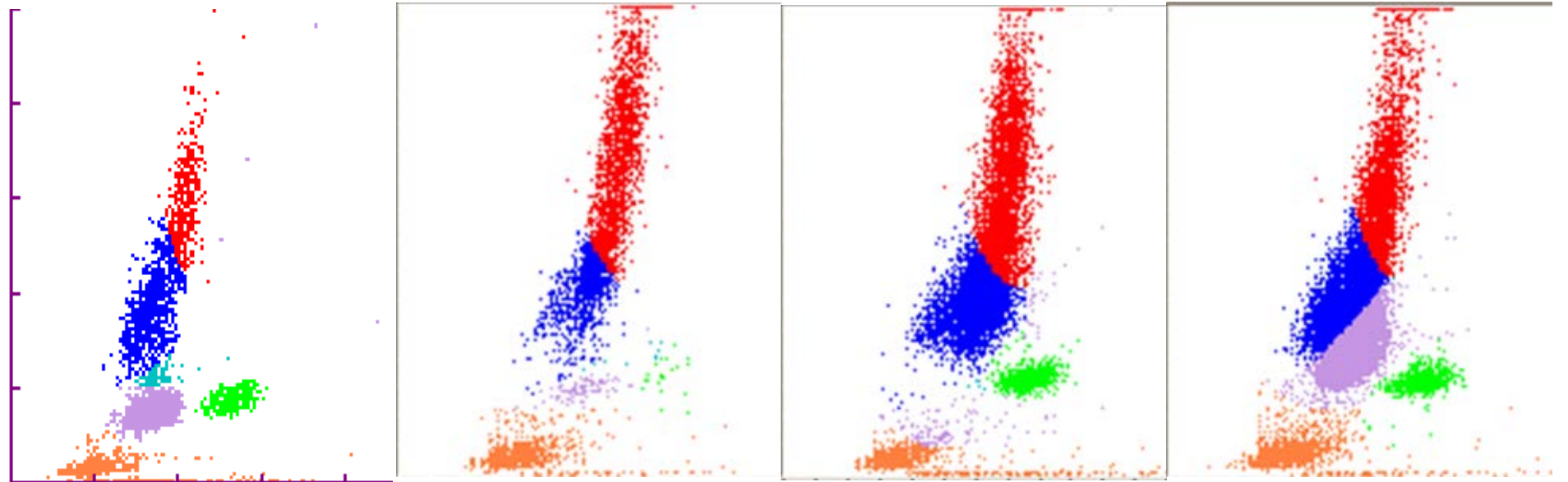
嗜中性球核左轉 & 毒性變化



嗜中性球核左轉 & 毒性變化



治療監控



正常犬

初診時

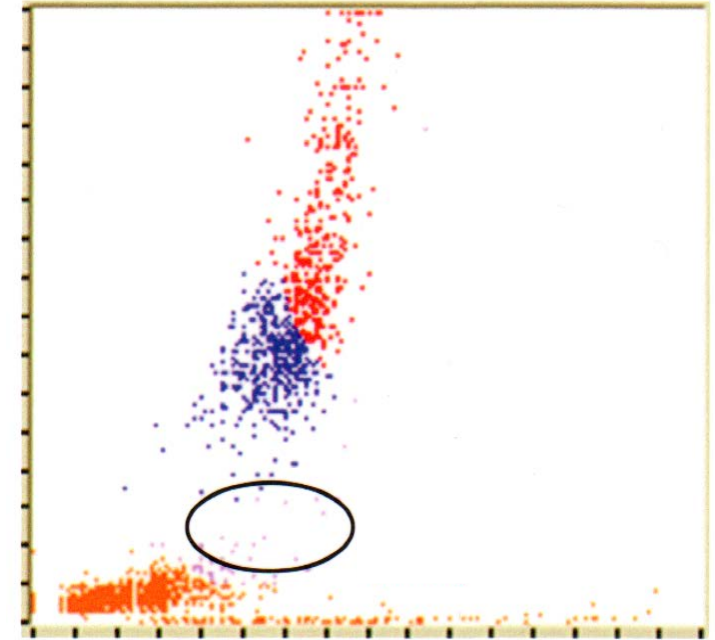
就診第3天

就診第5天

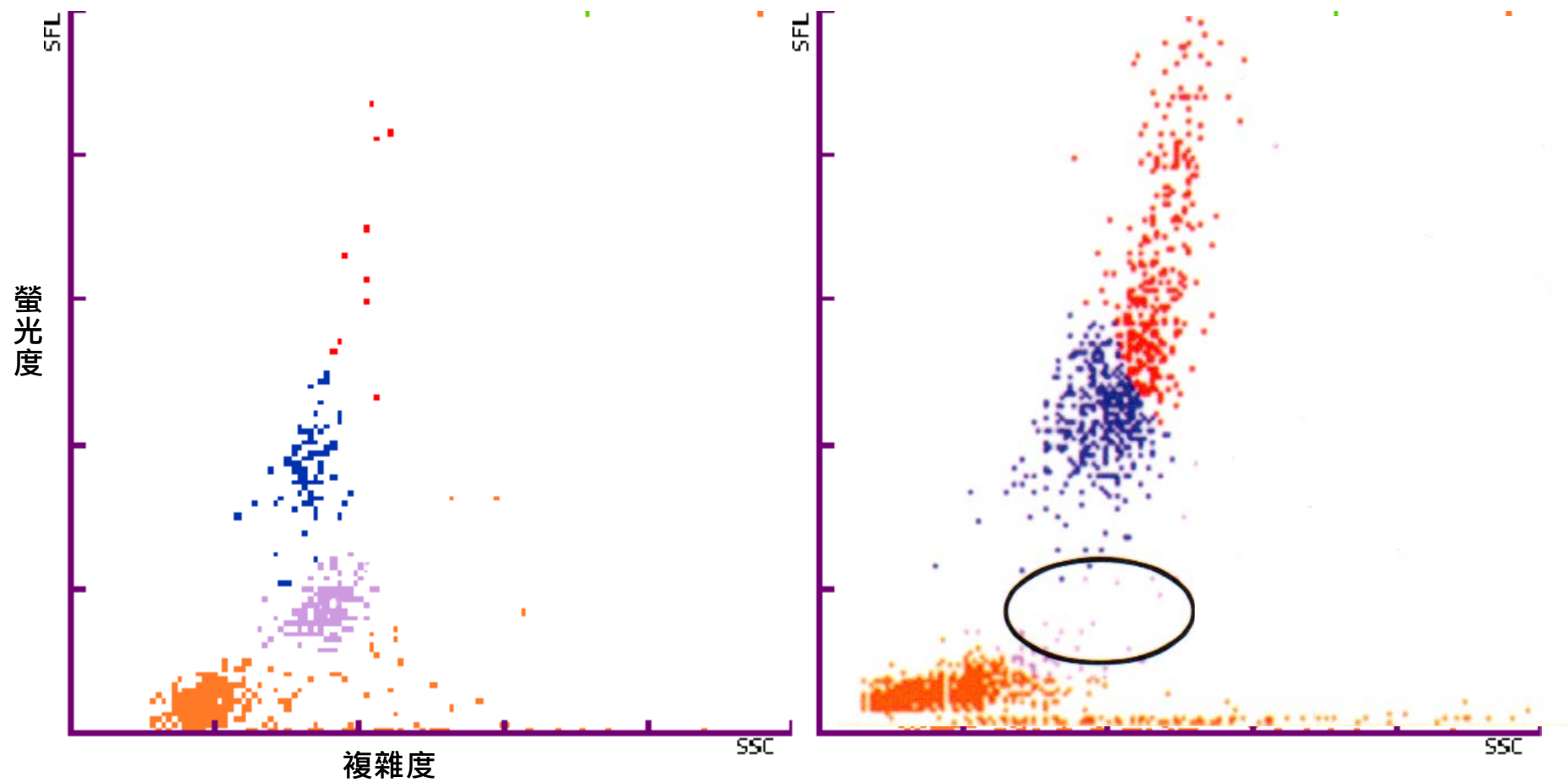
WBC (/uL)	3850	12880	32090
NEU (/uL)	100	160	*18120
LYM (/uL)	1290	*6670	*8900
MONO (/uL)	2430	*5190	*3940
EOS (/uL)	20	850	1130
BASO (/uL)	10	10	0

呈現重度炎症（退行性核左轉）的病例

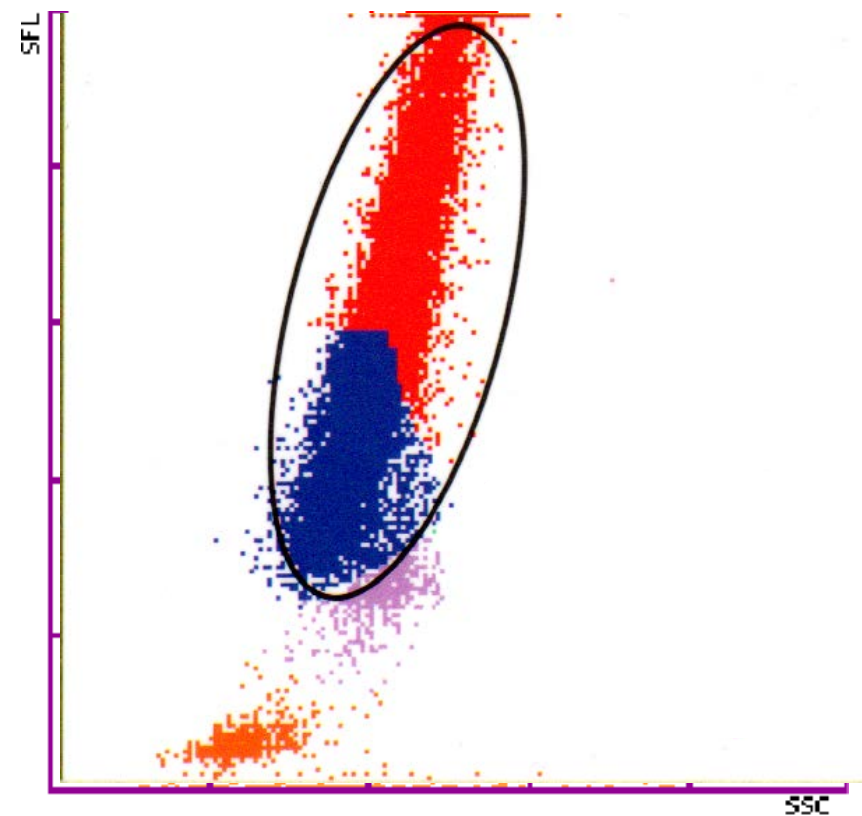
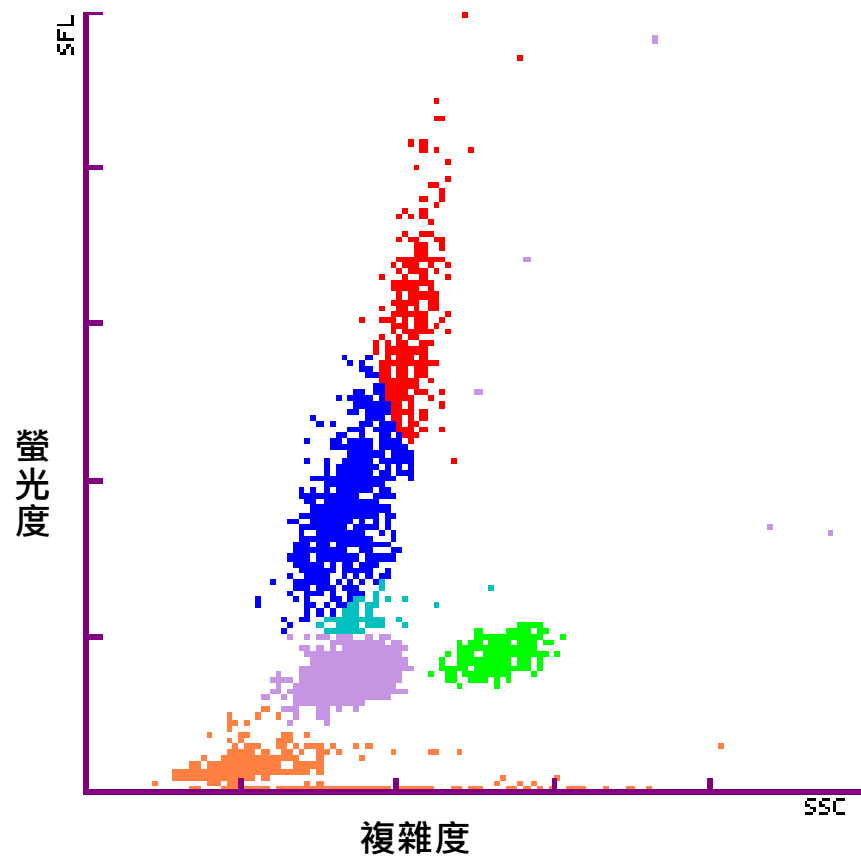
- 退行性核左轉
帶狀核 > 分節核
末梢所需 > 骨髓製造
- 嗜中性球點群（紫）消失
- 有時可能不會出現星號...



