

CHRIS Study

Biochemical traits – List of known interferences

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1. Introduction

Blood and urine samples (together referred to as biochemical traits) were collected for all participants at the CHRIS study center in Schlanders Hospital.

Participants book a morning appointment at the CHRIS study center, ranging from 7.45 to 8.45 a.m. Each study participant is assigned a workflow at the reception. If there are ten study participants (maximum capacity), there are ten different workflows, marked with the letters from “A” to “K”. The current workflow is as follows: A-B-C-D-E-F-G-H-I-K. All the workflows can be found in the documentation of CHRIS Baseline/General information/Administrative data, in the file named “Workflows at baseline assessment”.

For each parameter, the reagent’s manual lists the known interferences that should be checked before proceeding with the analysis. We therefore incorporate here all the known interferences from the reagent’s producers, with the name of the variables in the dataset if collected, and highly recommend the researchers to incorporate these variables into their data request.

2. Interferences list

Table 1. Interferences with blood parameters

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp02a	Prothrombin time (PT)	%	Citrat Plasma	Until 29/01/2014	ROCHE CA1500. Kit: Siemens Dade Innovin	Other potential substances interfering	CHRIS variable names	Results
						Heparin<2.0 UI/mL	x0dd*	No influence
						Inhibitors such as lupus anticoagulant	x0dd*	Imprecise values
						Hirudin or other direct thrombin inhibitors	x0dd*	Prolonged times
x0lp02a	Prothrombin time (PT)	%	Citrat Plasma	Since 30/01/2014	STAGO Compact max. Kit: STA-Neoplastine R - REF 00665	Potential substances interfering	CHRIS variable names	Results
						Low molecular weight Heparin<2.0 anti-Xa UI/mL	x0dd*	No influence
						Unfractionated Heparin<1.0 UI/mL	x0dd*	No influence
						Anticoagulant/blood sample should be 1:9 volume ratio	-	Imprecise values
						Hirudin or other direct thrombin inhibitors	x0dd*	Prolonged times
x0lp02b	International normalized ratio (INR) prothrombin time (PT)	INR	Citrat Plasma	-	-	See above for x0lp02a.		
x0lp02c	Activated partial thromboplastin time (aPTT)	Ratio	Citrat Plasma	Until 29/01/2014	ROCHE CA1500. Kit: Siemens Dade Actin FS Reagent	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	Not explicitly mentioned
						Hemolysis index	x0lp83	Not explicitly mentioned
						Lipemia	x0lp82	Not explicitly mentioned
						Other potential substances interfering	CHRIS variable names	Results
						Conjugated estrogen therapies in males	x0dd*	Decrease in time
						Contraceptives in females	x0wo02	Decrease in time

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences			
						Diphenylidantoin, heparin, warfarin, naloxone, radiographic agents	xOdd*	Increase in time	
						Hirudin, direct thrombin inhibitors in therapeutic doses	xOdd*	Increase in time	
x0lp02c	Activated partial thromboplastin time (aPTT)	Ratio	Citrat Plasma	Since 30/01/2014	STAGO Compact max. Kit: STA - REF 00308	Potential conditions/substances interfering	CHRIS variable names	Results	
						Prekallikrein deficiencies	x0ot*	Insensitive test	
						Heparin, vitamin K antagonist, circulating anticoagulants	xOdd*	Increase in time	
						Hirudin, direct thrombin inhibitors	xOdd*	Increase in time	
x0lp02d	Activated partial thromboplastin time (aPTT)	sec	Citrat Plasma	Since 30/01/2014		Same as above for x0lp02c, STAGO Compact max.			
x0lp03	Fibrinogen	mg/dL	Citrat Plasma	Until 29/01/2014	ROCHE CA1500 Kit: Siemens Multifibren* U	Potential substances interfering	CHRIS variable names	Results	
						Tissue factor pathway inhibitor<10 nmol/L	xOdd*	diminished recovery	
						Fondaparinux<1 µg/mL	xOdd*	diminished recovery	
x0lp03	Fibrinogen	mg/dL	Citrat Plasma	Since 30/01/2014	STAGO Compact max. Kit: STA-Liquid Fib – REF 00673	Potential substances interfering	CHRIS variable names	Results	
						Hirudin<3 µg/mL	xOdd*	No interference	
						Unfractionated and low molecular weight heparin<2 IU/mL	xOdd*	No interference	
						Fibrin degradation products<120 µg/mL	xOdd*	No interference	
x0lp04	Antithrombin III (AT III)	%	Citrat Plasma	Until 12/01/2014 and on 25-29/01/2014	ROCHE CA1500 Kit: Siemens Innovance Antithrombin	Potential substances interfering	CHRIS variable names	Results	
						Tissue factor pathway inhibitor<10 nmol/L	xOdd*	No influence	
						Fondaparinux<1 µg/mL	xOdd*	No influence	
						Hemolysis, lipemia, icterus	x0lp82-x0lp84	See analyzer specific reference guide	
x0lp04	Antithrombin III (AT III)	%	Citrat Plasma	Between 13/01/2014 and	STAGO Compact max.	Potential substances interfering	CHRIS variable names	Results	

