Challenges and everyday life in immunohematology laboratories: Case Studies

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NACIONALINIS
KRAUJO
CENTRAS

Vilnius, 2025

Declaration of interests

I have nothing to declare

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About us...

The public Institution National Blood Center, established by the Ministry of Health of Lithuania, is the largest blood establishment, collecting more than 70% of all blood donations in Lithuania.

In 2009, the Public Institution National Blood Center became first blood donation establishment to be certified in accordance with the requirements of the ISO 9001 standard

Participating in External Quality Assurance programs: Labquality, Instand, EQUALIS

Since 2017 all blood donors have been donating voluntarily and without remuneration

The number of voluntary, unpaid donations in 2024 was ~ 77 000

National Blood Center – 76898
Vilnius University Hospital Santaros Klinikos – 26253
The Hospital of Lithuanian University of Health Sciences Kauno klinikos - 14512

https://kraujodonoryste.lt/apie-mus/kas-mes-esame/
https://www.hi.lt/uploads/Institutas/padaliniai/KDR/2024/KDR_statistika_2024_metine.pdf

NACIONALINIS KRAUJO CENTRAS

Work in the Immunohematology Laboratory

2009 - 2015
Galileo
(Immucor)

2018 – 2020
Galileo Neo
(Immucor)

2015 - 2018
Qwalys 3
(Diagast)

2023 - Now Neo
Iris (Immucor)

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Remote Validation Tool - ImmuLINK

Status	Edited	Repeated	Test	Donor ID	Donor Type	Test Type	Result Value	Date Time Result Value	Lot ID	User Edited Value	Date Time Edited Value	Date Time Approved	Approved By	Date Time Transmitted	Transmitted by	History
☐	⚠	✎	D_ABDFULL			Final	O RH+	9/19/2025 10:45 PM	UD304							⟲
☐	▲		Pool_Cell			Final	Negative	9/19/2025 11:46 PM	CW444			9/19/2025 11:39 PM		9/19/2025 11:39 PM		⟲

Status	Edited	Repeated	Test	Donor ID	Donor Type	Test Type	Result Value	Date Time Result Value	Lot ID	User Edited Value	Date Time Edited Value	Date Time Approved	Approved By	Date Time Transmitted	Transmitted by	History
☐	✖		D_ABDFULL			Final	A RH+	9/19/2025 8:50 PM	UD304							⟲

Status	Edited	Repeated	Test	Donor ID	Donor Type	Test Type	Result Value	Date Time Result Value	Lot ID	User Edited Value	Date Time Edited Value	Date Time Approved	Approved By	Date Time Transmitted	Transmitted by	History
☐	?	✎	D_ABDFULL			Final	AB RH+		-							⟲

NACIONALINIS KRAUJO CENTRAS

Case No. 1

Donation: L03032401011521

Donation date: 2024-07-24

Sex: female

Age: 45

Frequency / number of donations: 1 time per year / 3

Case No. 2

Donation: L03032500105321

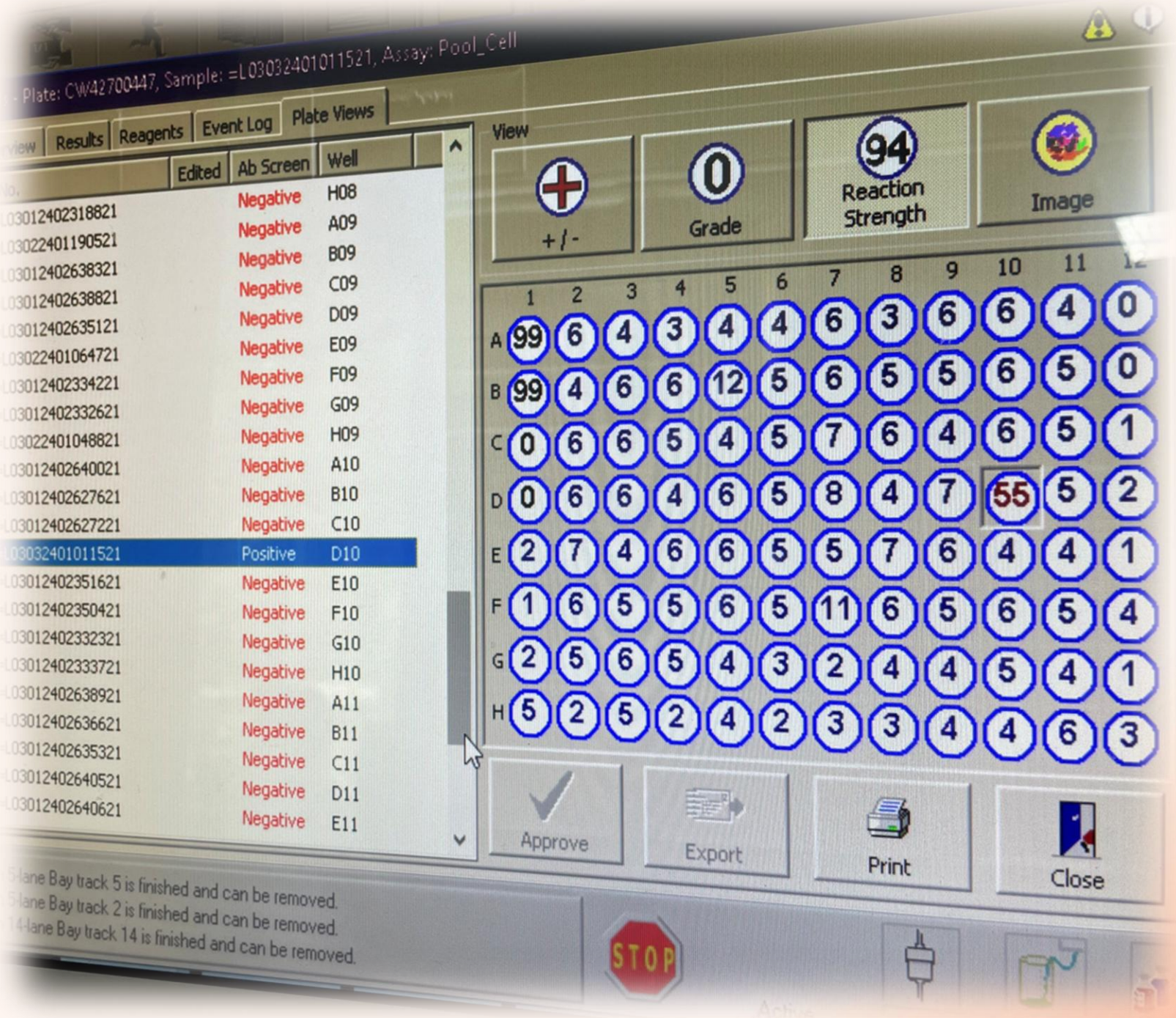
Donation date: 2025-01-09

Sex: female

Age: 43

Frequency / number of donations: 3-4 times per year / 31

NACIONALINIS KRAUJO CENTRAS



Case No. 1 (2)

- Immune anti-erythrocyte antibodies: ***Positive*** (automated method), reaction strength **55 (+2)**
- DiaCell I,II,III (Bio - Rad): ***Negative***
- Direct Coombs test: ***Positive***

Conclusion:

- The reaction for immune anti-erythrocite antibodies is ***positive.***
- The direct Coombs test is ***positive*** and should be repeated at the next donation.