重度的白血球減少症



急性白血病



嗜中性球

單核球

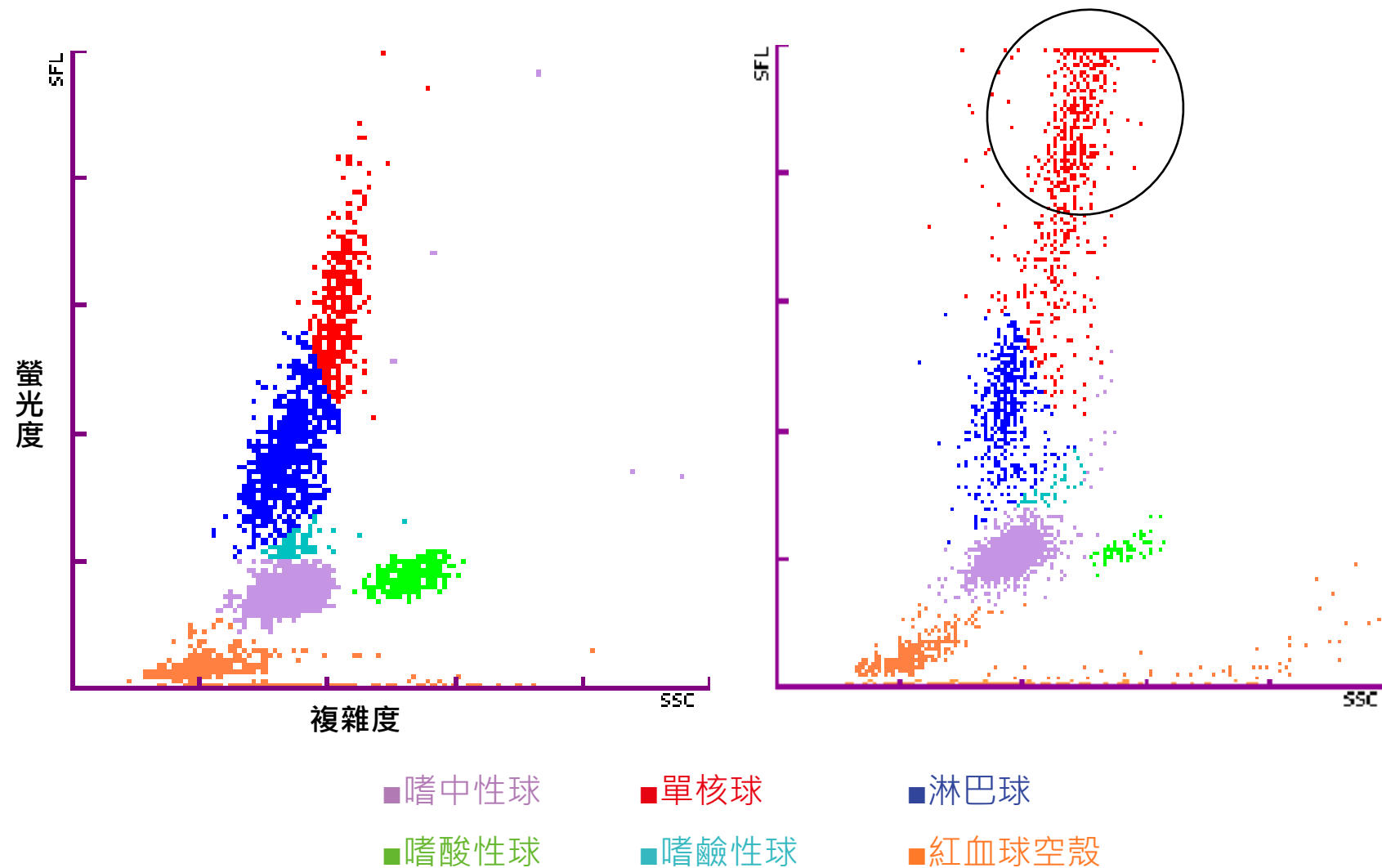
淋巴球

嗜酸性球

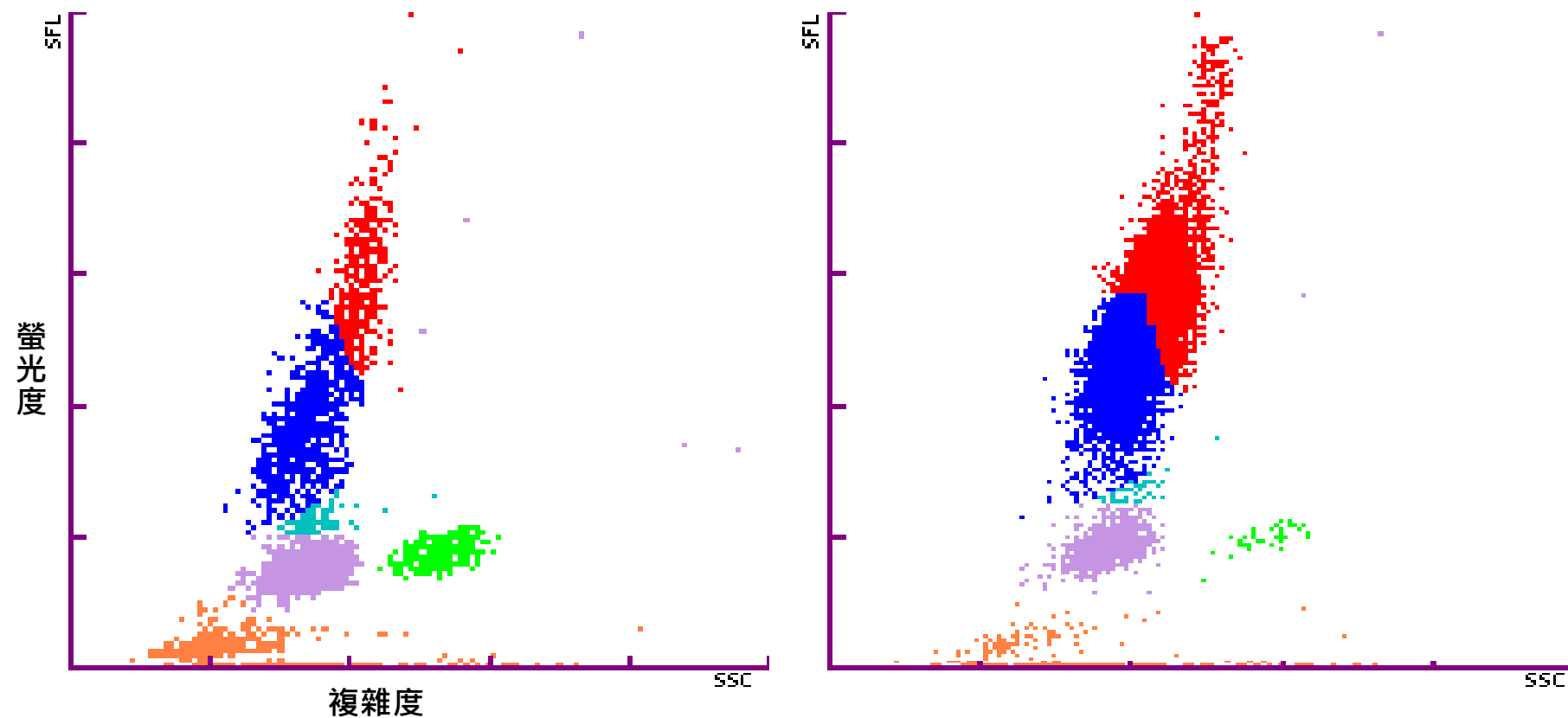
嗜鹼性球

紅血球空殼

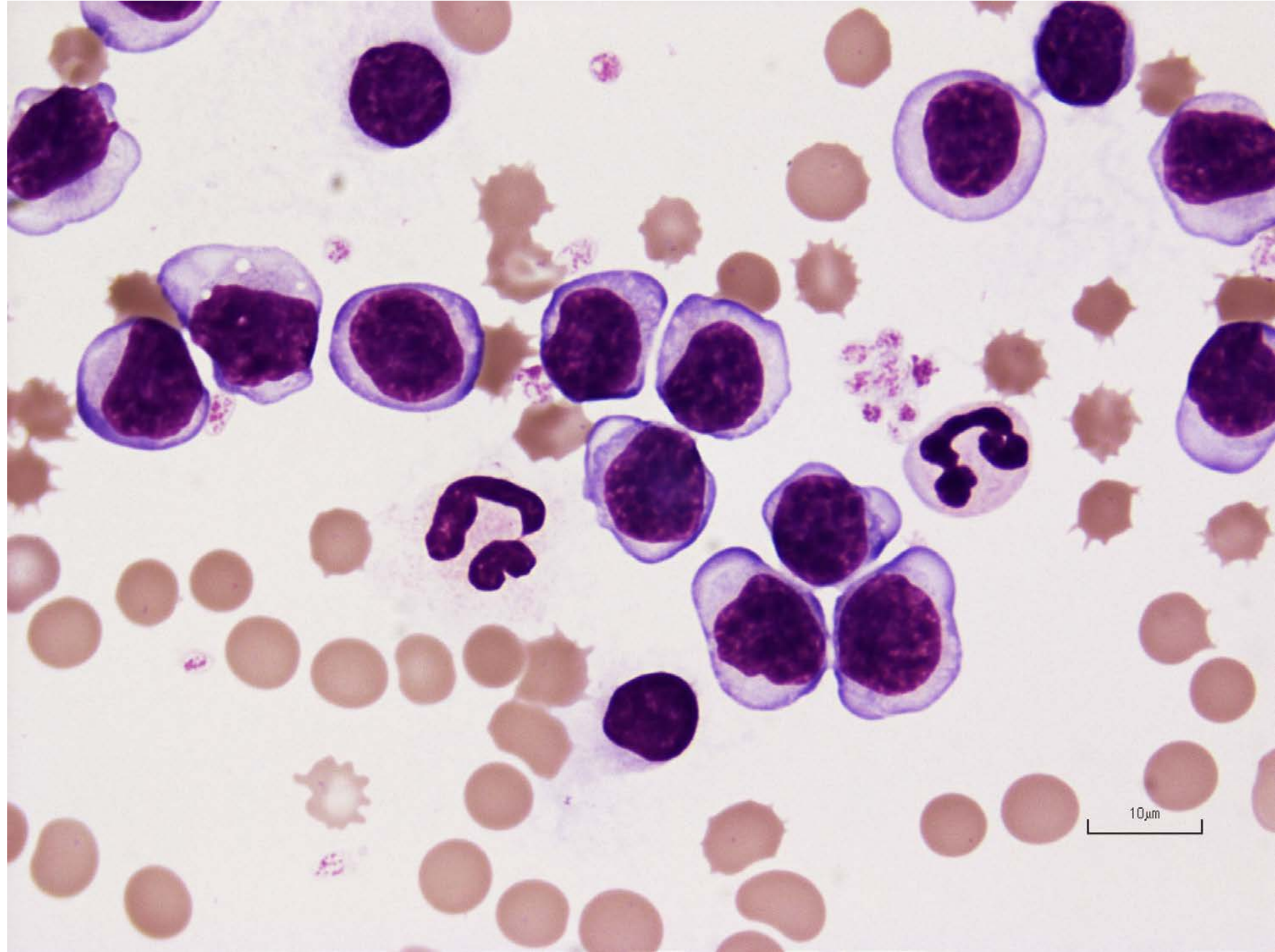
少量的腫瘤性（未成熟）細胞



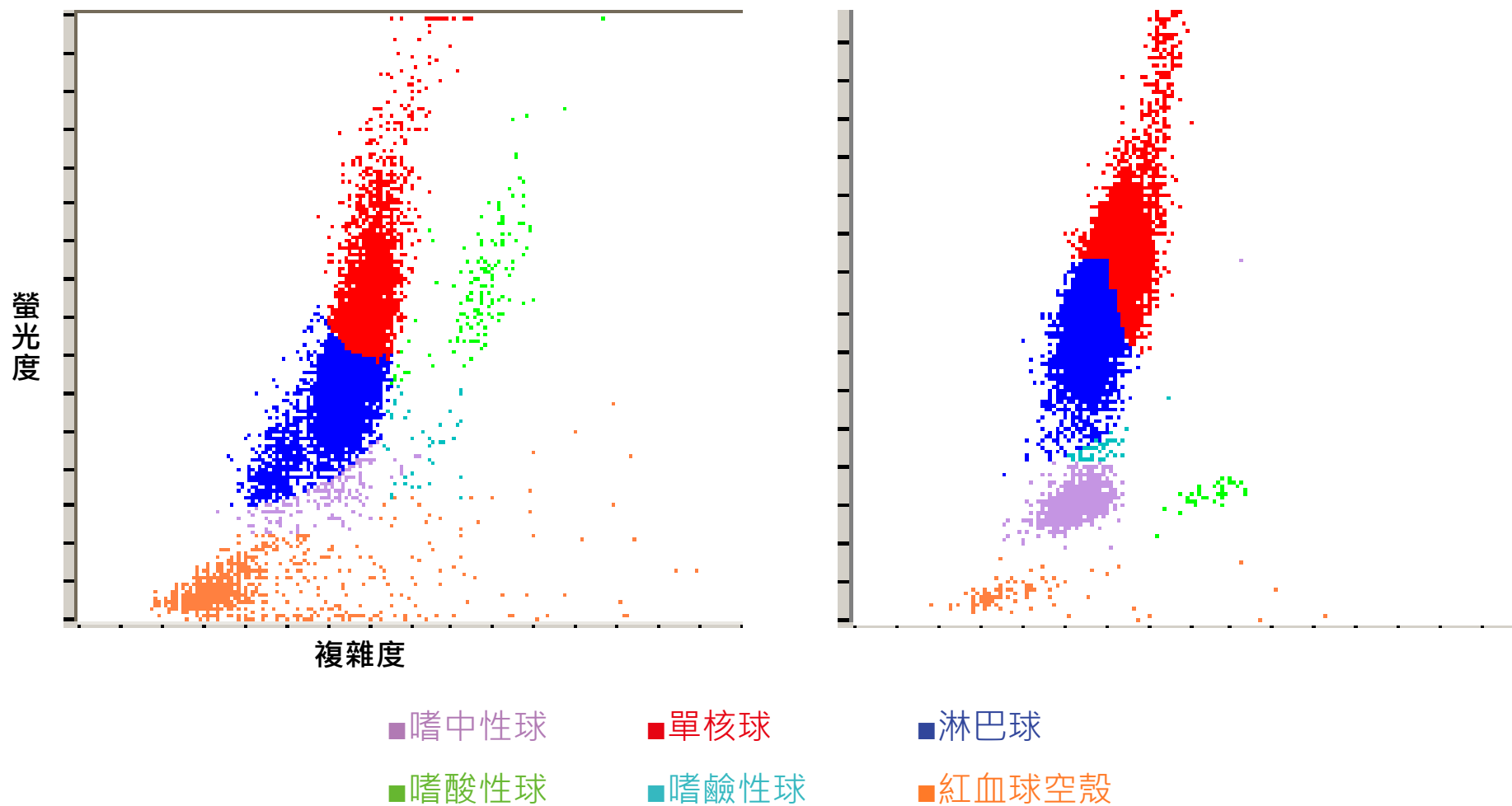
慢性淋巴球性白血病



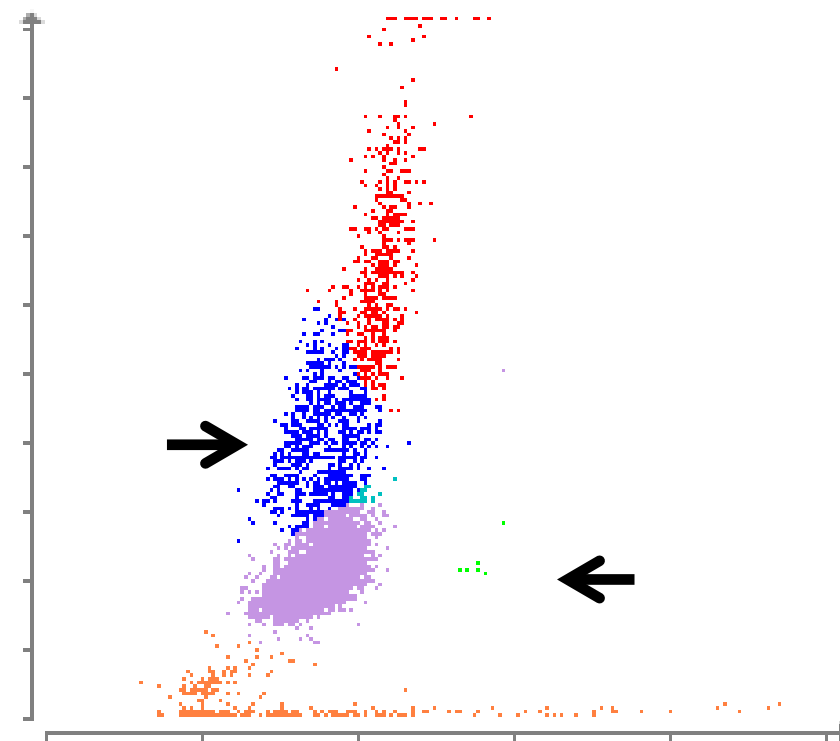
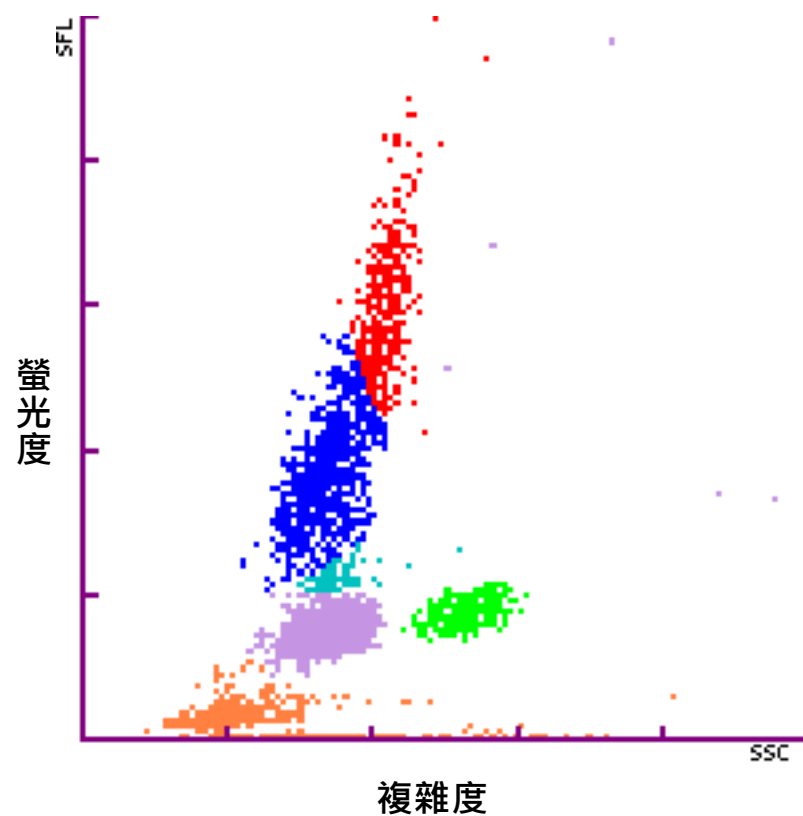
- 嗜中性球
- 嗜酸性球
- 單核球
- 嗜鹼性球
- 淋巴球
- 紅血球空殼