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
				24/01/2014 and since 30/01/2014	Kit: STA-Stachrom AT III - REF 00596	Thrombin inhibitors	x0dd*	Higher values
						Hemoglobin<0.7g/dL	x0lp41	No interference
						Bilirubin, direct<20 mg/dL	x0lp14b	No interference
						Triglycerides<760 mg/dL	x0lp19	No interference
x0lp05	Glucose	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Glucoquant Glucose HK	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	60
						Bilirubin, direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	1000
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
						Potential substances interfering	CHRIS variable names	Results
						Hemoglobin>1.0g/dL	x0lp41	interference
x0lp05	Glucose	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT	Bilirubin, direct>30 mg/dL	x0lp14b	interference
						Intralipid>1000mg/dL	-	interference
						Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	20
x0lp06a	Glycated hemoglobin (HbA1c)	%	EDTA Plasma	Until 12/05/2015 and on 14/05/2015	TOSOH CORPORATION SHIBA-KOEN FIRST BLDG Tosoh Automated Glycohemoglobin Analyzer HLC-723 G8 Kit: G8 Variant Elution Buffer HSi TOSOH CORP.	Bilirubin, direct	x0lp14b	20 mg/dL
						Potential substances interfering	CHRIS variable names	Results
						Glucose<1000 mg/dL	x0lp05	No influence
						Sodium cyanate<25 mg/dL	-	No influence
						Acetaldehyde<25 mg/dL	-	No influence
						Chyle<2100 formazine turbidity	-	No influence
						Aspirin<50 mg/dL	x0dd*	No influence
						Hemoglobin in low concentrations	x0lp41	The total area of the chromatogram may be <500.
						Potential substances interfering	CHRIS variable names	Results
x0lp06a	Glycated hemoglobin (HbA1c)	%	EDTA Plasma	On 13/05/2015 and since 15/05/2015	ARKRAY ADAMS A1c HA-8180V.			

