



HØGSKOLEN I SØR-TRØNDELAG
AVDELING FOR MAT- OG MEDISINSK
TEKNOLOGI
BIOINGENIØRUTDANNINGEN

Kandidatnr:					
Eksamensdato:	24. november 2006				
Varighet:	09.00 – 14.00				
Fagnummer:	LO 220H				
Fagnavn:	Medisinsk laboratorieteknologi modul 3				
Klasse(r):	3.BIO				
Studiepoeng:	12 of 15				
Faglærer(e):	Anne Lise Hjertø/ Shahnaz Rahimipoor m.fl.				
Hjelpemidler:	None				
Oppgavesettet består av:	2 parts; Part 1: Hematology, 2 questions Del 2: Immunohematology, 2 questions + 1 attachment				
Vedlegget består av:					
Lykke til!					

NB!

Questions 1 and 2 weight 50 %

Questions 3 and 4 weight 50 %

Part 1 - HEMATOLOGY

Question1

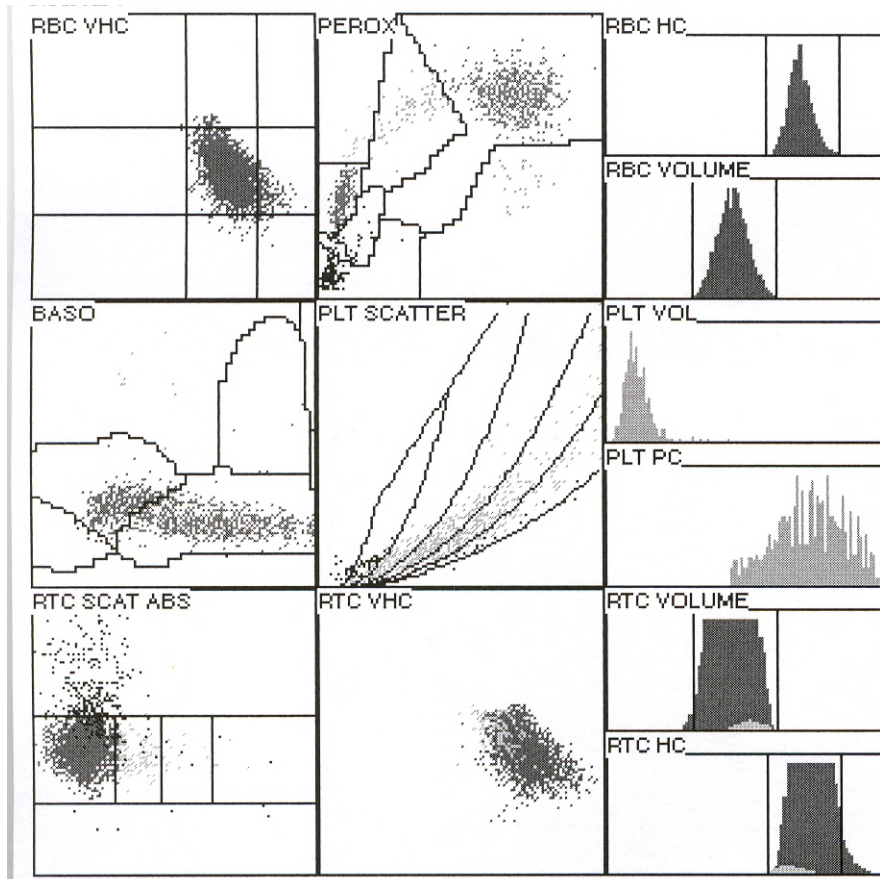


Figure 1 – cytograms and histograms from ADVIA 120

a)

Erythrocytes

In figure 1 you can see cytograms and histograms from Advia 120. Give an interpretation of the cytograms and histograms representing the *erythrocytes*. Also explain the *analytical principles* that are the basis for these cytograms/histograms.

Could an examination of a blood smear give the same information about the erythrocytes? Explain!

b)

Reticulocytes

Give an interpretation of those cytograms and histograms in figure 1 that are related to the *reticulocytes*. Also explain the *analytical principles* that are the basis for these cytograms/histograms.

What advantages do you think an automatic reticulocyte count has to a manual count?

c)

Anemia

Explain the main features of the *morphologically classification of anemia*.

Explain how the cytogram RBC VHC (figure 1) can be useful in such a classification.

Anemia can also be classified into 3 main groups according to the *pathophysiological* cause of the disease. Explain the main features of this method of classification.

Explain how the cytogram RTC SCAT ABS can be useful in the pathophysiological classification of anemia.

Question 2

Hemostasis

a)

Explain the analytical principle of PT-INR and the method of clot-detection on Thrombolyzer, KC4 and manual method (water bath).

b)

Describe at least 4 preanalytical variables which are relevant for hemostasis specimen and explain why they can influence the test results.

c)

Explain the function of antitrombin 3 (AT3) in normal hemostasis.

What is the clinical relevance of AT3?

Antithrombin activity may be measured using a chromogenic substrate assay.