白血球點狀圖



緊迫 · 類固醇相



- 嗜中性球
- 嗜酸性球
- 單核球
- 嗜鹼性球
- 淋巴球
- 紅血球空殼

ProCyte Dx 白血球系細胞

ProCyte Dx的優點

- 可以正確地分類正常白血球
- 可以辨識出嗜中性球核左轉 & 毒性變化

必須以血液抹片來確認的項目

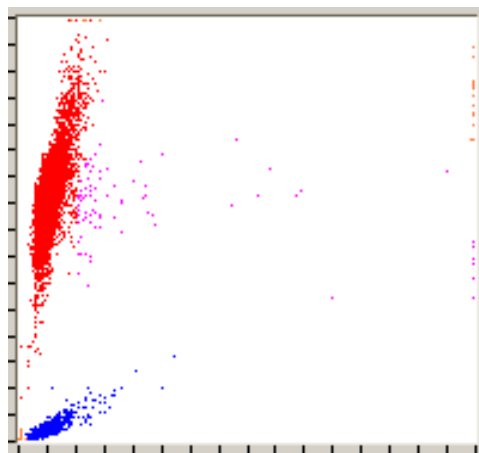
- 各種白血球在形態學上的詳細評估
- 呈現極少數的特異型態之白血球的評估



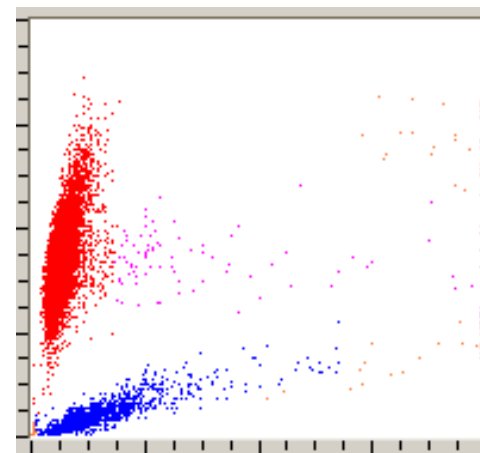
紅血球 在ProCyte Dx的評估方法

- 確認檢查結果的數值
- 確認有無星號 (*)
- 將病患的點狀圖與正常者比較

犬



貓

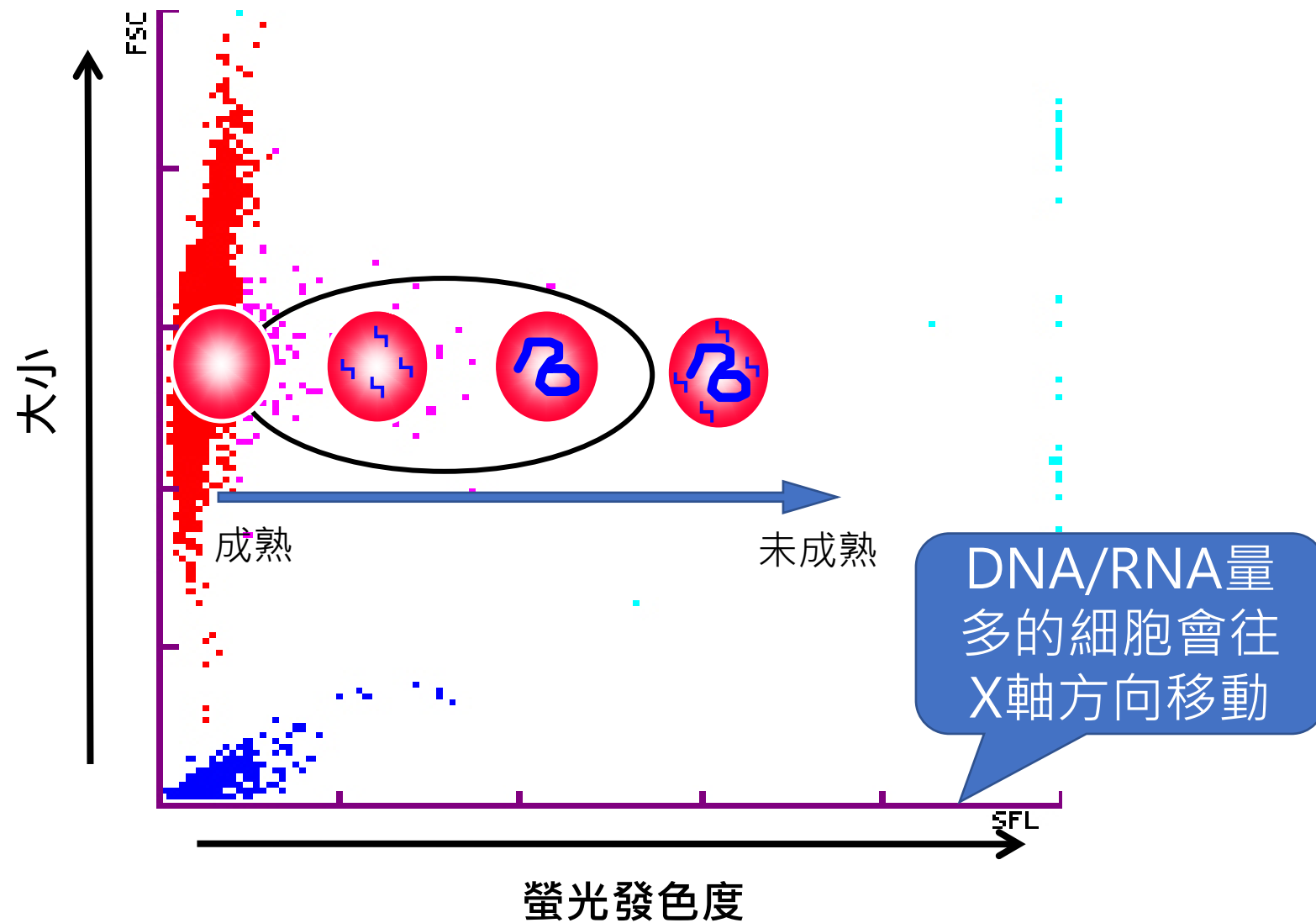


■ 紅血球

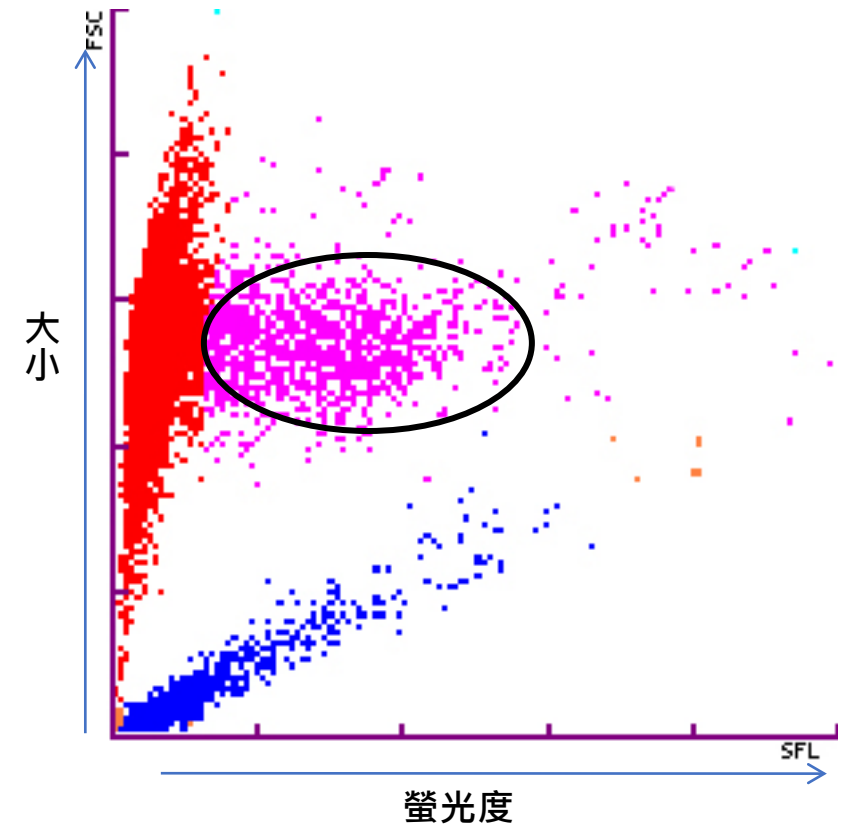
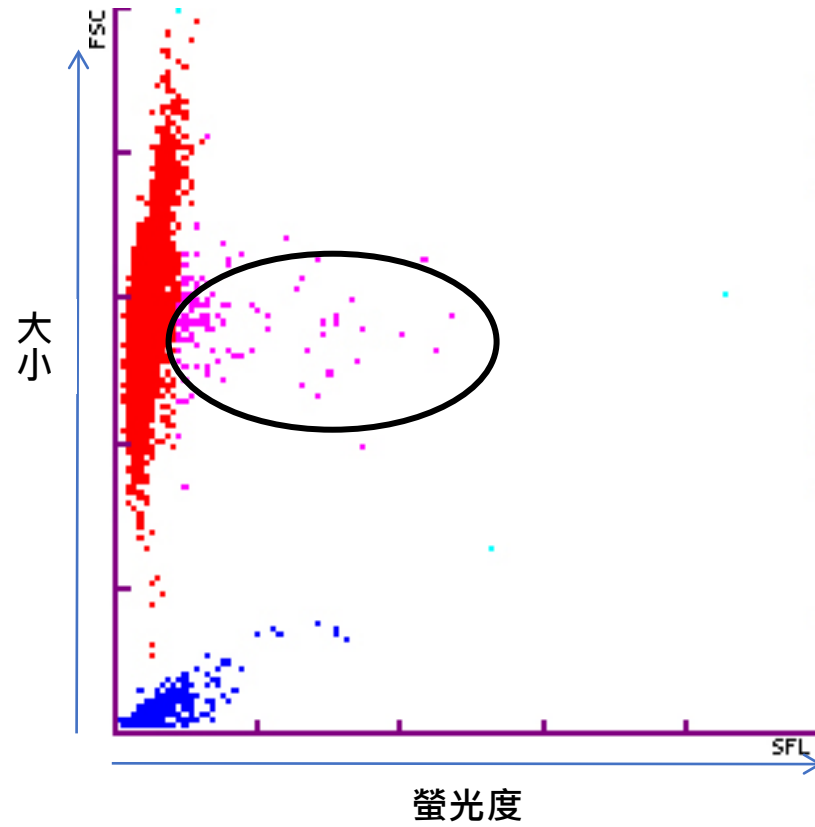
■ 網織球

■ 血小板

紅血球點狀圖



網織球



■ 紅血球

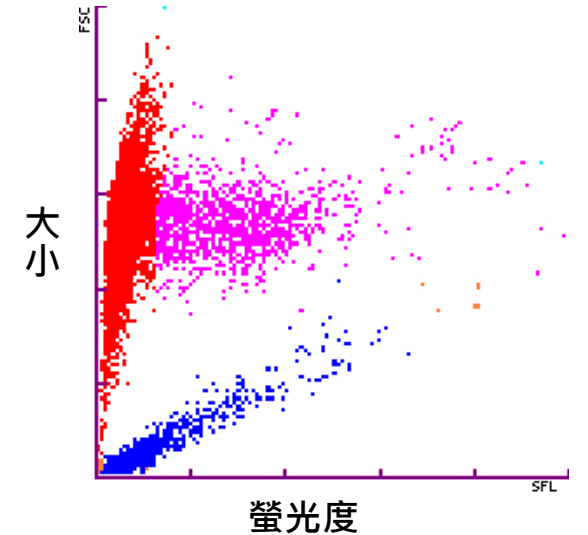
■ 網織球

■ 血小板

非貧血病例的網織球增多症

- 紅血球生成素濃度增加
- 低血氧症
 - 心血管、呼吸系統疾病
- 會產生紅血球生成素的腫瘤
- 會生成紅血球的腫瘤/多血症
- 體內代謝亢進：貓的甲狀腺機能亢進症