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
					Kit: MENARINI: Elent 80A, Eluent 80B, Eluent 80CV and HEMOLYSIS WASHING SOLUTION 80H	Hemoglobin carbamylated 3%	-	Interference below 0.1% NGSP
						Bilirubin, direct<268µmol/L	x0lp14b	Interference below 0.1% NGSP
						Hematocrit (3-14 mmol/L)	x0lp42	Interference below 0.1% NGSP
						Glucose: HbA1c-labile (13.8%)	x0lp05	Interference below 0.1% NGSP
x0lp06b	Glycated hemoglobin (HbA1c) (IFFC)	mmol/mol	EDTA Plasma	Until 12/05/2015 and on 14/05/2015	TOSOH CORPORATION SHIBA-KOEN FIRST BLDG Tosoh Automated Glycohemoglobin Analyzer HLC-723 G8	Potential substances interfering	CHRIS variable names	Results
						Glucose<10 g/L	x0lp05	No interference
						Sodium cyanate<0.25 g/L	x0dd*	No interference
						Acetaldehyde<0.25 g/L	x0dd*	No interference
						Bilirubin, direct<0.2 g/L	x0lp14b	No interference
						Chyle<2100 formazine turbidity	-	No interference
						Aspirin<0.50 g/L	x0dd*	No interference
x0lp06b	Glycated hemoglobin (HbA1c) (IFFC)	mmol/mol	EDTA Plasma	On 13/05/2015 and since 15/05/2015	ARKRAY ADAMS A1c HA-8180V	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin carbamylated 3%	-	Interference below 0.1% NGSP
						Bilirubin, direct<268 µmol/L	x0lp14b	Interference below 0.1% NGSP
						Hematocrit (3-14 mmol/L)	x0lp42	Interference below 0.1% NGSP
						Glucose: HbA1c-labile (13.8%)	x0lp05	Interference below 0.1% NGSP
x0lp07	Creatinine	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Creatinine Jaffé Methode	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	10
						Bilirubin	x0lp14a	10 mg/dL
						Hemolysis index	x0lp83	750
						Hemoglobin	x0lp41	0.75 g/dL
						Lipemia	x0lp82	1000
						Other potential substances interfering	CHRIS variable names	Results
						Aceton≤8.6 mmol/L	x0dd*	No significant influence
						Acetacetat≤20mmol/L	x0dd*	No significant influence

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences								
						β-Hydroxylbyrat≤25 mmol/L	x0dd*	No significant influence						
						Antibiotics with cephalosporin	x0dd*	False positive values						
						Cefoxitin	x0dd*	Falsely high values						
						Conditions interfering	CHRIS variable names	Results						
						Gammopathy	x0ot*	Unreliable results						
x0lp07	Creatinine	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Creatinine	Potential substances interfering	CHRIS variable names	Results						
						Hemoglobin≥1000 mg/dL	x0lp41	Higher values						
						Bilirubin, direct≥60mg/dL	x0lp14b	Lower values						
						Intralipid<1000 mg/dL	x0dd*	Underestimation≤2%						
						Glucose>300 mg/dL	x0lp05	Higher values						
						Ascorbate<3.0 mg/dL	x0dd*	Underestimation≤1%						
						Proteins>10.6 g/dL	-	Higher values						
						x0lp08	Uric acid	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Uric acid plus	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
Icteric index	x0lp84	40												
Bilirubin direct	x0lp14b	40 mg/dL												
Hemolysis index	x0lp83	1000												
Hemoglobin	x0lp41	1.0 g/dL												
Lipemia	x0lp82	1000 mg/dL												
Other potential substances interfering	CHRIS variable names	Results												
Ascorbic acid<30mg/dL	-	No influence												
α-Methyldopa, desferoxamin, Calciumdobesilat	x0dd*	Falsely low values												
Conditions interfering	CHRIS variable names	Results												
Gammopathy	x0ot*	Unreliable results												
x0lp08	Uric acid	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Uric acid							Potential substances interfering	CHRIS variable names	Results
												Hemoglobin≤2000 mg/dL	x0lp41	Interference below 2%
						Bilirubin, direct≥40mg/dL	x0lp14b	Lower values						
						Intralipid≥750 mg/dL	x0dd*	Lower values						

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Glucose≤1000 mg/dL	x0lp05	No interference
						Ascorbate≥30 mg/dL	x0dd*	Lower values
x0lp09	Albumin	g/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Albumin BCG-Method	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1 g/dL
						Lipemia	x0lp82	2000
						Conditions interfering	CHRIS variable names	
						Gammopathy	x0ot*	
						Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥750 mg/dL	x0lp41	Higher values
x0lp09	Albumin	g/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Albumin BCG	Bilirubin, direct≤40mg/dL	x0lp14b	Interference below 2%
						Intralipid≥1000 mg/dL	x0dd*	Higher values
x0lp10	Aspartate aminotransferase (AST), glutamic oxaloacetic transaminase (GOT)	U/L	Serum	Until 07/04/2014:	ROCHE MODULAR PPE MODULAR PE: Kit. Cobas Aspartat-Aminotransferase after IFCC with/out Pyridoxalphosphate activation	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin	x0lp14a	60 mg/dL
						Hemolysis index	x0lp83	25
						Hemoglobin	x0lp41	0.025 g/dL
						Lipemia	x0lp82	500
						Other potential substances interfering	CHRIS variable names	Results
						Isoniazid	x0dd*	Falsely low values of AST
						cyanokite (hydroxocobalamin)	x0dd*	Significantly lower values of AST
						Conditions interfering	CHRIS variable names	
						Gammopathy	x0ot*	
x0lp10	Aspartate aminotransferase (AST), glutamic oxaloacetic transaminase (GOT)	U/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Aspartate Aminotransferase	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥62mg/dL	x0lp41	Higher values
						Bilirubin, direct≥30mg/dL	x0lp14b	Higher values
						Intralipid≥550 mg/dL	x0dd*	Both directions