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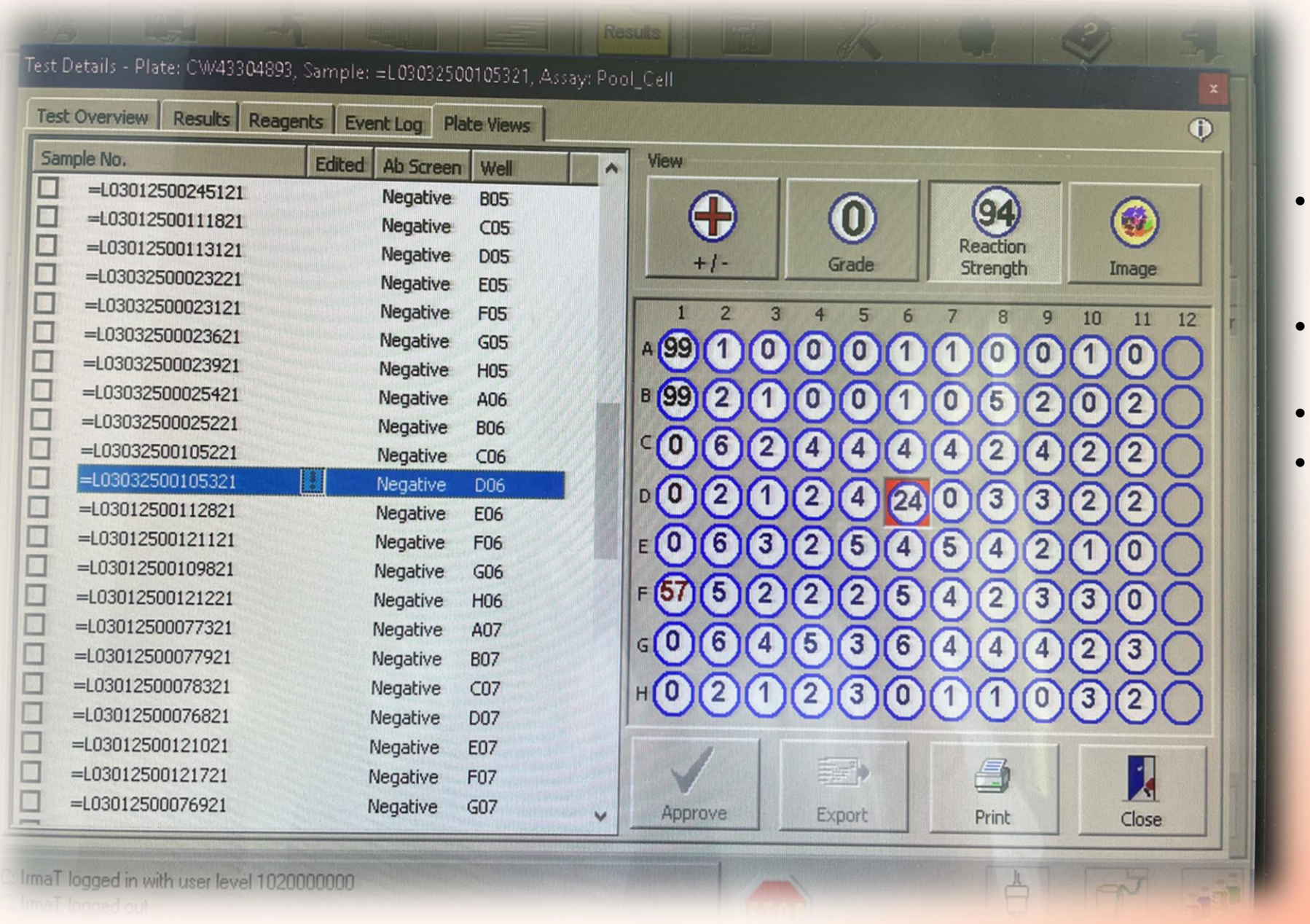
Case No. 2 (2)



- Immune anti-erythrocyte antibodies : ***?*** (automated method), reaction strength **24 (?)**
- DiaCell I,II,III (Bio - Rad): ***Negative***
- Direct Coombs test: ***Positive***
- The Direct Coombs test is ***Positive.*** A repeat test is recommended after 6 months.