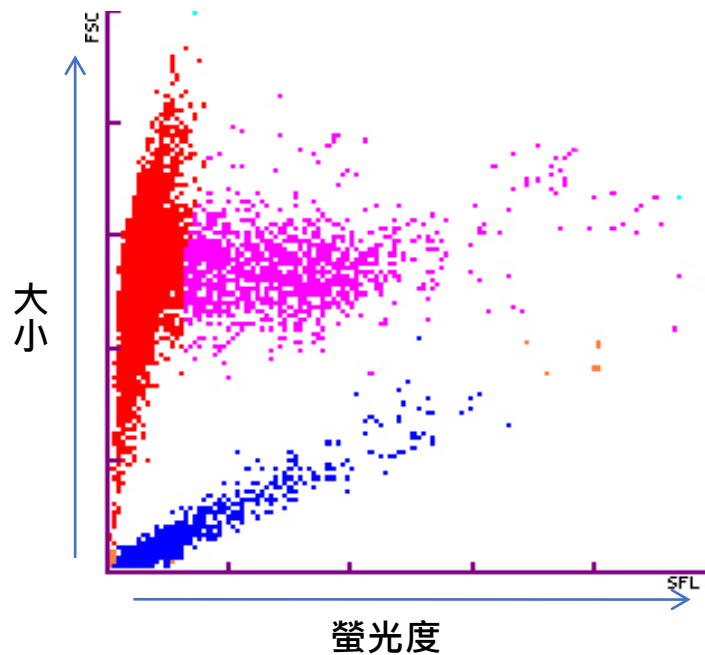
- 骨髓內皮細胞機能障礙



注意事項！！

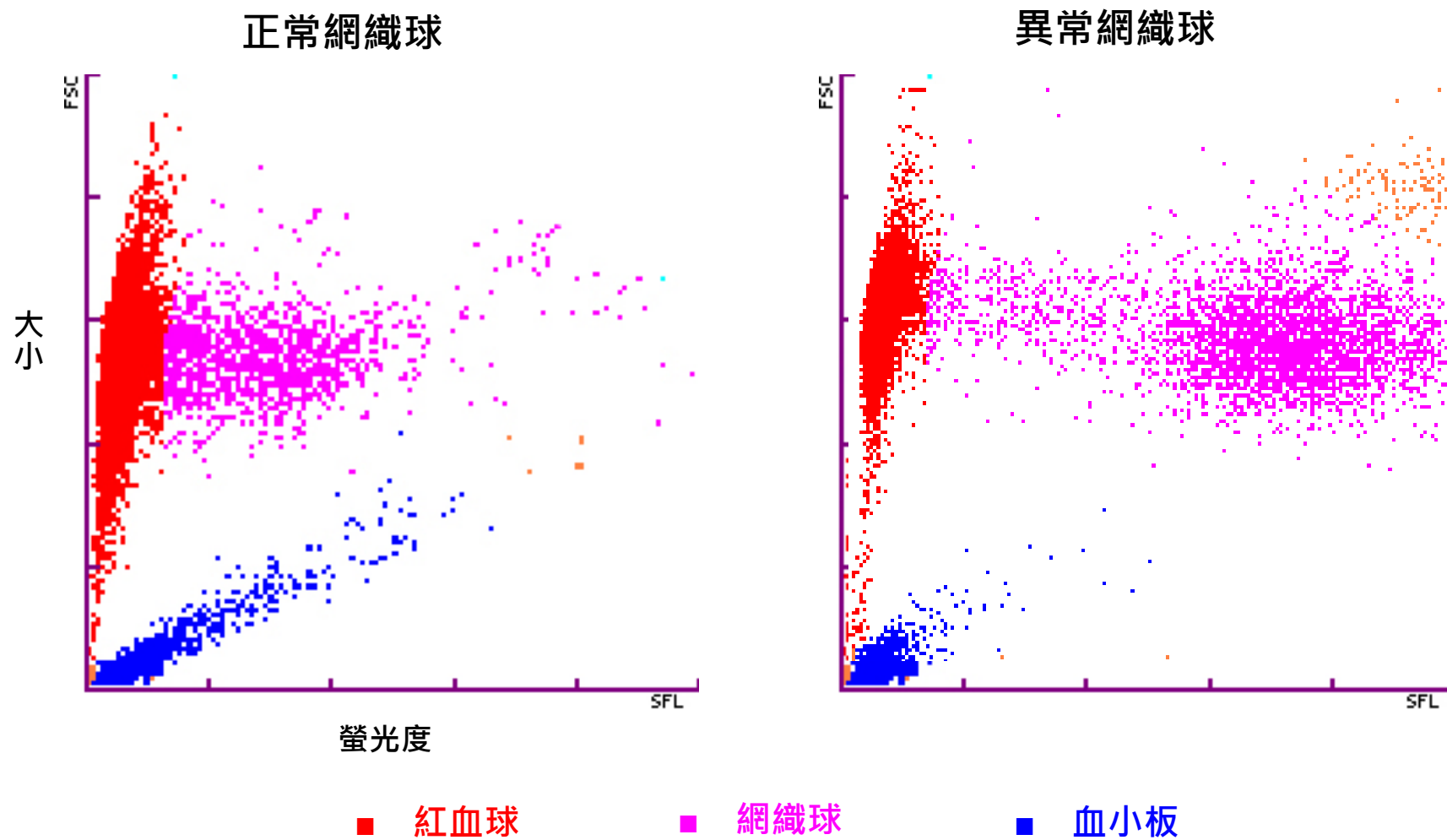
網織球的評估

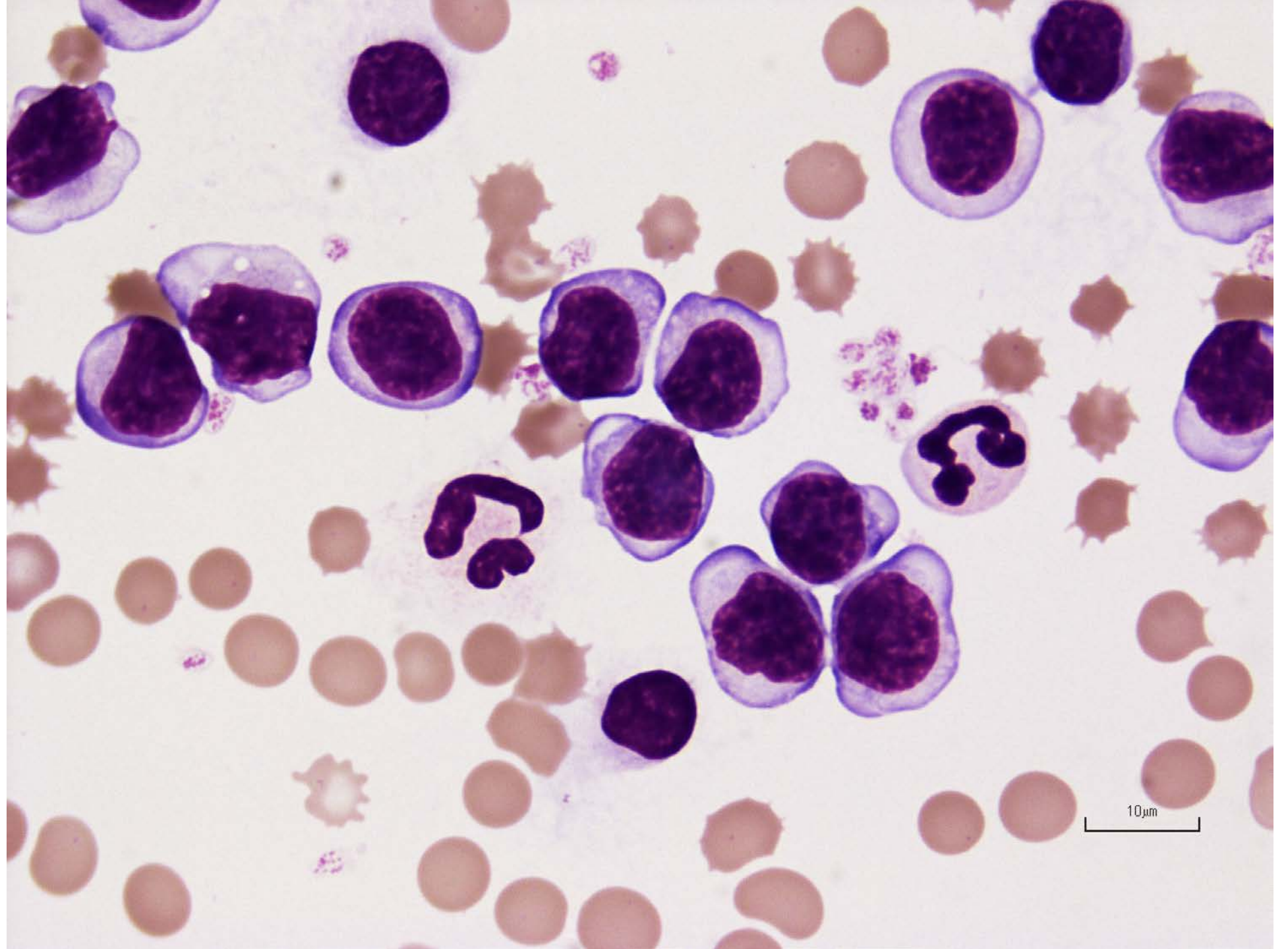
- 網織球在點狀圖上的位置
- 點狀圖中的紅血球點所呈現的是相對數量



	HCT	%RETIC	RETIC
Case 1	35%	5%	250 K/ μ l
Case 2	15%	5%	50 K/ μ l

異常網織球





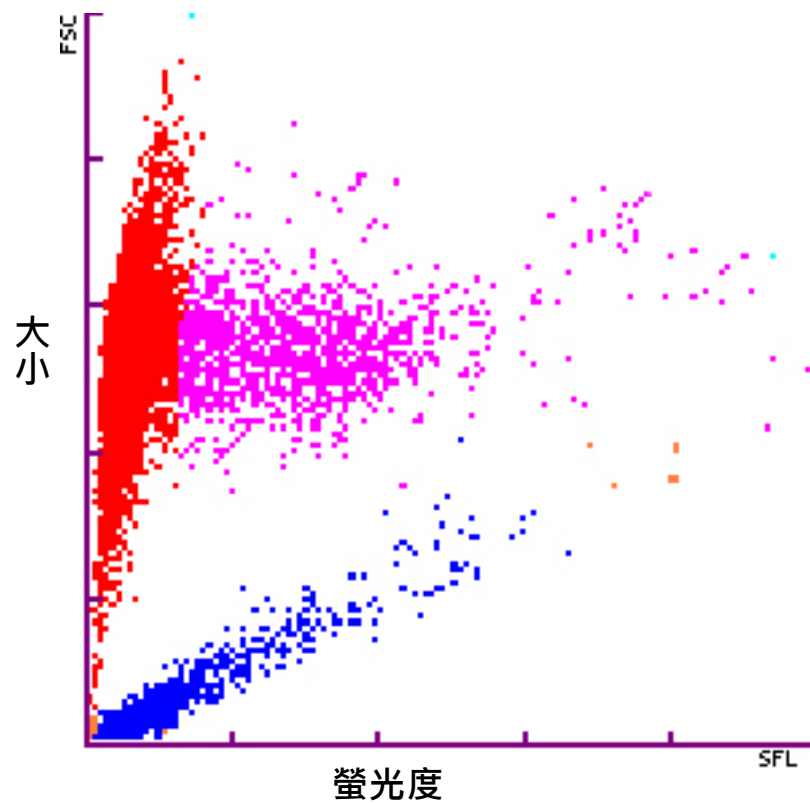
犬焦蟲(*Babesia canis*)感染症



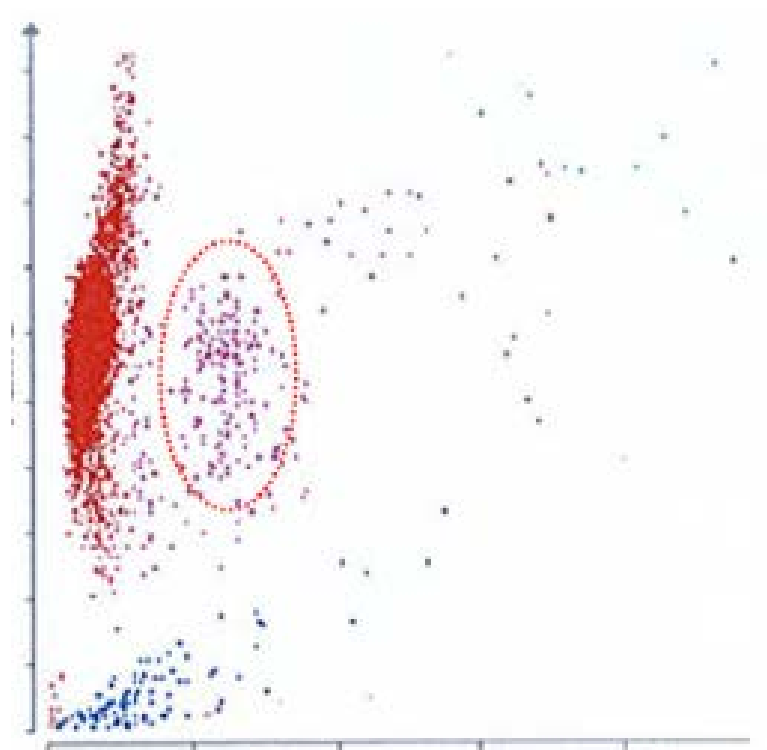
異常網織球

Vet Clin Pathol. 2016 Dec;45(4):598-603.