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp11	Alanine aminotransferase (ALT), glutamate pyruvate transaminase (GPT)	U/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin	x0lp14a	60 mg/dL
						Hemolysis index	x0lp83	60
						Hemoglobin	x0lp41	0.06 g/dL
						Lipemia	x0lp82	500
						Other potential substances interfering	CHRIS variable names	Results
						Isoniazid	x0dd*	Falsely low values of ALT
						cyanokite (hydroxocobalamin)	x0dd*	Significantly lower values of ALT
						Conditions interfering	CHRIS variable names	
						Gammopathy	x0ot*	
x0lp11	Alanine aminotransferase (ALT), glutamate pyruvate transaminase (GPT)	U/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Alanine Aminotransferase	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥750mg/dL	x0lp41	Higher values
						Bilirubin, direct≥30mg/dL	x0lp14b	lower values
						Intralipid≥550 mg/dL	x0dd*	Lower values
x0lp12	Gamma-glutamyl transferase (gamma-GT, GGT)	U/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Gamma-Glutamyltransferase fluid	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	50
						Direct Bilirubin	x0lp14b	50 mg/dL
						Hemolysis index	x0lp83	200
						Hemoglobin	x0lp41	0.2 g/dL
						Lipemia	x0lp82	1000
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	unreliable results
						Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥250 mg/dL	x0lp41	Lower values
x0lp12	Gamma-glutamyl transferase (gamma-GT, GGT)	U/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Gamma-Glutamyl transferase fluid	Bilirubin, direct≥15mg/dL	x0lp14b	lower values
						Intralipid≥2000 mg/dL	x0dd*	Higher values

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp13	Alkaline phosphatase (ALP)	U/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Alkaline Phosphatase fluid after IFCC	Substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	70
						Bilirubin	x0lp14a	70 mg/dL
						Hemolysis index	x0lp83	500
						Hemoglobin	x0lp41	0.5 g/dL
						Lipemia	x0lp82	2000
						Conditions interfering	CHRIS variable names	
						Gammopathy	x0ot*	
x0lp13	Alkaline phosphatase (ALP)	U/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Alkaline Phosphatase	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin $\geq$ 750 mg/dL	x0lp41	Lower values
						Bilirubin, direct $\geq$ 30mg/dL	x0lp14b	higher values
						Intralipid $\leq$ 1000 mg/dL	x0dd*	No interference
x0lp14a	Bilirubin, total	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas total bilirubin fluid	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1 g/dL
						Lipemia	x0lp82	1000
						Other potential substances interfering	CHRIS variable names	Results
						Anticoagulants: not sufficiently filled heparin tubes	x0dd*	Higher values
						Indican $<$ 10 mg/dL	x0dd*	No significant effect
						Conditions interfering	CHRIS variable names	Results
						Multiple myeloma	x0ot*	Positive deviation
						Gammopathy	x0ot*	Unreliable results
x0lp14a	Bilirubin, total	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: total Bilirubin	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin $\geq$ 1000 mg/dL	x0lp41	Lower values
						Intralipid $\geq$ 1000 mg/dL	x0dd*	Higher values, especially at low concentrations of total bilirubin.
						Indoxyl sulfate $\leq$ 8.62 mg/dl	x0dd*	Falsely higher values