NACIONALINIS KRAUJO CENTRAS

Case No. 3

Donation: L03022500366821

Donation date: 2025-02-28

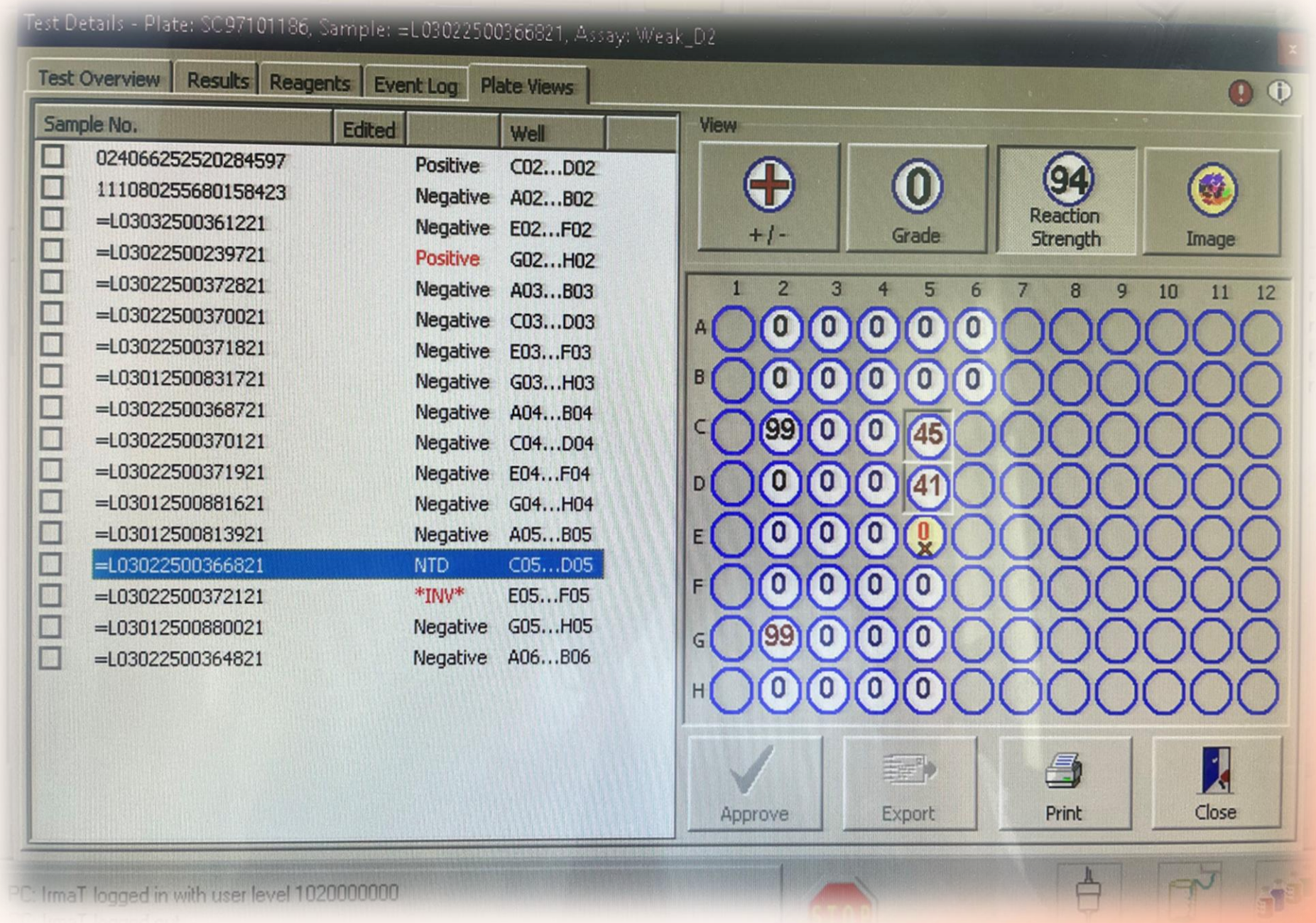
Sex: male

Age: 23

Frequency / number of donations: first time donor

NACIONALINIS KRAUJO CENTRAS

Case No. 3 (2)



- Weak D Control : ***Positive***
- Direct Coombs test: ***Positive***

- **Conclusion: a Positive Direct Coombs test** may produce a potentially false positive weak D result and a positive control. Therefore, the reaction was not evaluated.
- **Recommendation:** at the next donation, only Weak D and the Direct Coombs tests should be performed.

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Case No. 4

Donation: L03012505617721

Donation date: 2025-09-30

Sex: female

Age: 28

Frequency / number of donations: one time per year / 3

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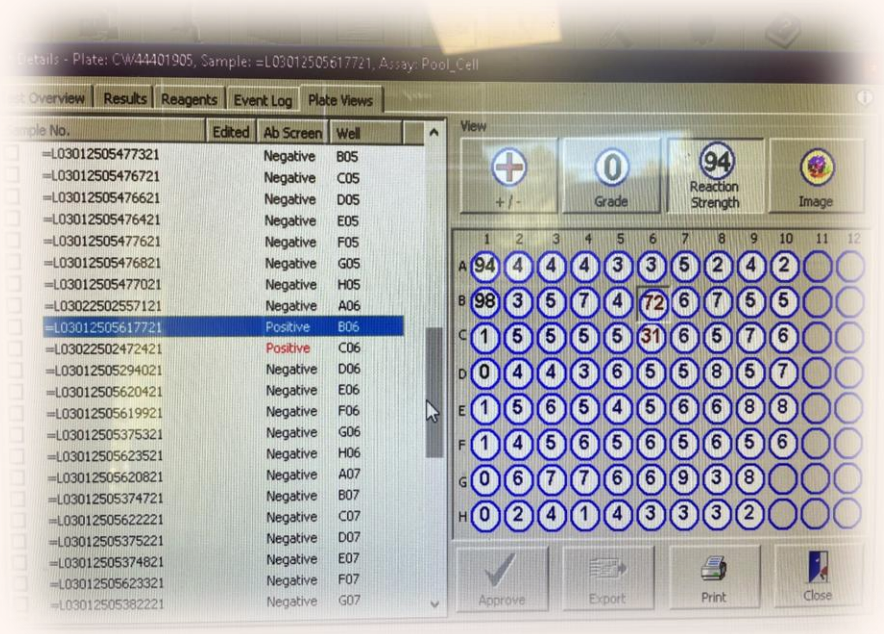
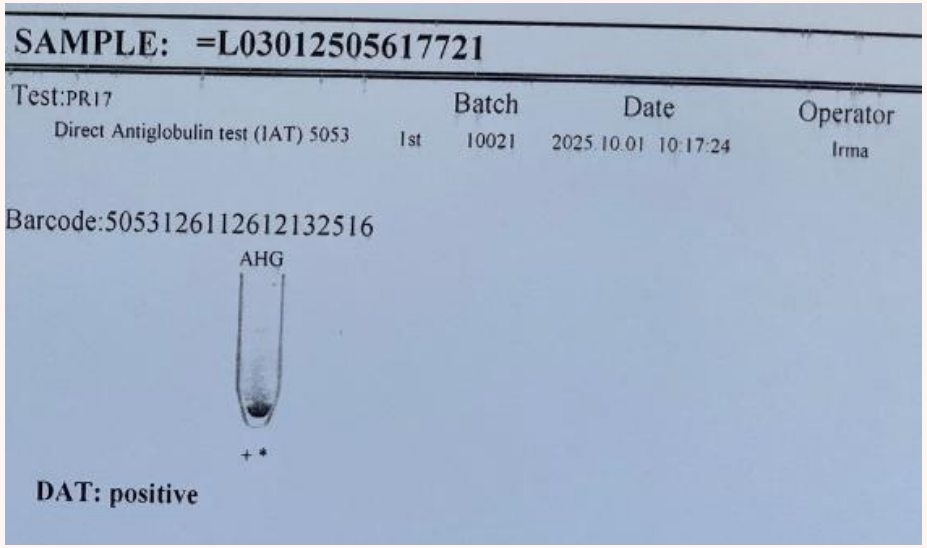
Case No. 4 (2)



- Immune anti-erythrocyte antibodies : ***Positive*** (automated method), reaction strength **77**
- DiaCell I,II,III (Bio - Rad): ***Positive in all three DiaCell's***
- Direct Coombs test: ***Positive*** (+1)



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Case No. 4 (3)

Tyr. data **2025-10-01** Pacientas **L03012505617721**
Lytis **M** Gimimo data Amžius
Siuntimo įstaiga **VšĮ Nacionalinis kraujo centras**
Gydytojas **RAŠČIŪTĖ**
Ėminys paimtas **2025-10-01 00:00** priimtas **2025-10-01 12:39** Ėminys / mėginys **Kraujas (violetinis)**