In this assay plasma is mixed with reagents containing heparin, factor Xa and chromogenic substrate. Explain the function of these reagents in measuring antithrombin activity.

PART 2- IMMUNOHEMATOLOGY

Please, begin with a new sheet.

Question 3

- a) Explain the following terms:
- Sensitive red blood cells
 - Antibody-screening
 - Fenotype
 - D^u
 - Jk^a
- b) What is H substance and explain how the antigens in the ABO-system are developed. Explain how the naturally occurring antibodies of the ABO-system are developed.
- c) Describe the principle of the direct anti-human globulin test (DAT), and the indirect anti-human globulin test (IAT).
Give some examples when you would use these techniques and explain why.
- d) The whole blood is sectioned in blood components.
Explain the production process, quality control, and storage condition for SAGMAN blood and platelets.

Question 4

A 45- year-old woman is admitted to hospital for treatment, and 4 units of SAGMAN blood (red blood cells) are requested for her. During the last 5 years she has been transfused with 10 units of SAGMAN blood.

- a) Blood samples are drawn from the patient and ABO-typing, Rh-typing and antibody screening are performed.

The following results are obtained:

ABO-typing:

	Anti-A	Anti-B	A ₁ -cells	B-cells
Blood type A, control	4+	-	-	3+
Blood type B, control	-	4+	3+	-
Patient's sample	-	4+	3+	-

Rh-typing:

	Anti-C	Anti-D	Anti-c	Anti-E	Anti-e
R ₁ R ₂ control	2+	3+	2+	2+	2+
rr control	-	-	3+	-	3+
Patient's sample	4+	3+	-	-	3+

Question 4 - continues

Antibody screening:

	Screening cell I O Rh(pos) R ₁ R ₂		Screening cell II O Rh(pos) R ₁ R ₁		Screening cell III O Rh(neg) rr	
	1.reading [*]	2.reading ^{**}	1.reading [*]	2.reading ^{**}	1.reading [*]	2.reading ^{**}
Anti-D control	-	4+	-	4+	-	-
Anti-E control	-	3+	-	-	-	-
Patient's sample	-	3+	-	-	-	-

* 1. reading taken after 10 minutes incubation at room temperature (RT).

** 2. reading taken after 15 minutes incubation at +37 °C and addition of LISS and anti-human globulin reagent (AHG).

- indicate none visible agglutination.

2+, 3+, 4+ indicates the relative degree of agglutination with 4+ as the highest.

- **Discuss these results.**
Determine the patient's ABO type and most probable Rh genotype.
- **Explain the results of the antibody screening.**

b) The patient's sample is examined for antibody identification.
The conclusion is that the patient has developed anti-E.

- **Explain through the attached antigen-table (antigen-chart), how this conclusion can be taken.**
- **Which blood type in the ABO-system and the Rh-system will you select for the transfusion to this patient? Give the reasons for your answer.**
- **Which other pre-transfusions tests would you perform for this patient? Explain your answer.**
- **What can happen if this patient is transfused with E+(pos)-blood ?**

Rh-ir	Spender Donor Donneur	Rh-ir					Kell					Duffy	Kidd	Lewis	P	MNS		Luth.	Xg		Spez. Antigene Special types Antigènes part.								
		D	C	E	c	e	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P ₁			M	N	S	s	Lu ^a	Lu ^b	Xg ^a
1	C ^w CD.ee R ₁ ^w R ₁	+	+	0	0	+	+	0	+	+	0	+	+	0	+	0	0	0	+	+	0	+	0	0	+	+	+	+	1
2	CCD.ee R ₁ R ₁	+	+	0	0	+	+	0	+	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+	+	2
3	ccd.EE R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	+	0	+	0	+	0	+	+	0	0	+	0	+	0	+	+	3
4	Ccddee r'r	0	+	0	+	+	0	0	+	0	+	0	+	+	+	0	0	0	+	0	+	0	+	+	0	+	+	+	4
5	ccddeE r'r	0	0	+	+	+	0	0	+	0	+	0	+	+	+	0	+	+	+	+	0	+	+	+	+	+	+	+	5
6	ccddeE rr	0	0	0	+	+	0	+	+	0	+	0	+	+	0	0	+	0	+	+	+	+	+	+	0	+	0	+	6
7	ccddeE rr	0	0	0	+	+	0	0	+	0	+	0	+	0	+	+	0	+	0	+	+	0	+	0	+	0	+	0	7
8	ccd.ee RoR	+	0	0	+	+	0	0	+	0	+	0	+	0	0	+	0	0	0	+	0	0	+	+	+	+	0	+	8
9	ccddeE rr	0	0	0	+	+	0	0	+	0	+	0	+	0	+	0	0	0	0	0	0	0	+	0	+	+	+	+	9
10	ccddeE rr	0	0	0	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	0	+	+	+	10
11	ccddeE rr	0	0	0	+	+	0	0	+	+	0	+	+	0	0	+	0	0	+	+	0	+	0	+	0	+	0	+	11