再生性貧血

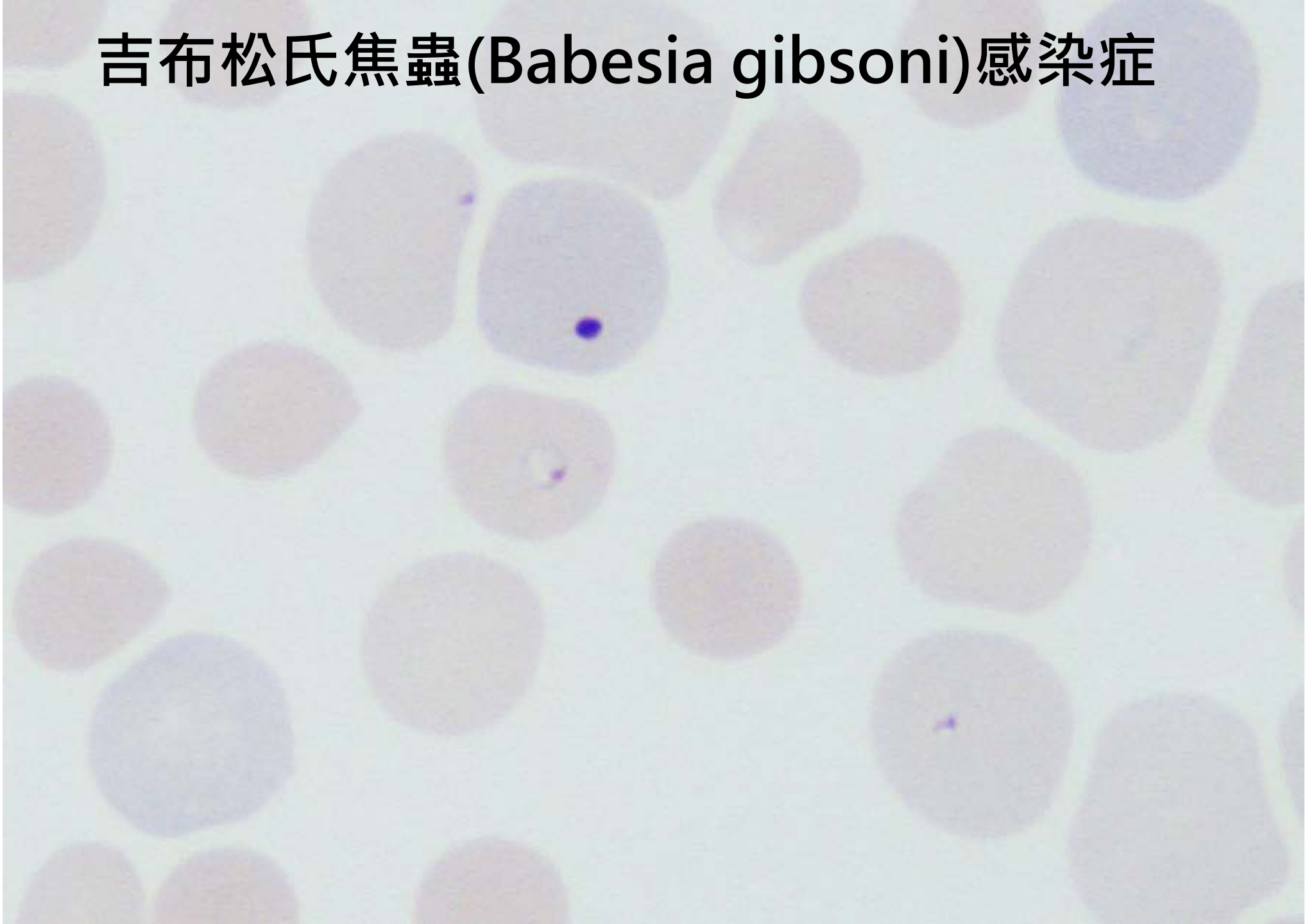


焦蟲感染症

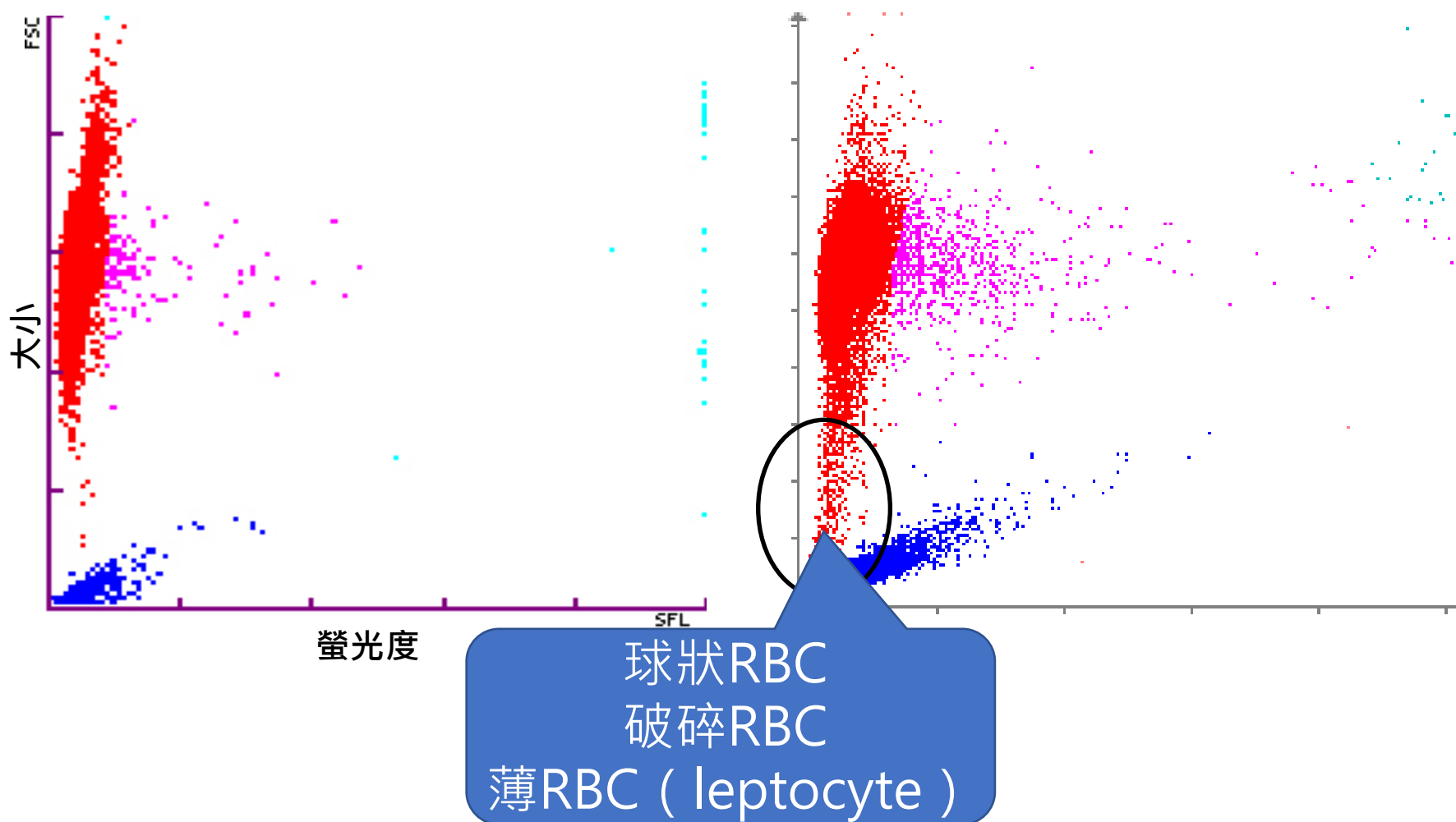


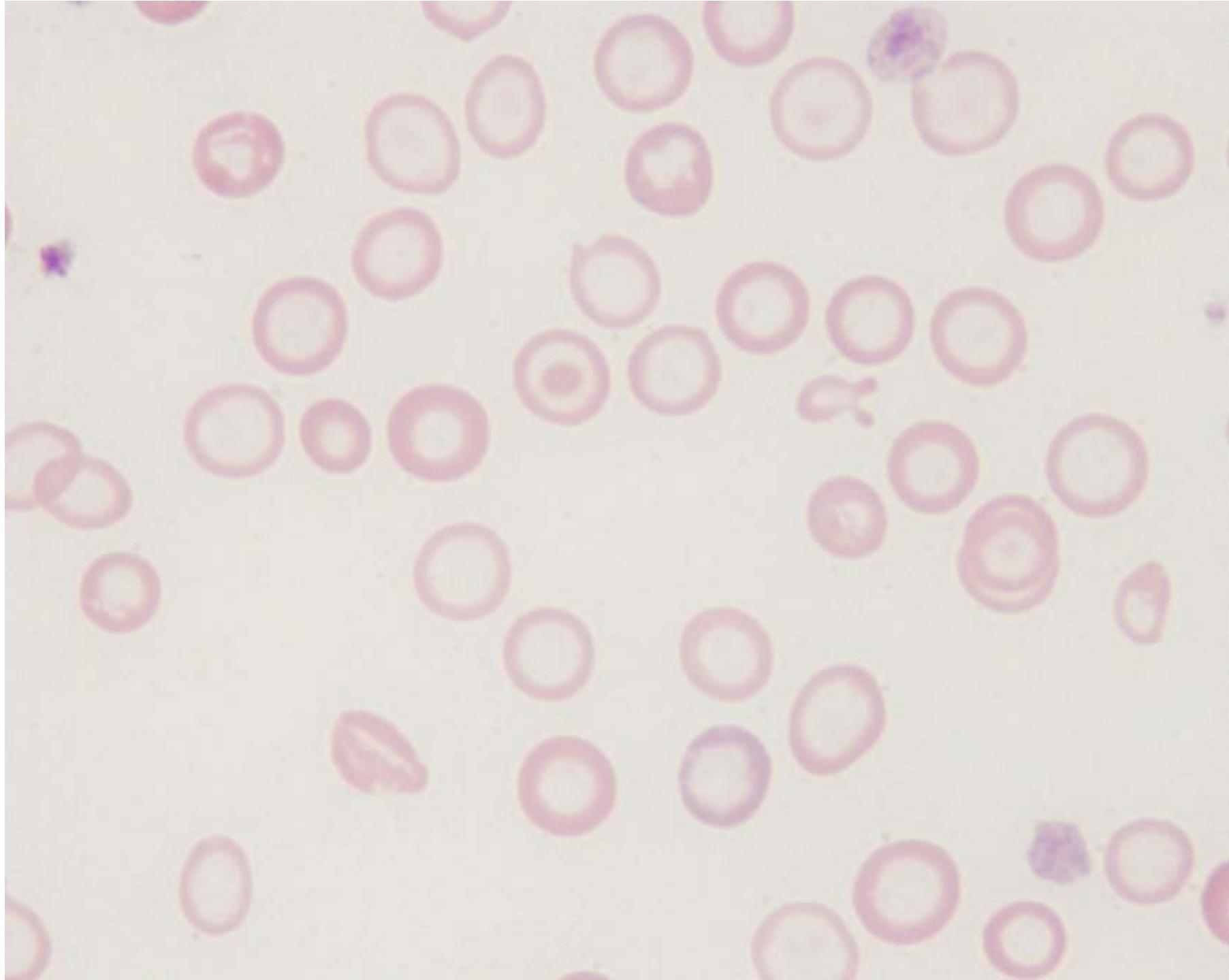
■ 紅血球 ■ 網織球 ■ 血小板

吉布松氏焦蟲(*Babesia gibsoni*)感染症

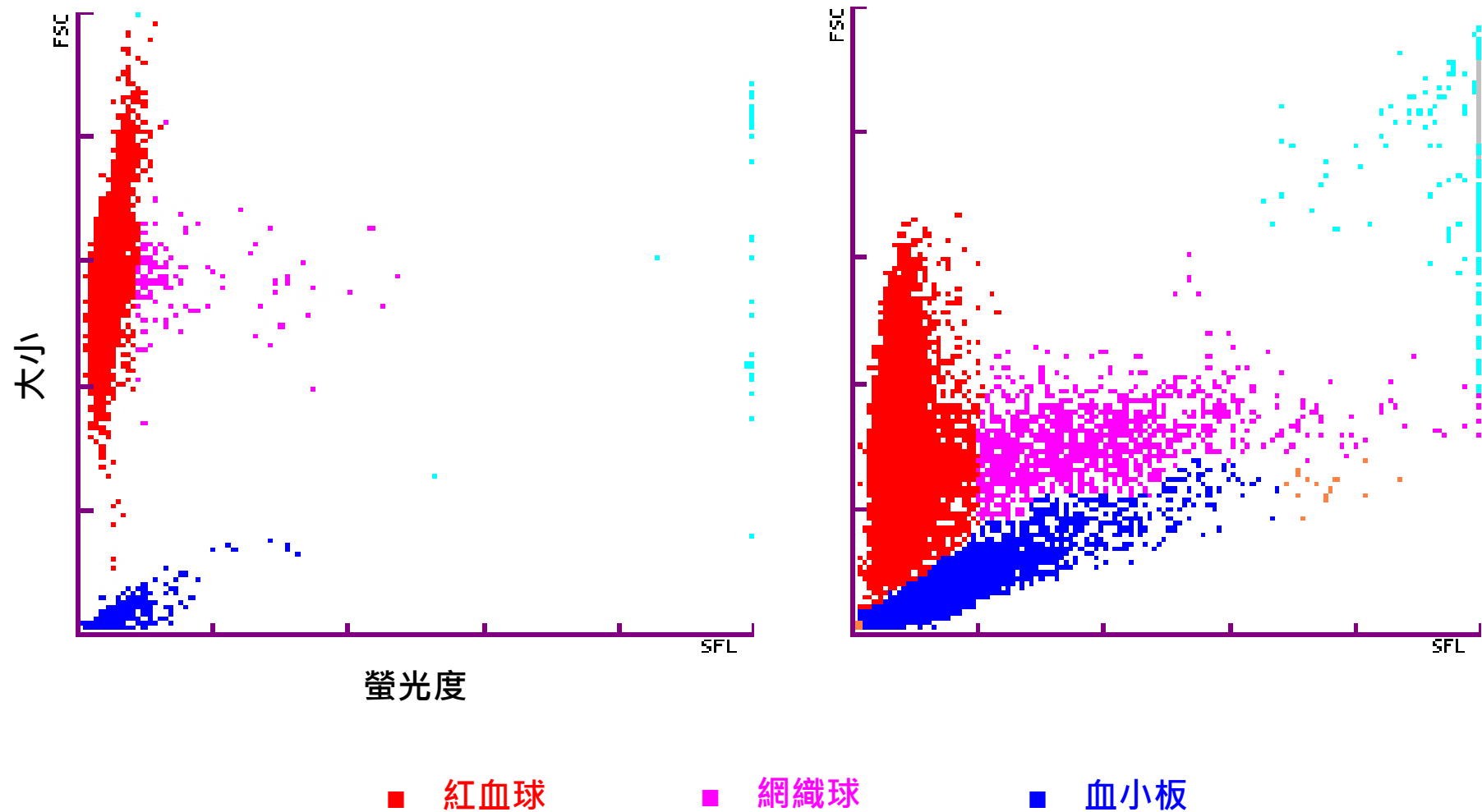


小型紅血球的檢測 (犬)

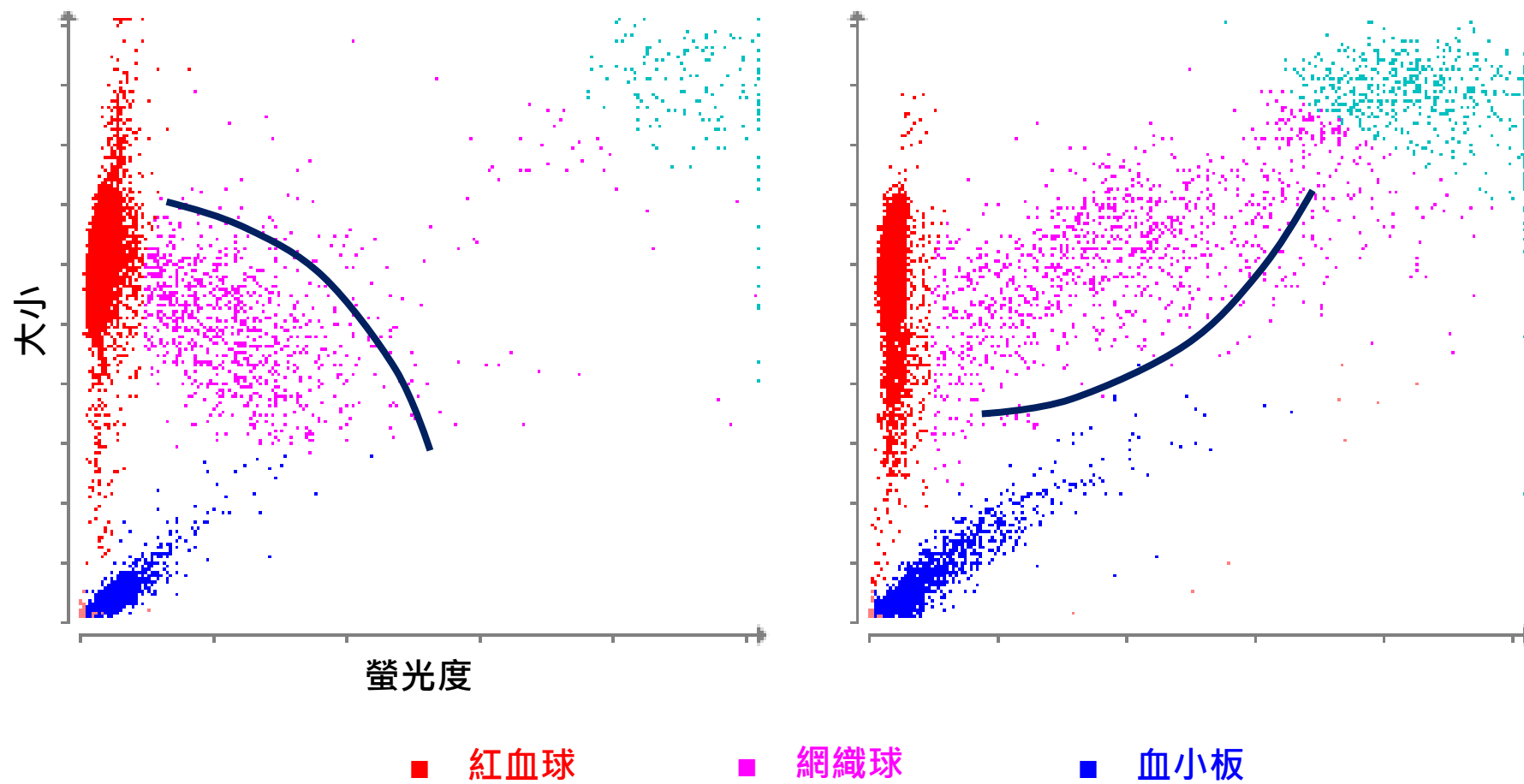




小型紅血球：缺鐵性貧血(犬)