Tyrimas	Rezultatas	Pamatinių biologinių verčių intervalai ar klinikinių sprendimų vertės	M L
Kumbso reakcija			
Tiesioginė Kumbso reakcija IgG	TEIGIAMA		M41 L1
Tiesioginė Kumbso reakcija C3d	NEIGIAMA		M41 L1
Tiesioginė Kumbso reakcija ctl	NEIGIAMA		M41 L1
Netiesioginė Kumbso reakcija	**TEIGIAMA**	NEIGIAMA	M41 L2
Pastabos: IgG1+			
Antikūnų identifikavimas			
Antikūnų identifikavimas	NEAIŠKUS		M40 L3
Antikūnų identifikavimas po eliucijos	TEIGIAMAS		M40 L4
Pastabos: eliuate- autoantikūnai			
Atliko:			
Patvirtino: 2025-10-01 21:28;			

Antikūnų identifikavimo tyrime iš plazmos - antikūnų specifiškumas neaiškus. Tiesioginė Kumbso reakcija teigiama: IgG(1+), todėl atliktas eliuatas. Eliuato tyrime - autoantikūnai.

Antibody identification was referred to an **external laboratory.**

Antibody identification : Inconclusive
Eluate: **Autoantibodies detected**

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Case No. 5

Donation: L03022300514421

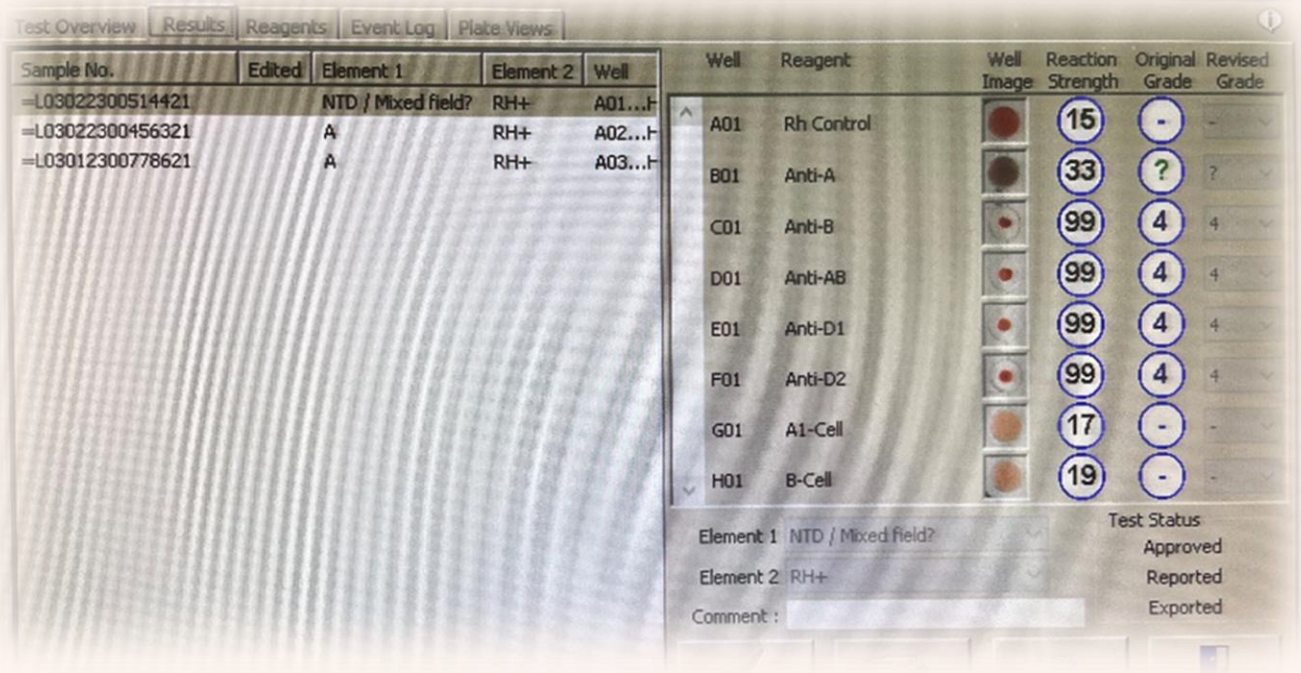
Donation date: 2023-03-30

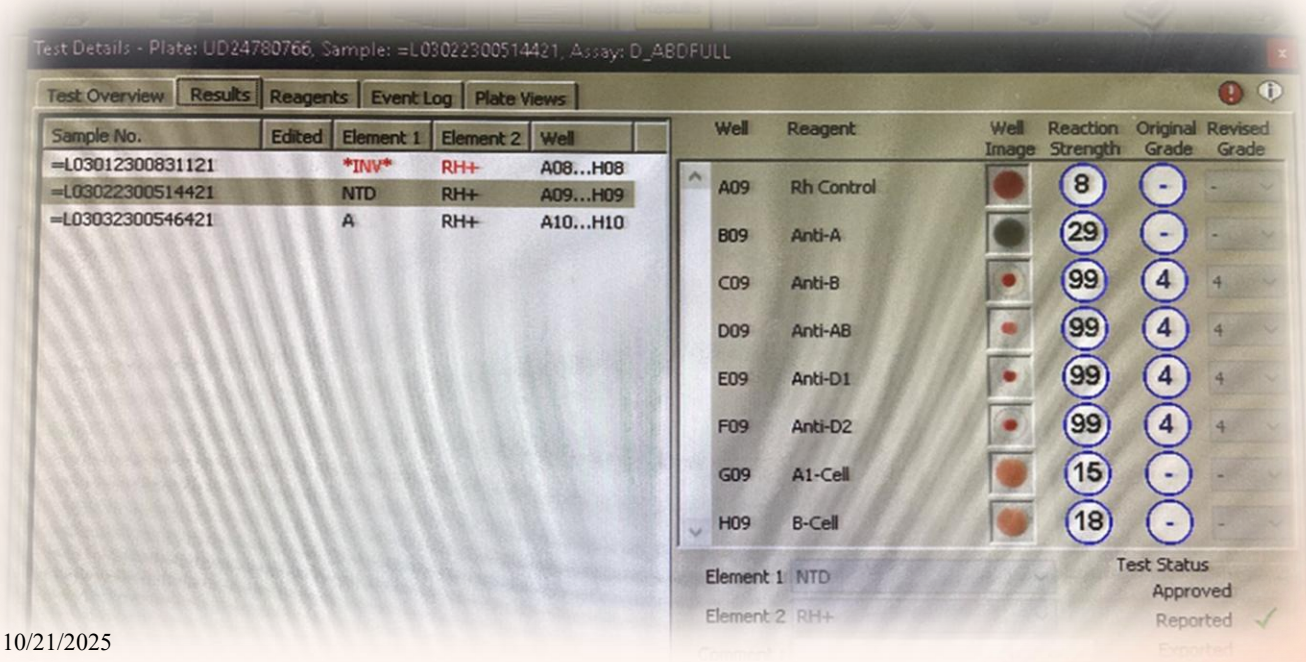
Sex: male

Age: 40

Frequency / number of donations: first time donor

NACIONALINIS KRAUJO CENTRAS





Case Nr. 5 (2)