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp14b	Bilirubin, direct	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas direct Bilirubin cod. 11555413	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Hemolysis index	x0lp83	25
						Hemoglobin	x0lp41	0.025 g/dL
						Lipemia	x0lp82	140
						Other potential substances interfering	CHRIS variable names	Results
						Rifampicin	x0dd*	falsely high values of direct bilirubin
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp14b	Bilirubin, direct	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: direct bilirubin	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥31 mg/dL	x0lp41	Lower values
						Bilirubin, direct≥30mg/dL	x0lp14b	higher values
						Intralipid≥125 mg/dL	x0dd*	Both directions of interference
						Triglycerides≥519 mg/dL	x0lp19	Both directions of interference
						Indoxyl sulfate≤8.62 mg/dl	x0dd*	No interference
x0lp15	Lipase	U/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Lipase color test	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin	x0lp14a	60 mg/dL
						Hemolysis index	x0lp83	500
						Hemoglobin	x0lp41	0.5 g/dL
						Lipemia	x0lp82	1000
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Altered values
x0lp15	Lipase	U/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: lipase	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥1000 mg/dL	x0lp41	Both directions of interference
						Bilirubin, direct≥15mg/dL	x0lp14b	lower values

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp16	Cholesterol total (TC)	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Cholesterol CHOD-PAP	Intralipid≥750 mg/dL	x0dd*	Lower values
						Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	25
						Bilirubin	x0lp14a	25 mg/dL
						Hemolysis index	x0lp83	700
						Hemoglobin	x0lp41	0.7 g/dL
						Lipemia	x0lp82	1250
						Conditions interfering	CHRIS variable names	
						Gammopathy	x0ot*	
						Potential substances interfering	CHRIS variable names	Results
x0lp16	Cholesterol total (TC)	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Cholesterol	Hemoglobin≥750 mg/dL	x0lp41	higher values
						Bilirubin, direct≥7.5 mg/dL	x0lp14b	lower values
						Intralipid≥1000 mg/dL	x0dd*	Higher values
						Ascorbate≥1.5 mg/dL	x0dd*	Lower values
						Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
x0lp17	Cholesterol High Density Lipoprotein (HDL)	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas HDL-C plus 3 rd generation	Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1200
						Hemoglobin	x0lp41	1.2 g/dL
						Lipemia	x0lp82	2000
						Triglycerides	x0lp19	1200 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						High concentration of free fatty acids and denaturated lipoproteins	-	Falsely high values of HDL
						Ascorbic acid<2.84 mmol/L or 50mg/dL	-	No influence
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
						Liver function problems	x0cd01*	Significant deviation from actual HDL level

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp17	Cholesterol High Density Lipoprotein (HDL)	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: ULTRA HDL	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤1000 mg/dL	x0lp41	Interference≤1%
						Bilirubin, direct≥32 mg/dL	x0lp14b	Both directions
						Intralipid≤2000 mg/dL	x0dd*	Interference≤1%
						Ascorbic acid<3.9 mg/dL	x0dd*	Interference≤1%
x0lp18	Cholesterol Low Density Lipoprotein (LDL)	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas LDL-C plus 2 nd generation	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	35
						Bilirubin direct	x0lp14b	35 mg/dL
						Hemolysis index	x0lp83	1500
						Hemoglobin	x0lp41	1.5 g/dL
						Lipemia	x0lp82	200
						Triglycerides	x0lp19	1200 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						High concentration of free fatty acids and denaturated lipoproteins	-	Falsely high values of HDL
						Ascorbic acid<2.84 mmol/L or 50mg/dL	x0dd*	No influence
						HDL≤75 mg/dL	x0lp17	No influence
						VLDL≤140 mg/dL	-	No influence
						ULDL≤2000 mg/dL	-	No influence
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
						Liver function problems	x0cd01*	Significant deviation from actual LDL level
x0lp18	Cholesterol Low Density Lipoprotein (LDL)	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: direct LDL	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤500 mg/dL	x0lp41	No interference
						Bilirubin, direct≤20mg/dL	x0lp14b	No interference
						Ascorbic acid≤50 mg/dL	x0dd*	No interference
						Gammaglobulin<5000mg/dL	-	No interference
						Triglycerides>1293 mg/dL	x0lp19	Samples not to be analyzed