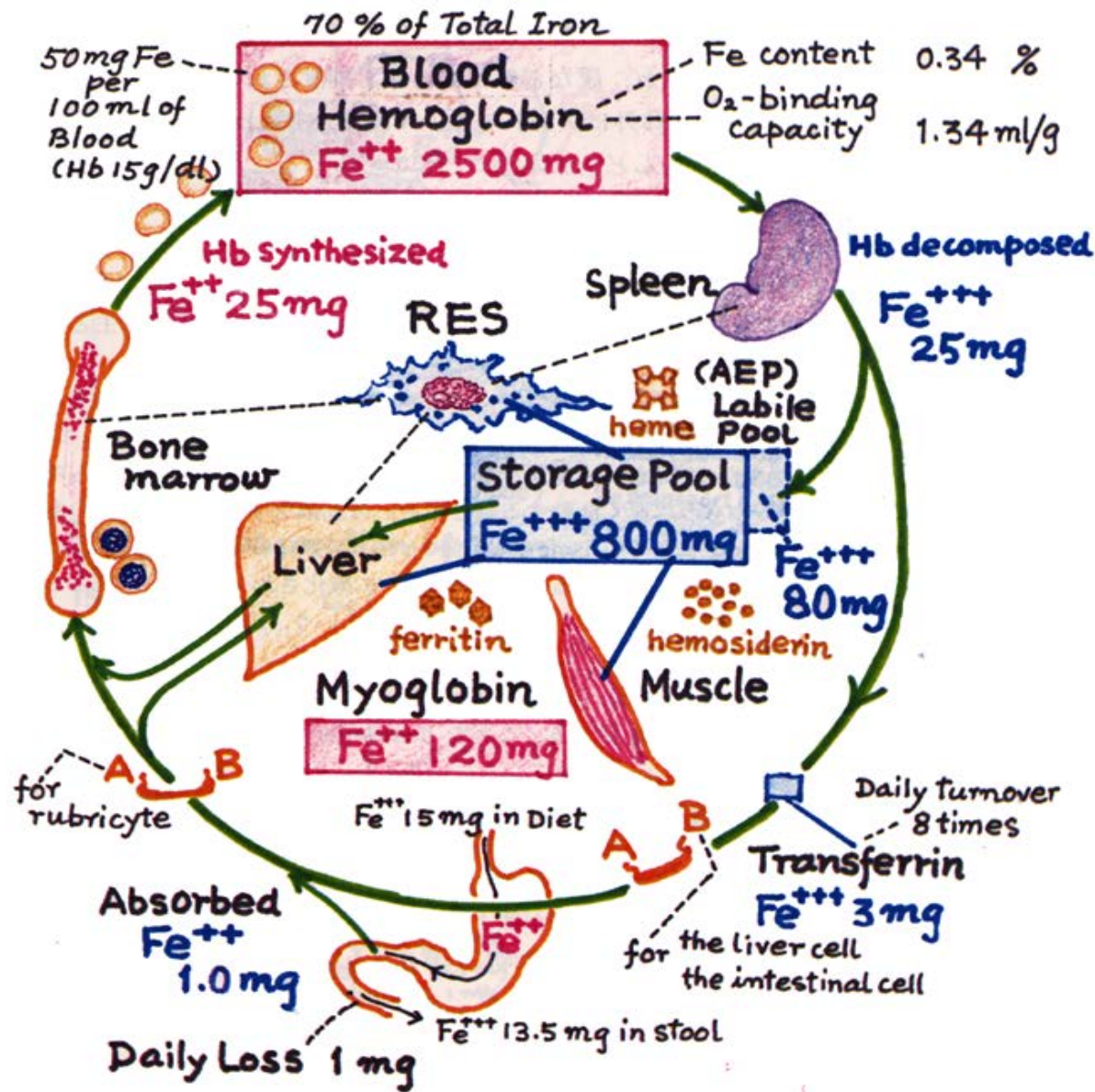
ProCyte Dx : 網織球



生物體內的鐵質代謝·儲存

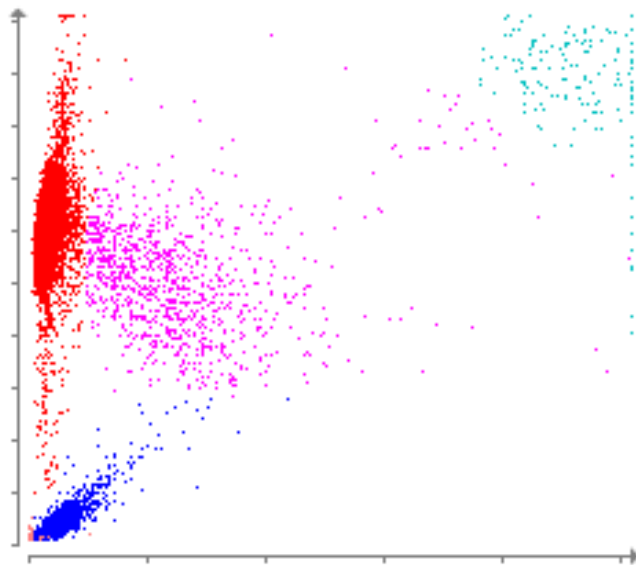
機能鐵

儲存鐵

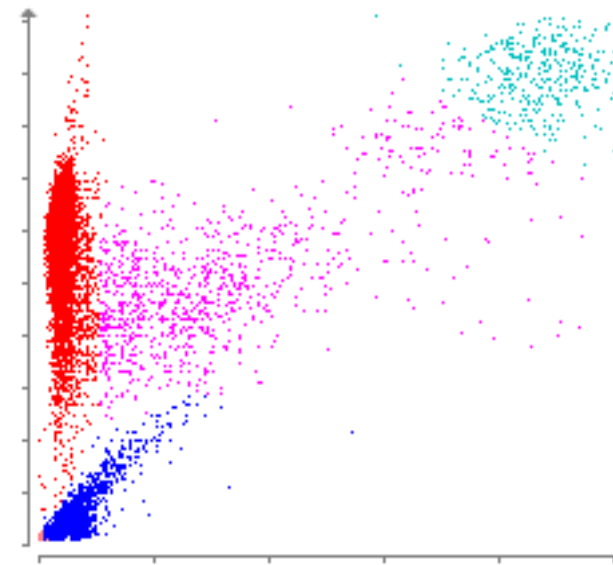


運送鐵

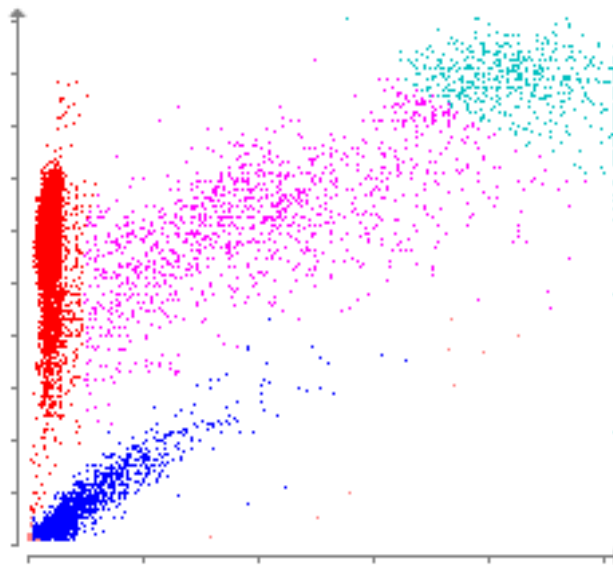
就診第 1 天



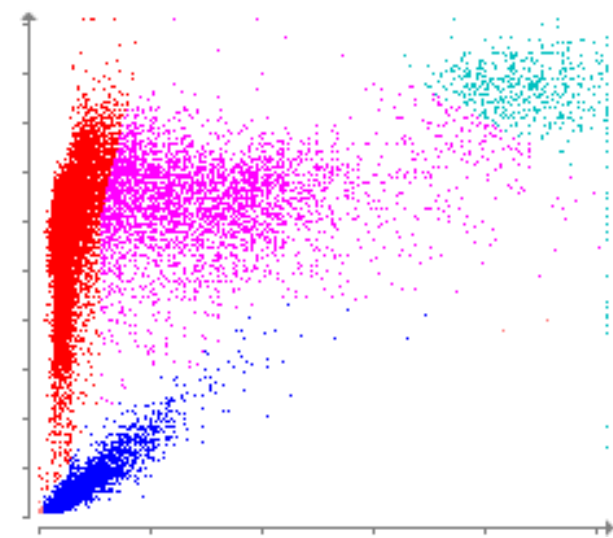
就診第 3 天



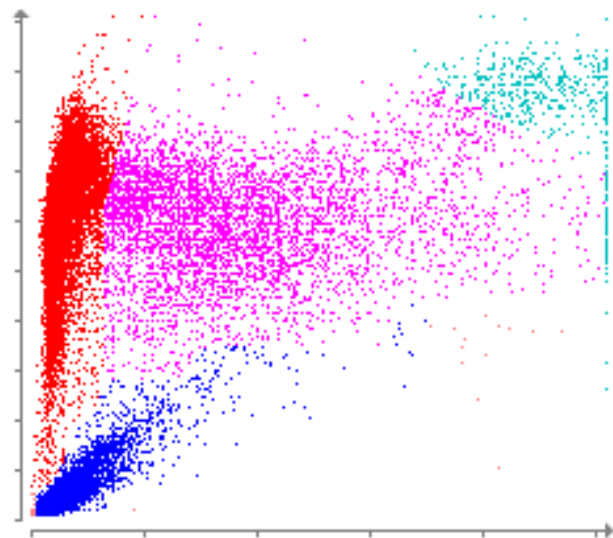
就診第 4 天



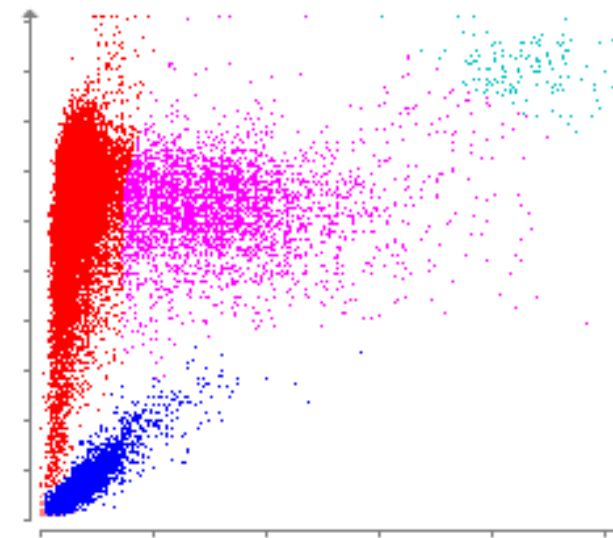
就診第 6 天



就診第 8 天



就診第 11 天



RETIC-HGB的減少 近期在紅血球生成時的鐵質利用能力下降

一般性的原因

- 慢性失血
- 炎症性疾病
- 失血與炎症性疾病的合併發生

非一般性的原因

- 肝門脈分流
- 腸道吸收減少（例：IBD或含鐵不足的飲食 [非常罕見] ）

其他的原因

- 品種相關的小型紅血球症（例：柴犬、秋田犬）

RETIC-HGB的增加（罕見）

- 紅血球生成障礙（例：FeLV、化療）
- 品種相關的大型紅血球症（例：迷你貴賓犬、玩具貴賓犬）
- Artifact：重度溶血

ProCyte Dx 紅血球系細胞

ProCyte Dx的優點

- 迅速且正確地計算網織球數 ⇒ 量（數目）上的檢查

必須以血液抹片來確認的項目

- 紅血球的形態學評估 ⇒ 質（型態）上的檢查



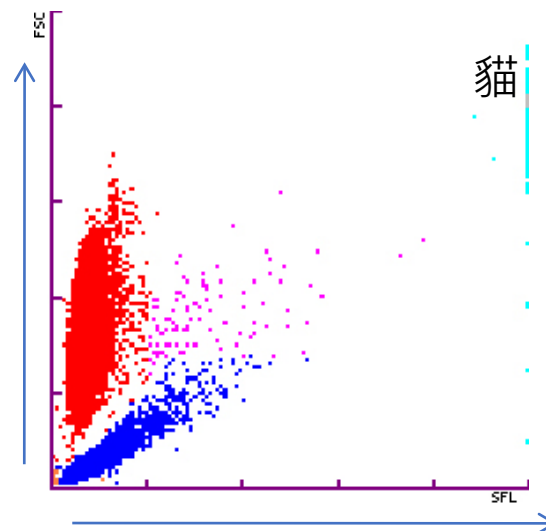
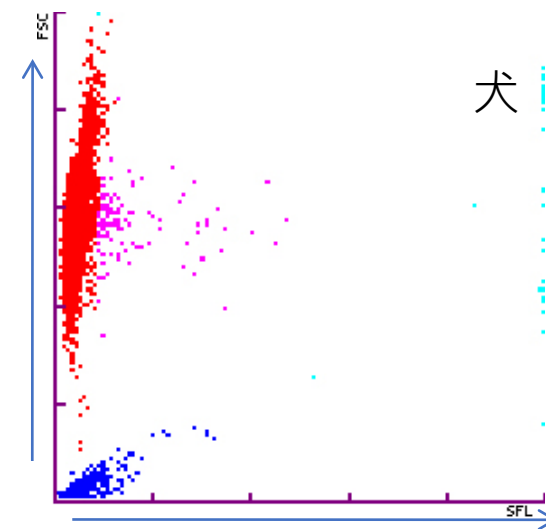
血小板 在狗跟貓的測定原理不同

犬：電阻抗法

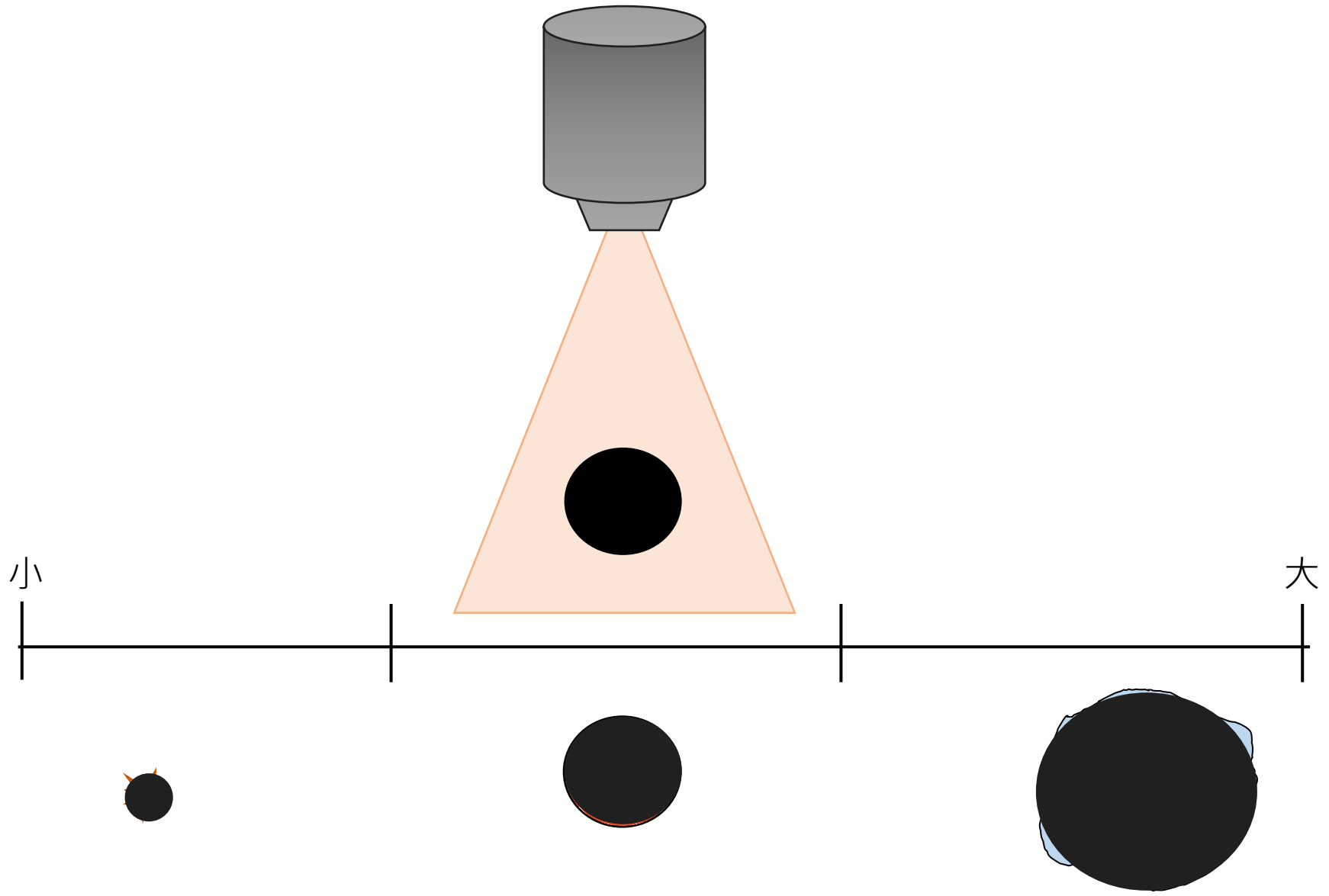
- 血小板數 (PLT)
- 平均血小板體積 (MPV)
- 血小板容積比 (PCT)
- 血小板分布寬度 (PDW)

貓：流式細胞分析法

- 血小板數 (PLT)
- 平均血小板體積 (MPV)
- 血小板容積比 (PCT)