- Blood group reaction could not be assessed by the automated method. Determination **by antigen – B RhD Positive (?)** ; determination **by antibody – AB RhD**;

- External laboratory confirmation: Blood group – indeterminate, RhD +, anti – A / anti – B – not detected. Recommendation: **A antigen determination by PCR genotyping.**

NACIONALINIS KRAUJO CENTRAS

Tyrimų protokolas

Tyr. data 2023-03-31 Pacientas L03022300514421
Lytis V Gimimo data Amžius
Siuntimo įstaiga VšĮ Nacionalinis kraujo centras
Ėminys paimtas 2023-03-31 00:00 priimtas 2023-03-31 13:43 Ėminys / mėginys Kraujas (violetinis)

Tyrimas	Rezultatas	Pamatinių biologinių verčių intervalai ar klinikinių sprendimų vertės
Kraujo grupės nustatymas		
Kraujo grupė DiaClon ABD	NEAIŠKI	
RHD	TEIGIAMAS	
Kraujo grupė DG ABO/Rh(2D)	NI	
RHD	TEIGIAMAS	
Antikūnai anti-A	NERASTA	
Antikūnai anti-B	NERASTA	
Pastabos: antigeną A nustatyti genotipavimu.		
Atliko:	: 2023-03-31 19:33;	
Patvirtino:	2023-03-31 19:52;	
Kraujo grupių genotipavimas		
ABO kraujo grupės genotipavimas		
ABO kraujo grupės genotipas	*O *B *A1 [1]	
ABO kraujo grupės fenotipas	NEAIŠKI	
Pastabos: Tikralaikės PGR rezultatas patikslintas sekvenuojant. Nustatytas chimerizmas.		

Case No. 5 (3)

ABO genotype: *O / *B / *A1

ABO phenotype: Unclear

Chimerism was identified.

The donor was invited for consultation.

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Cause	Explanation	Frequency / Notes
Twin chimerism	During fetal development, twins may exchange hematopoietic stem cells through shared placental circulation	Rare; more likely in twin or multiple pregnancies
Transfusion – related chimerism	After massive blood transfusions, donor erythrocytes may temporarily coexist with recipient cells without completely replacing them	Temporary; disappears within weeks as transfused red cells are cleared
Bone marrow / Stem cell transplantation	Donor stem cell engraft in the recipient's bone marrow and produce erythrocytes. Mixed hematopoiesis (recipient + donor) may occur.	Common after transplantation; can be long - term or permanent
Congenital chimerism (embryo fusion)	Extremely rare event where two embryos fuse early in development, resulting in one individual with two genetic cell lines	Very rare; usually detected incidentally
Microchimerism	Small numbers of foreign hematopoietic cells persist (e.g. maternal – to – fetal or fetal – to – maternal transfer)	Relatively common but usually clinically insignificant; difficult to detect with routine testing
Oncological / hematological disorders	Certain leukemias or other bone marrow diseases may alter antigen expression on erythrocytes, mimicking chimerism	Very rare; observed only in specific cases

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Case No. 6

Donation: L03012500754721

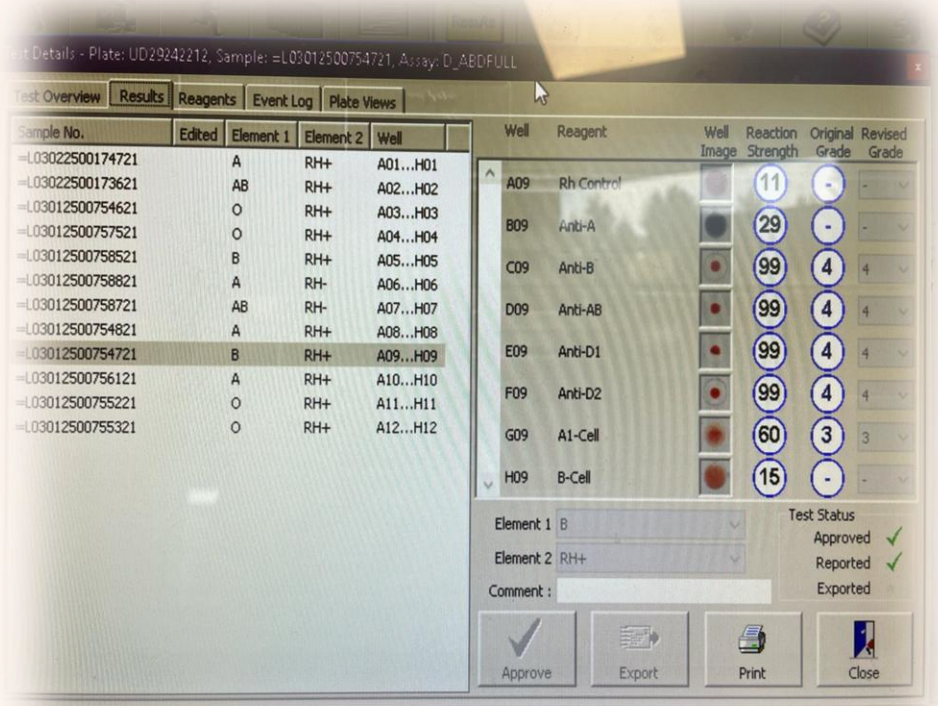
Donation date: 2025-02-10

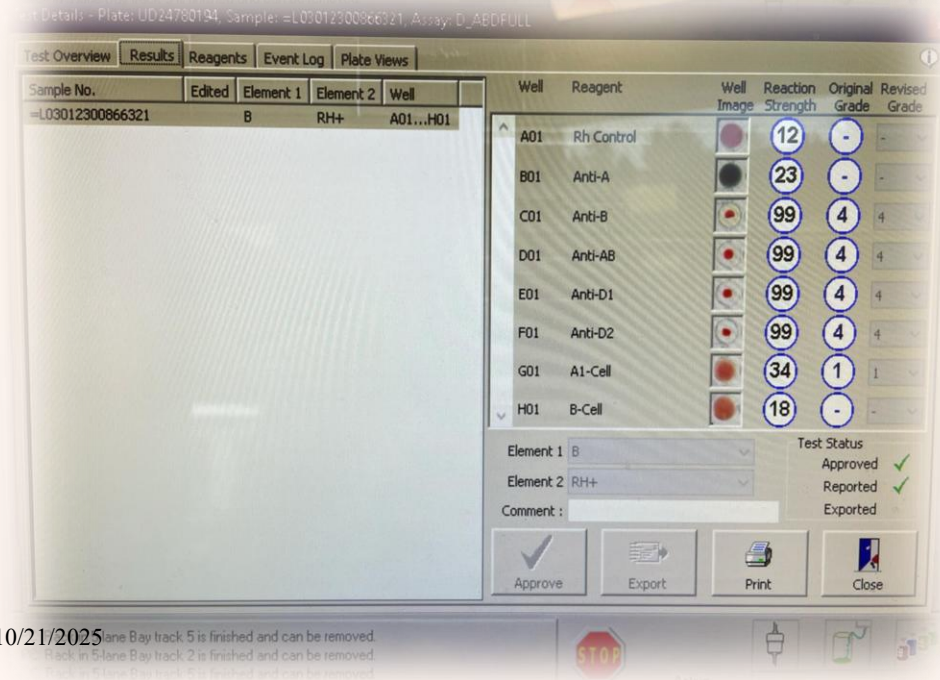
Sex: female

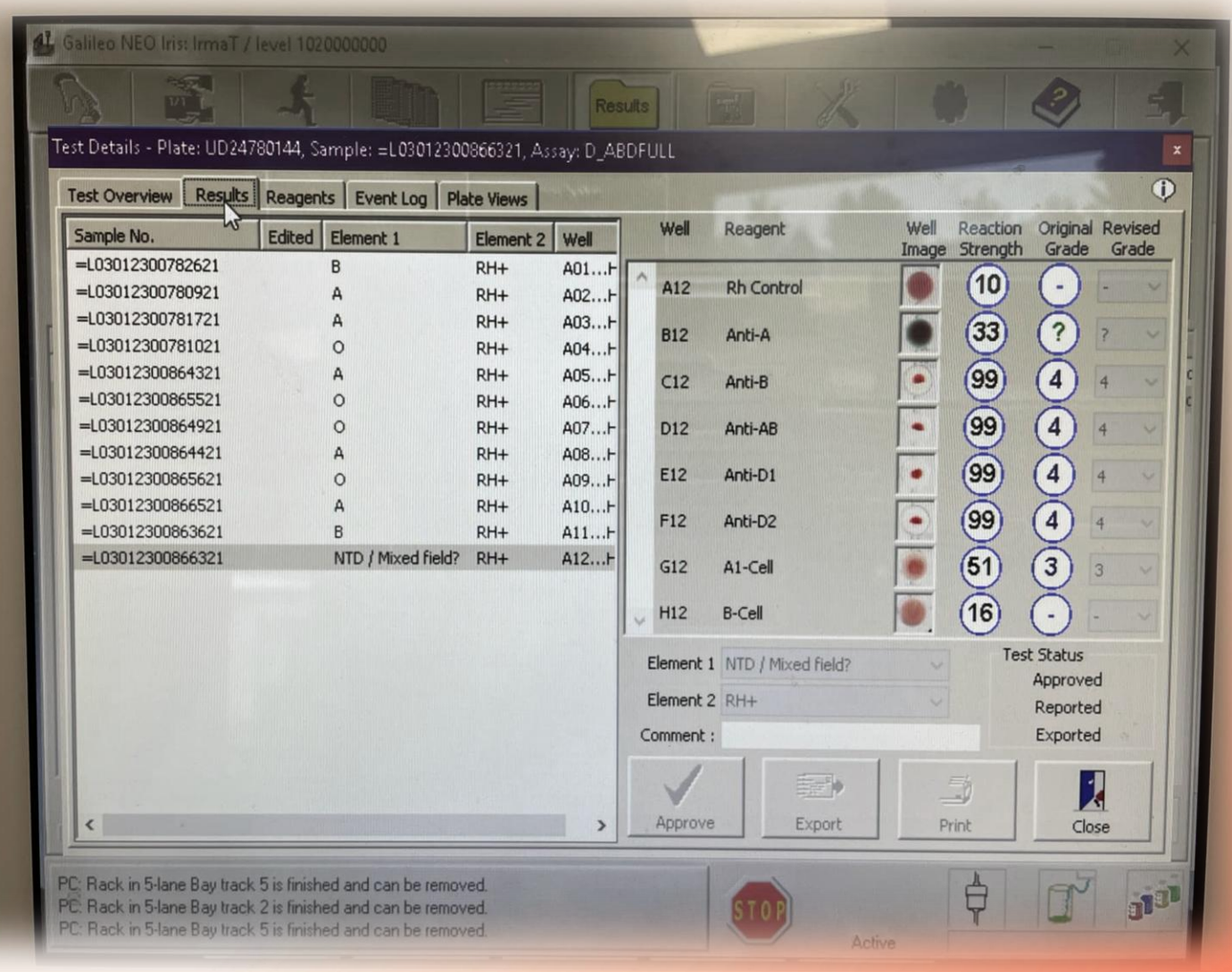
Age: 29

Frequency / number of donations: 1 time per year / 4

NACIONALINIS KRAUJO CENTRAS







Case No. 6 (2)

NACIONALINIS KRAUJO CENTRAS

Tyrimų protokolas Reg. Nr.

Tyr. data 2025-02-26 Pacientas L030125007547
Lytis M
Siuntimo įstaiga VšĮ Nacionalinis kraujo centras
Gydytojas RAŠČIŪTĖ TENIENĖ
Ėminys paimtas 2025-02-26 00:00 priimtas 2025-02-26 12:38 Ėminys / mėginys Kraujas (violetinis)

Tyrimas	Rezultatas	Pamatinių biologinių verčių intervalai ar klinikinių sprendimų vertės	M L
Kraujo grupės nustatymas			
Kraujo grupė DiaClon ABD	AB	M41 L1	
RHD	TEIGIAMAS	L1	
Kraujo grupė (DiaClon ABO/D)	AB	M41 L2	
RH	TEIGIAMAS	M41 L2	
Antikūnai anti-A	NERASTA	M41 L2	
Antikūnai anti-B	NERASTA	M41 L2	
A pogrupai: DiaClon A1 antigenas	NEIGIAMAS	M41 L2	
Pastabos: AgA(2+)			

Tyrimų protokolas Reg. Nr.

Tyr. data 2025-08-04 Pacientas L030125049252 21
Lytis M Gimimo data Amžius
Siuntimo įstaiga VšĮ Nacionalinis kraujo centras
Ėminys paimtas 2025-08-04 00:00 priimtas 2025-08-04 12:52 Ėminys / mėginys Kraujas (violetinis)

Tyrimas	Rezultatas	Pamatinių biologinių verčių intervalai ar klinikinių sprendimų vertės	M L
Kraujo grupių genotipavimas			
ABO kraujo grupės genotipavimas			
ABO kraujo grupės genotipas	A2.01/B.01	M47 L1	
ABO kraujo grupės fenotipas	A2B	M47 L1	

Case No. 6 (3)

- An external laboratory reported the blood group as **AB RhD positive (DiaClon ABD)**. Antigen A – 2+; Antigen A1 – negative.
- After six months, genotyping was carried out:
- **ABO genotype**: A2.01 / B.01
- **ABO phenotype**: A2B
- Final conclusion: the donor's blood group is **AB (A2B RhD positive)**.