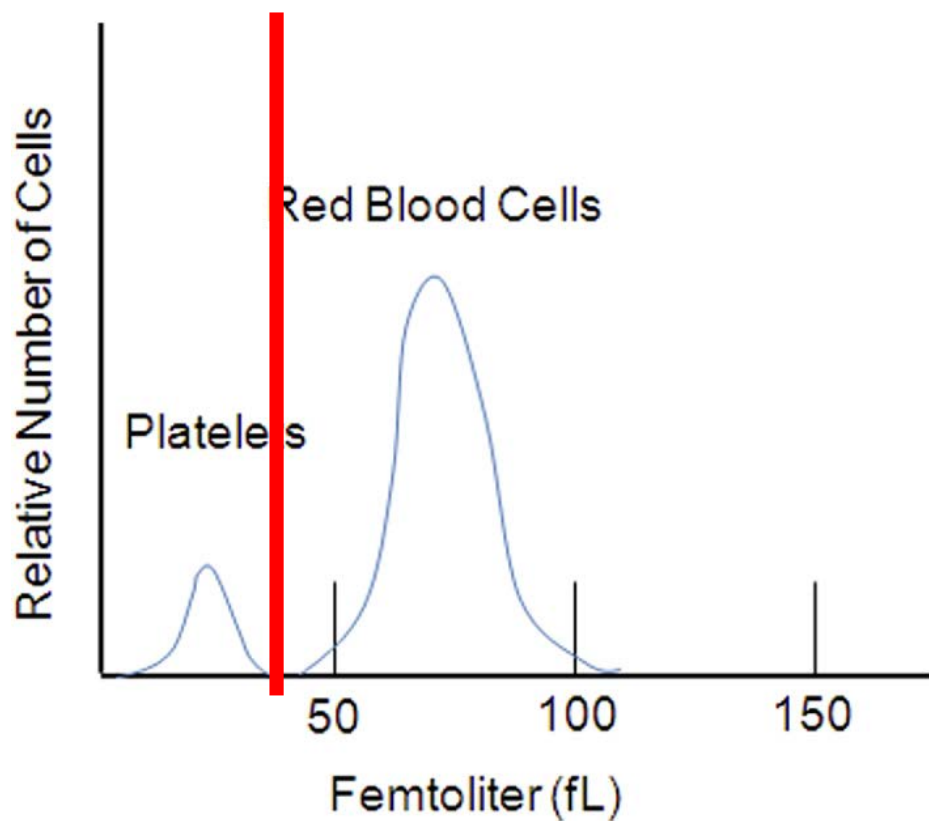


電阻抗法

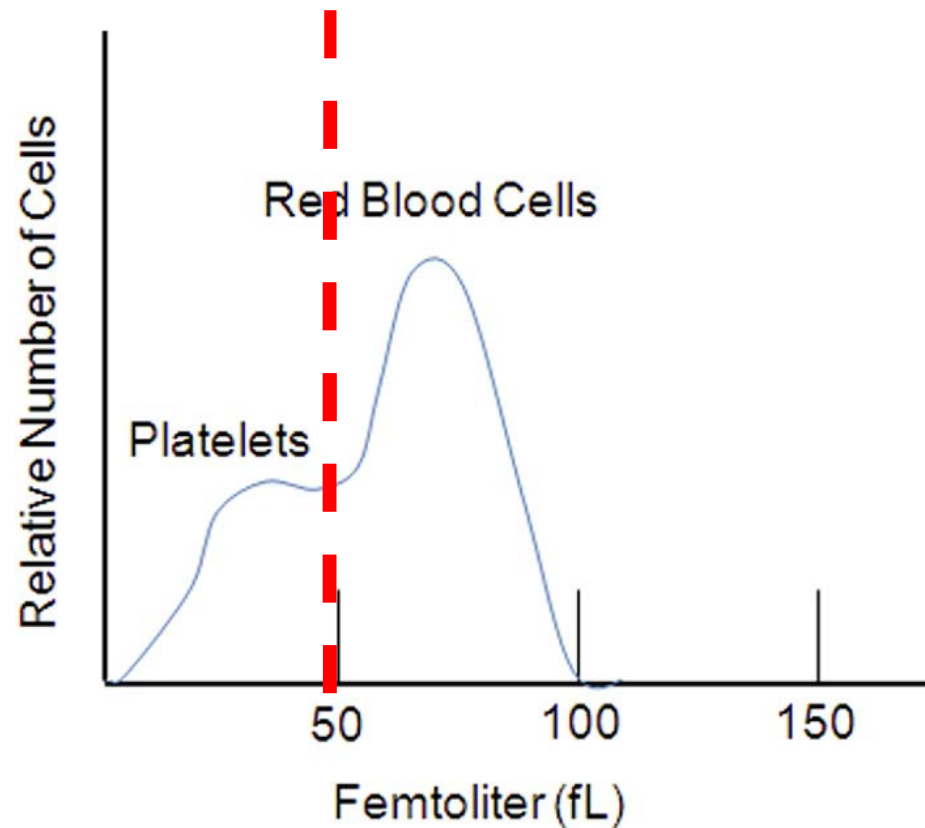


電阻抗法

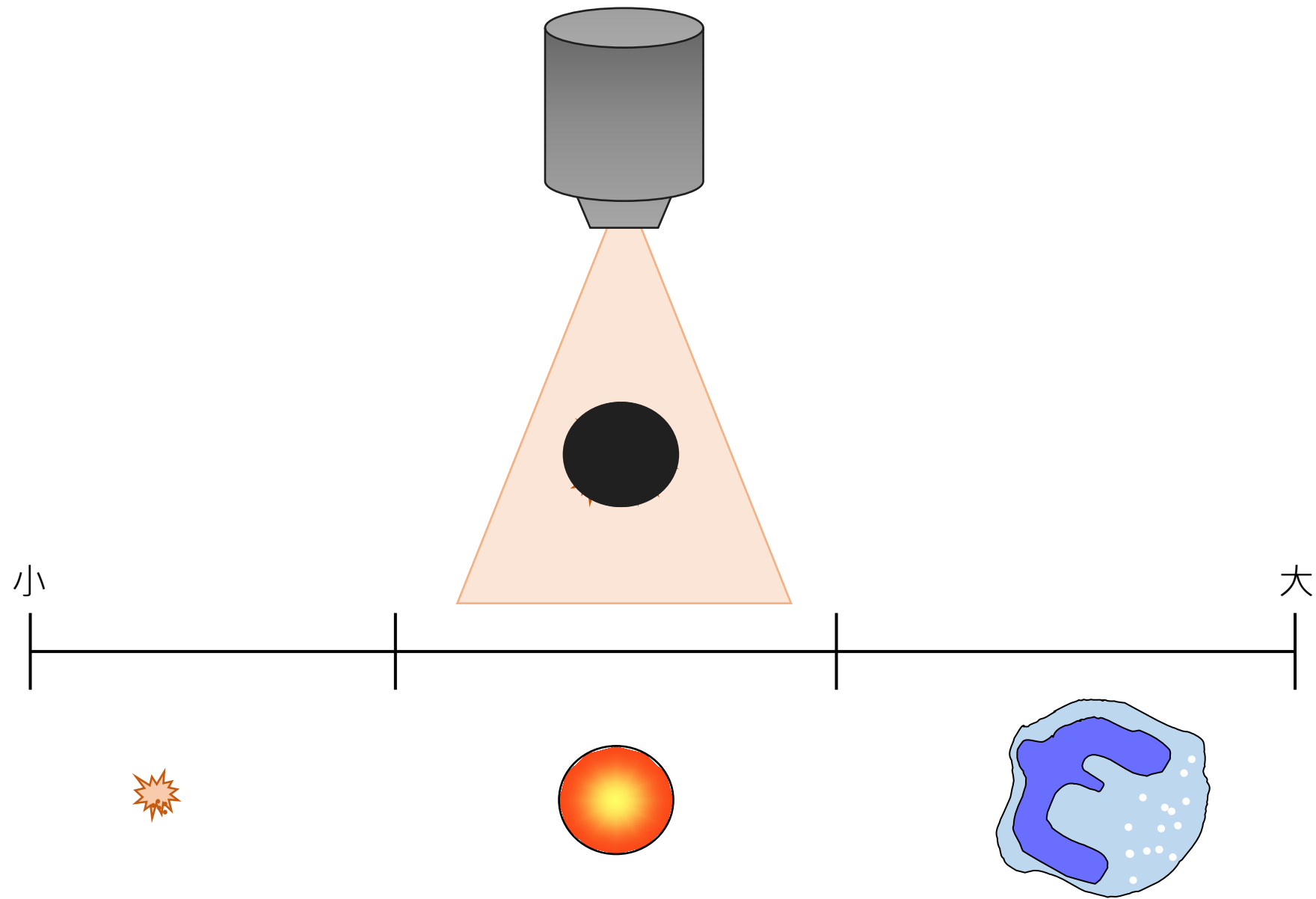
犬



貓

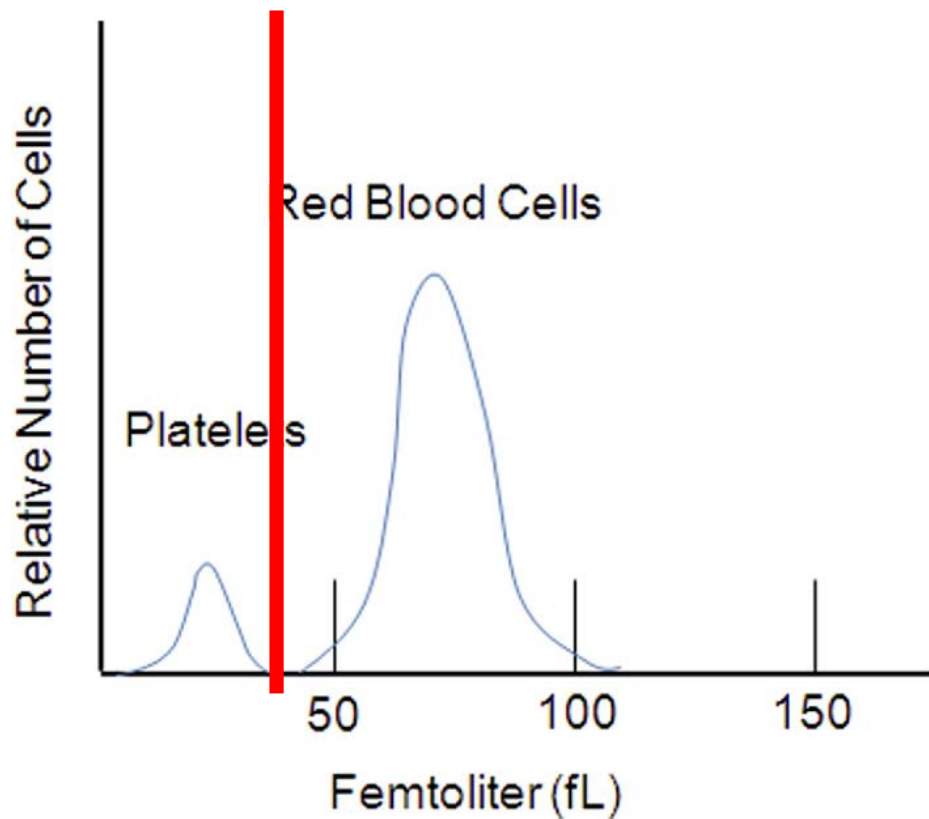


電阻抗法

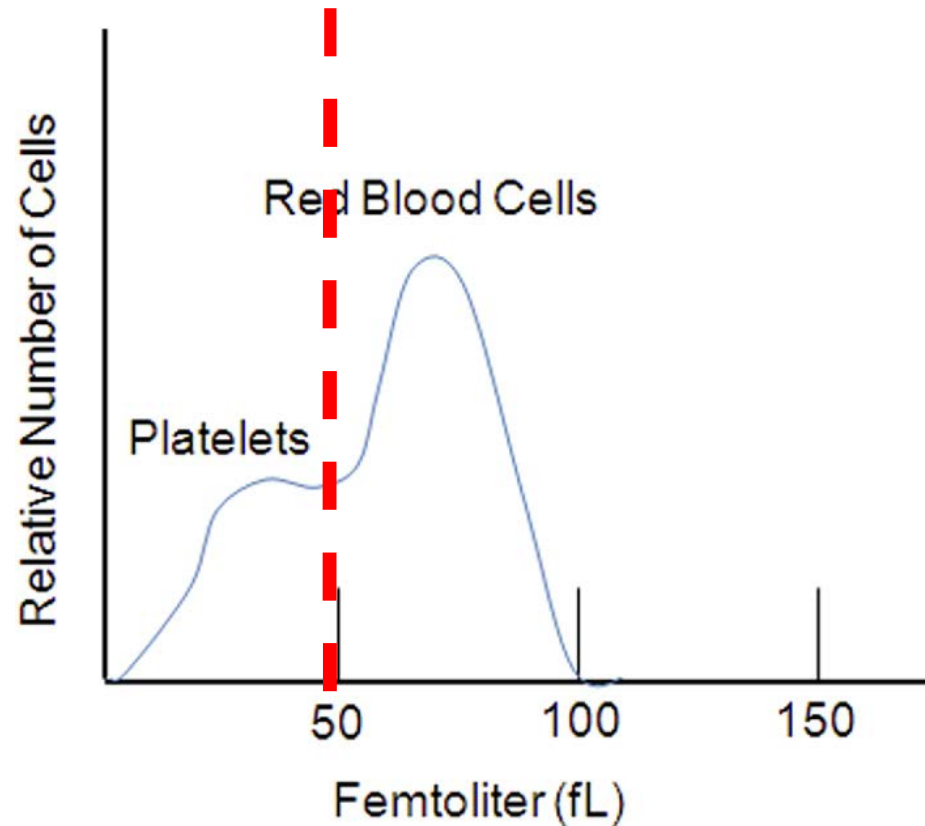


電阻抗法

犬

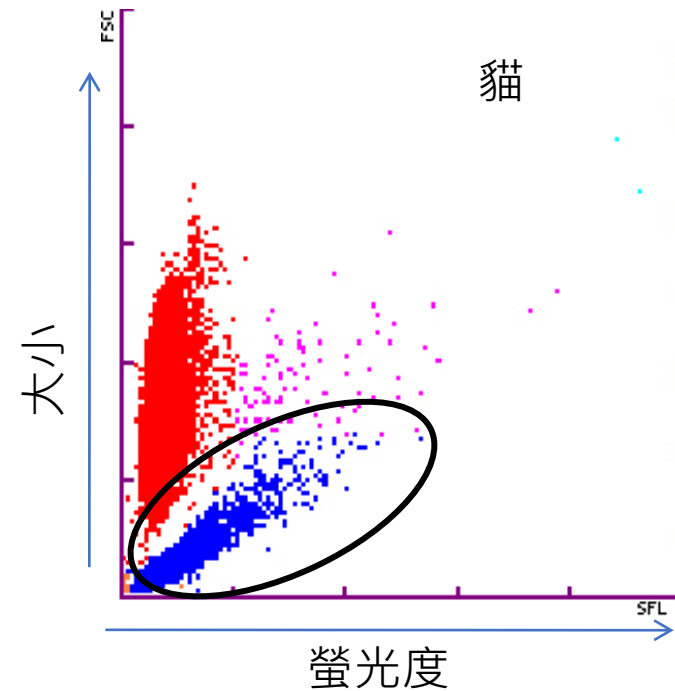
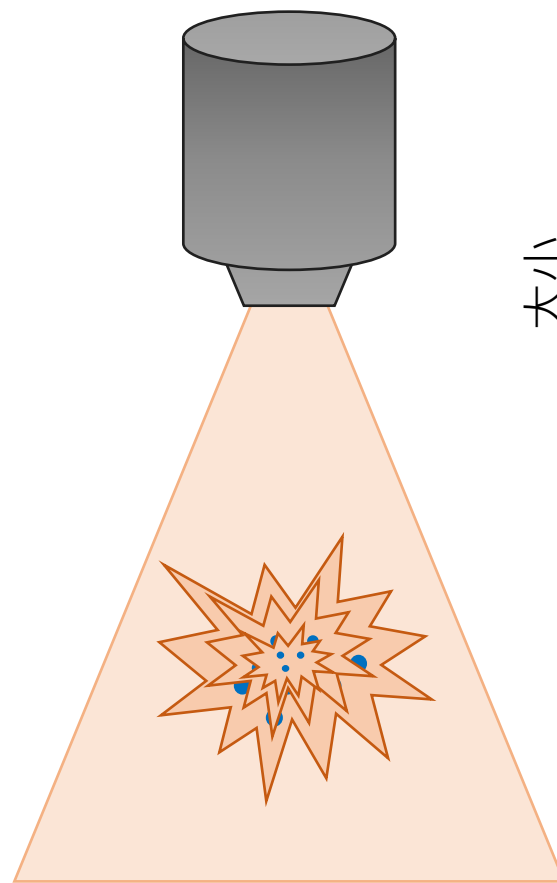


貓

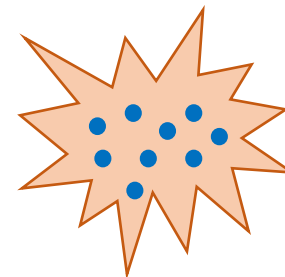
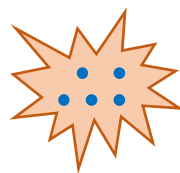