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Case No. 7

Donation: L03012504435421

Donation date: 2025-06-17

Sex: female

Age: 54

Frequency / number of donations: 1 time per year / 14

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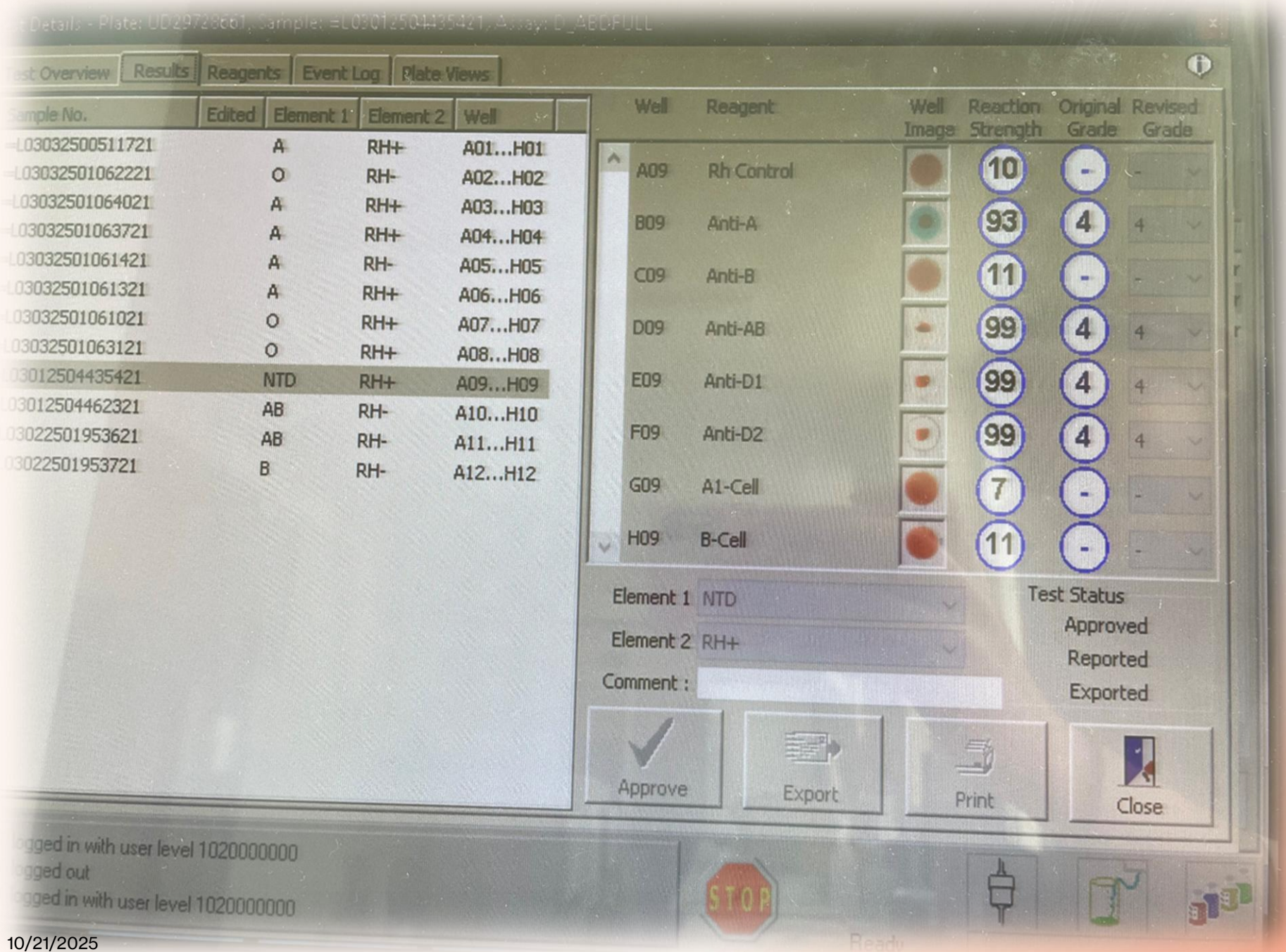
Case No. 7 (2)



Blood group reaction could not be assessed by the automated method.

Determination by antigen – **A RhD Positive** ; determination by antibody – **AB RhD.**

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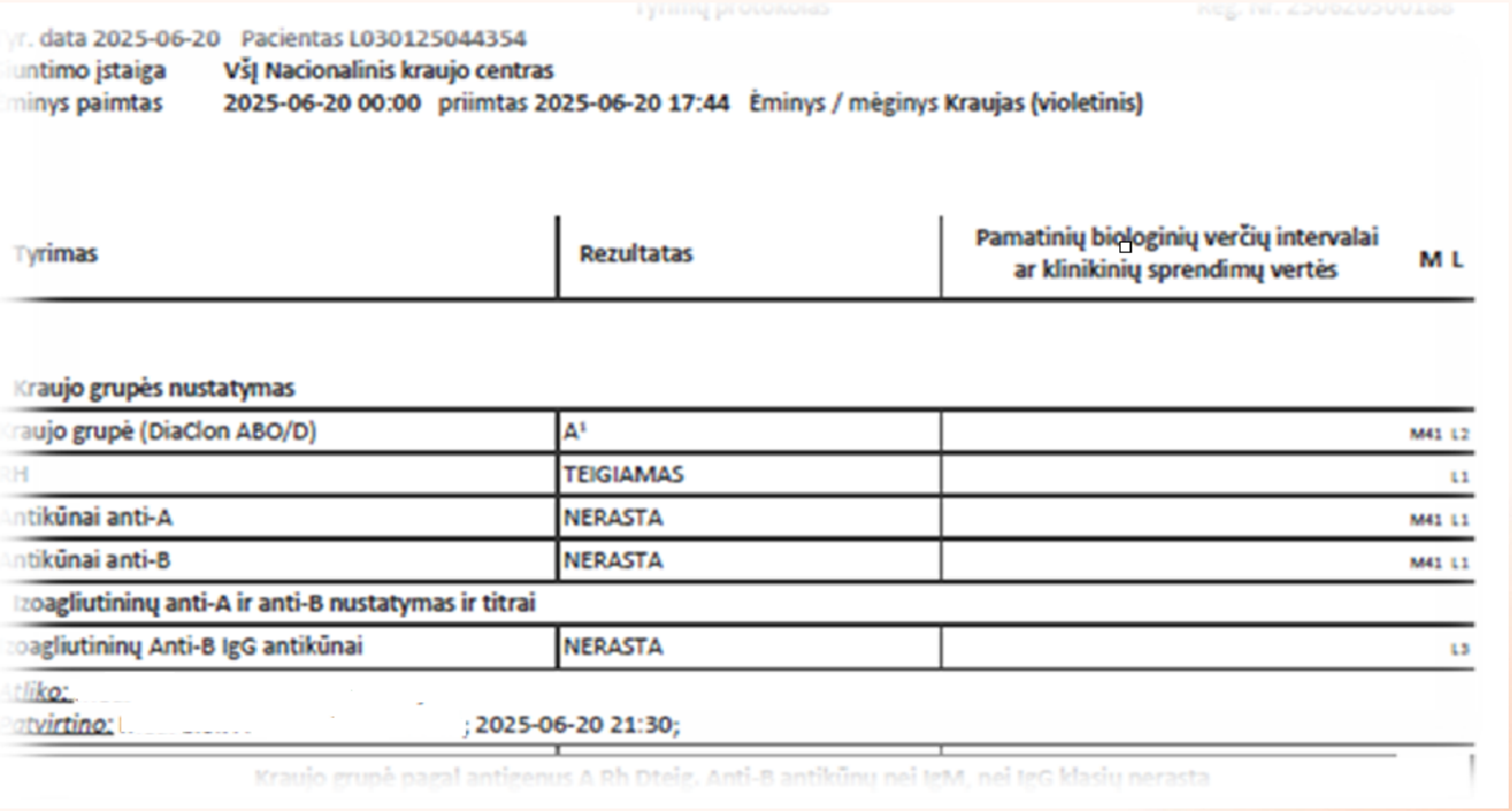
Case No. 7 (3)