流式細胞分析法

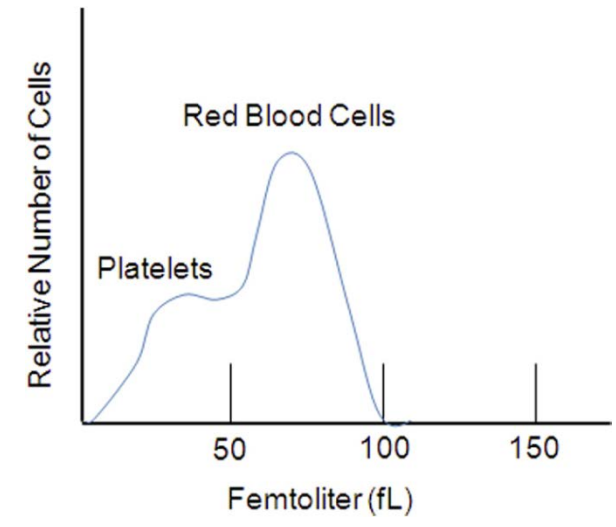
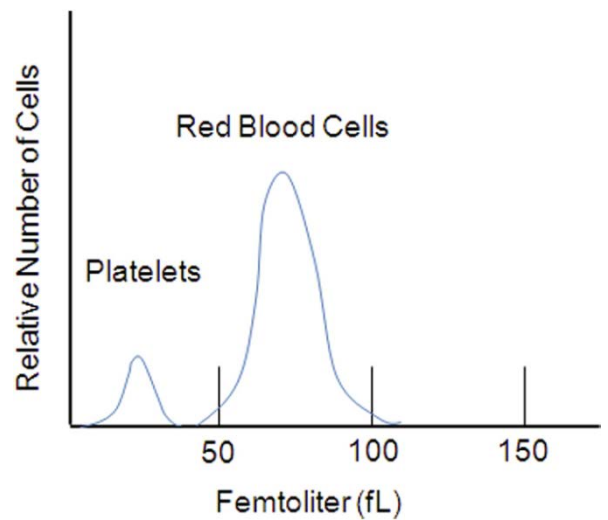
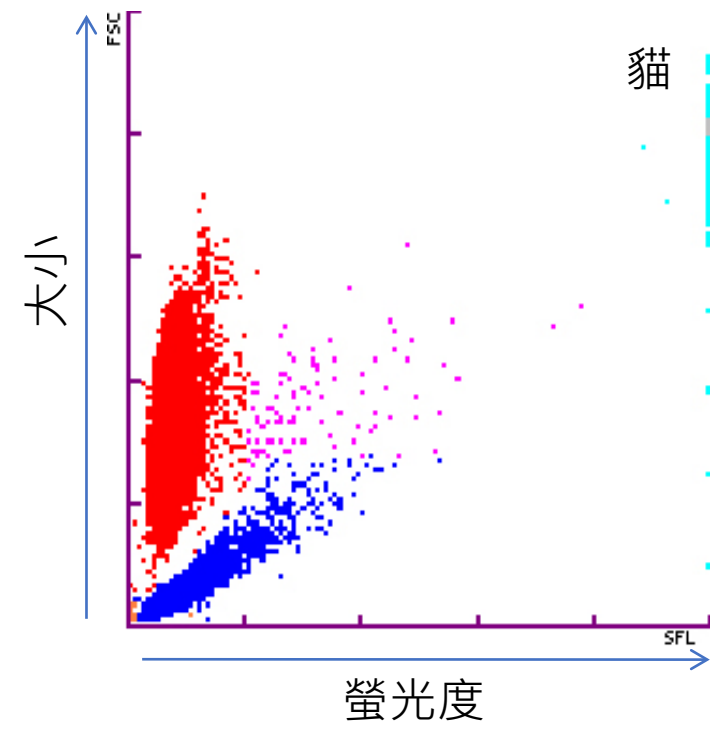
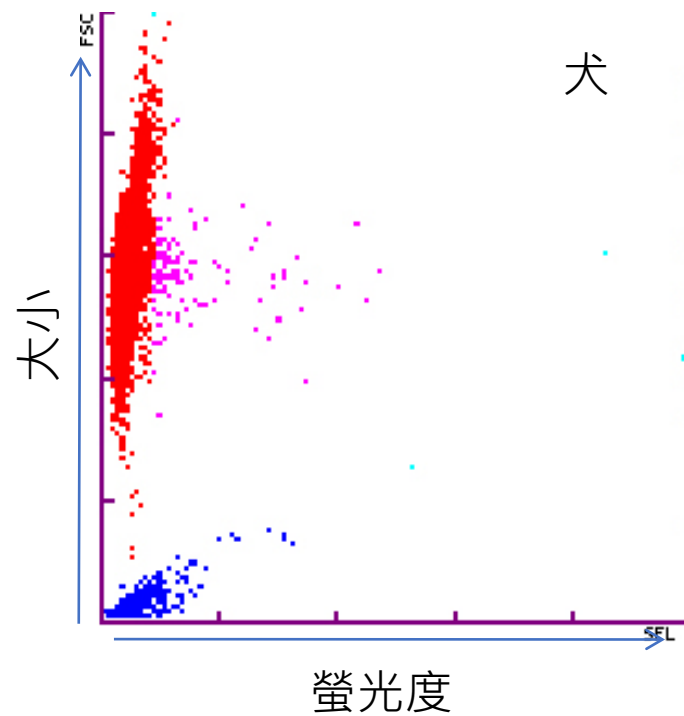
小
少



大
多



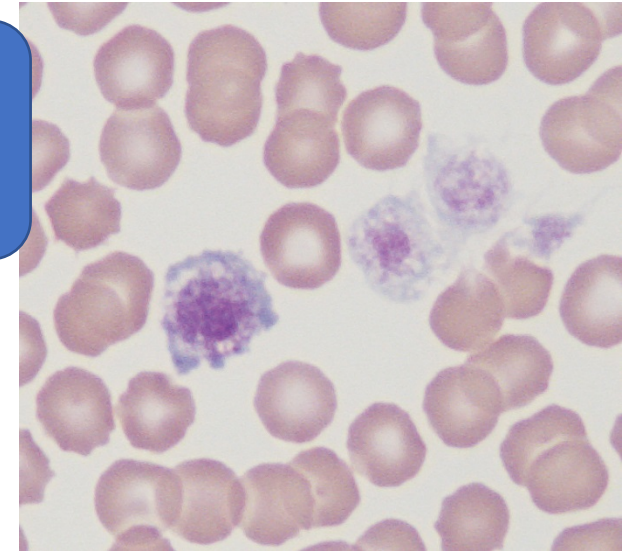
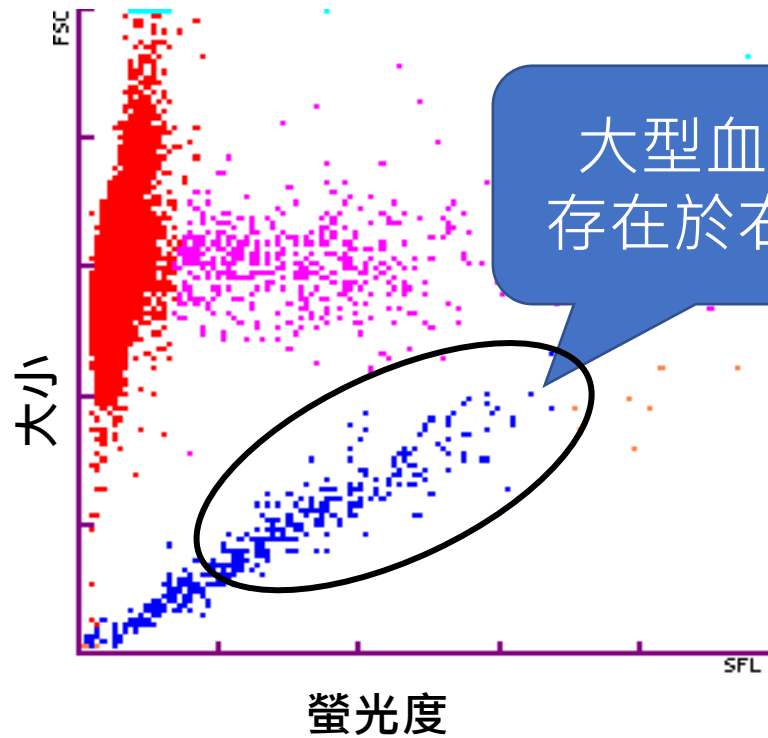
紅血球-血小板點狀圖



血小板 在ProCyte Dx的評估方法

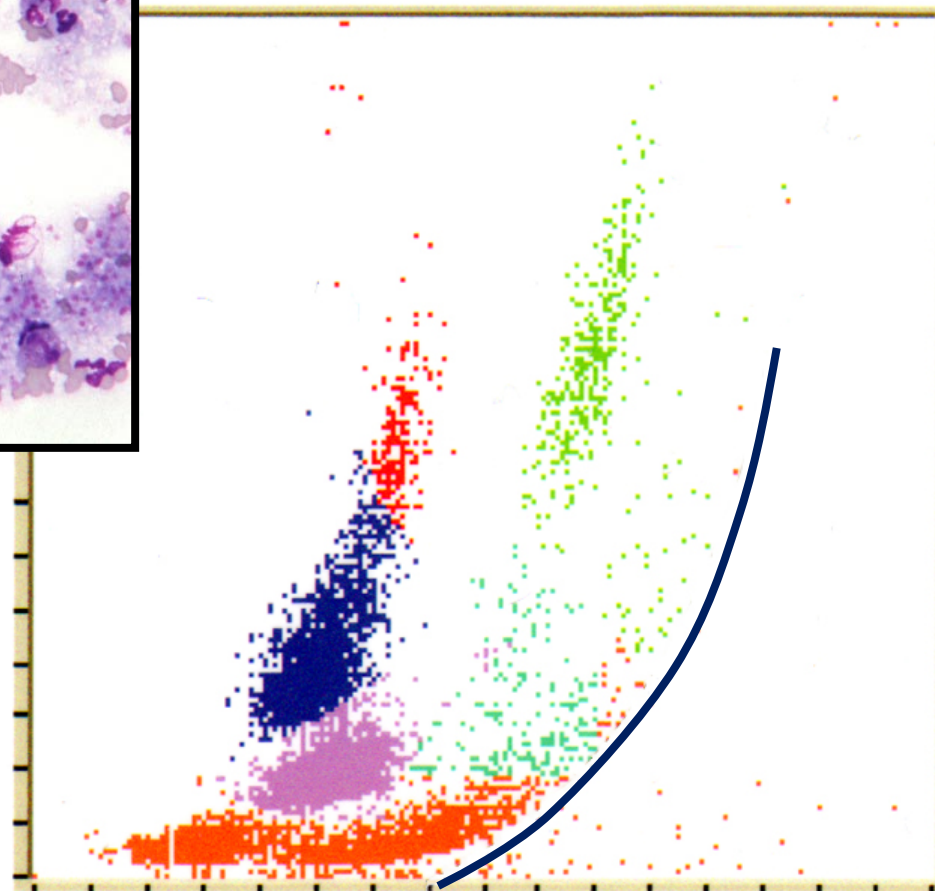
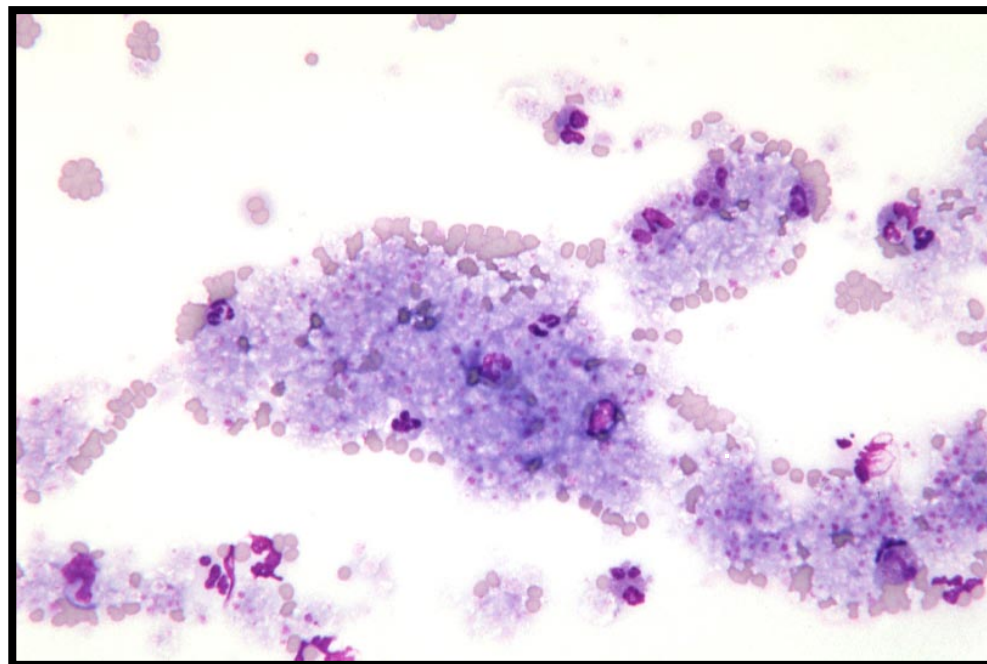
- 確認血小板總數
- 有無星號 (*)
- 點狀圖：
 確認大型血小板與血小板凝集塊的有無
- 血液抹片：
 概算血小板數、大型血小板、血小板凝集塊的確認

大型血小板



PLT	*14	K/ μ L	148 - 484	低值
MPV	----	fL	8.7 - 13.2	
PDW	----	fL	9.1 - 19.4	
PCT	----	%	0.14 - 0.46	

血小板凝集



ProCyte Dx 血小板系細胞

ProCyte的優點

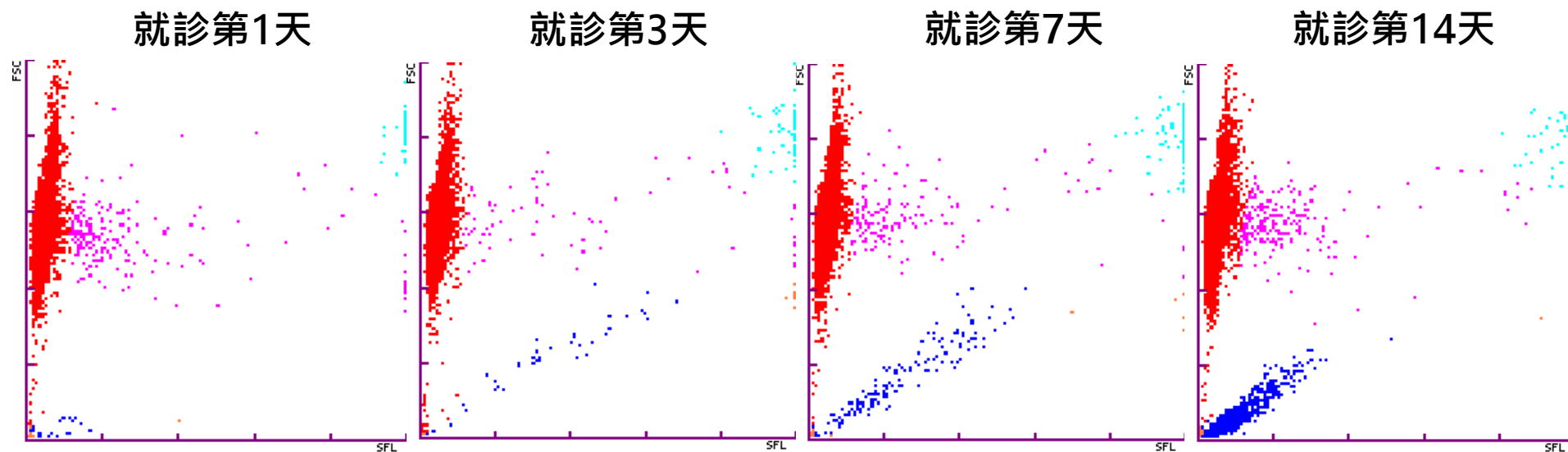
- 可以更正確地計算貓的血小板總數
- 可以視覺上確認大型血小板的有無

必須以血液抹片來確認的項目

- 包含大型血小板以及血小板凝集塊在內的犬之血小板總數的評估
- 血小板形態學的詳細評估



治療監控



	就診第1天	就診第3天	就診第7天	就診第14天
ProCyte 血小板總數	*0	*3	*49	263
抹片 血小板總數	1	20	163	286
抹片 大型血小板	+	+	++	-

ProCyte Dx 數據的判讀法

將點狀圖活用於診療上

判讀數據（數值）時的重點

- 確認星號（*）的有無
 - 出現時需確認的事項

點狀圖判讀的重點

- 與正常點狀圖進行比較
- 確認星號出現的原因
- 超越一般分布界線的點群（細胞集塊）的有無