data 2025-06-20 Pacientas L030125044354
untimo įstaiga VšĮ Nacionalinis kraujo centras
minys paimtas 2025-06-20 00:00 priimtas 2025-06-20 17:44 Ėminys / mėginys Kraujas (violetinis)

Tyrimas	Rezultatas	Pamatinių biologinių verčių intervalai ar klinikinių sprendimų vertės	M L
Kraujo grupės nustatymas			
raujo grupė (DiaClon ABO/D)	A¹		M41 L2
H	TEIGIAMAS		L1
tikūnai anti-A	NERASTA		M41 L1
tikūnai anti-B	NERASTA		M41 L1
zoagliutininų anti-A ir anti-B nustatymas ir titrai			
oagliutininų Anti-B IgG antikūnai	NERASTA		L3

tliko:
tvirtino: ; 2025-06-20 21:30;

Kraujo grupė pagal antigenus A Rh Dteig. Anti-B antikūnų nei IgM, nei IgG klasių nerasta

- Based on antigens, the blood group is **A RhD positive**
- No anti-B antibodies were detected (neither IgM nor IgG)
- **Genotyping is recommended**
- The reduced antibody titer may be due to age or an unknown immunodeficiency

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Conclusions

- **Blood testing is essential:** All first-time donors are tested for antibodies and RhD type. Antibody testing is then repeated every six months for female donors, and as needed for all donors.
- **Automated analyzers help detect issues quickly:** The Neo Iris, linked to our LIS via Immulink, flags mismatched results. RhD is the reaction most often corrected, usually due to weak D.
- **Complex cases need extra testing:** When antigen and antibody results don’t match, reference labs and PCR genotyping help clarify the donor’s true blood type.
- **Rare cases like chimerism can occur:** Even without twins or transfusions, unusual blood types can appear, and donation may need to be stopped for safety.
- **Safety first:** Donors are informed of unusual results, and blood components are withheld until testing is confirmed.

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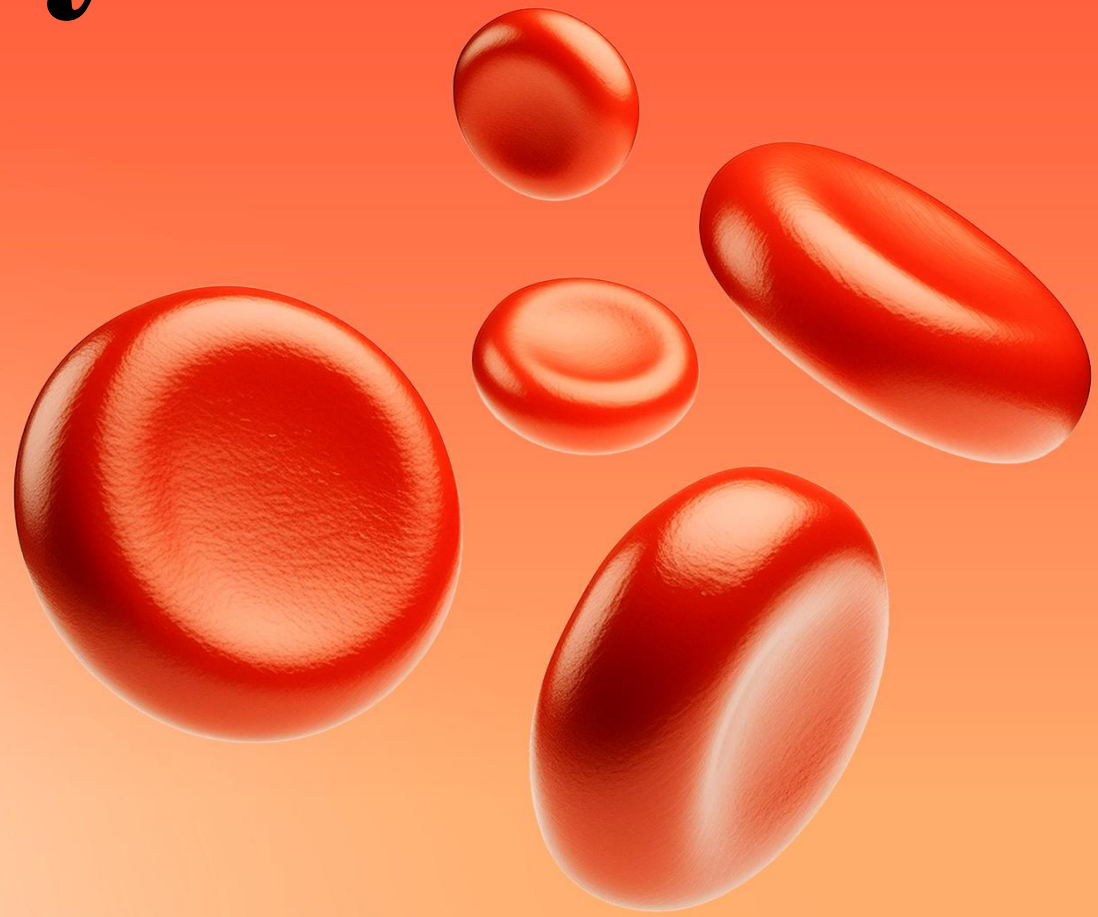
Thank you for your attention



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