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp19	Triglycerides (TG)	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Triglyceride GPO-PAP	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	10
						Bilirubin direct	x0lp14b	10 mg/dL
						Hemolysis index	x0lp83	500
						Hemoglobin	x0lp41	0.5 g/dL
						Triglycerides	x0lp19	3000 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						Ascorbic acid	x0dd*	Falsely low values
						Calcium dobesilate	x0dd*	Falsely low values
						Intralipid	x0dd*	Falsely high values
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp19	Triglycerides (TG)	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: triglyceride	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin $\geq$ 750 mg/dL	x0lp41	Higher values
						Bilirubin, direct $\geq$ 7.5 mg/dL	x0lp14b	higher values
						Ascorbate $\geq$ 1.5 mg/dL	-	Lower values
x0lp20	Sodium (Na)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas indirect NA, K, Cl	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	2000
						Other potential substances interfering	CHRIS variable names	Results
						Acetaminophen $\leq$ 200 mg/L	x0dd*	No influence
						Acetylcysteine $\leq$ 150 mg/L	x0dd*	No influence
						Ampicillin sodium $\leq$ 1000 mg/L	x0dd*	No influence
						Acetylsalicylic acid $\leq$ 1000 mg/L	x0dd*	No influence
						Ascorbic acid $\leq$ 300 mg/L	x0dd*	No influence

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Calcium dobesilates≤200 mg/L	x0dd*	No influence
						Cefoxitin≤2500 mg/L	x0dd*	No influence
						Cyclosporin<5 mg/L	x0dd*	No influence
						Doxycycline≤50mg/L	x0dd*	No influence
						Heparin<5000 U	x0dd*	No influence
						Ibuprofen≤500 mg/L	x0dd*	No influence
						Intralipid<10000 mg/L	x0dd*	No influence
						L-3,4-dihydroxyphenylalanine ≤20 mg/L	x0dd*	No influence
						Methyldopa≤20 mg/L	x0dd*	No influence
						Metronidazole< 200 mg/L	x0dd*	No influence
						Phenylbutazone≤400 mg/L	x0dd*	No influence
						Rifampicin≤ 60 mg/L	x0dd*	No influence
						Theophylline≤ 100 mg/L	x0dd*	No influence
x0lp20	Sodium (Na)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT.	No reagents used.		
x0lp21	Potassium (K)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas indirect NA, K, Cl	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	100
						Hemoglobin	x0lp41	0.1 g/dL
						Lipemia	x0lp82	2000
						See x0lp20, ROCHE MODULAR PPE MODULAR PE.		
x0lp21	Potassium (K)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT	No reagents used.		
x0lp22	Chloride (Cl)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas indirect NA, K, Cl	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	2000
						See x0lp20, ROCHE MODULAR PPE MODULAR PE.		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp22	Chloride (Cl)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT	No reagents used.		
x0lp23	Calcium (Ca)	mg/dL	Serum	-				
x0lp23a	Calcium (Ca)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin	x0lp14a	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1 g/dL
						Lipemia	x0lp82	1000
						Other potential substances interfering	CHRIS variable names	Results
						Drugs containing strontium	x0dd*	Significantly higher values of Ca
						Intravenously administered contrast media for MRI	x0dd*	Disturbed assessment of Ca
						Gadodiamid (GdDTPA-BMA)	x0dd*	Strongly lowered Ca values
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
						Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤2000 mg/dL	x0lp41	Interference<1%
						Bilirubin, direct≥60mg/dL	x0lp14b	lower values
						Intralipid≥500 mg/dL	x0dd*	Higher values
x0lp23a	Calcium (Ca)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT			
x0lp24	Calcium corrected by albumin	mmol/L mg/dL	Serum	-	-	See kits for x0lp09 and x0lp23a.		
x0lp25	Phosphorus (P)	mg/dL	Serum	-	-			
x0lp25a	Phosphorus (P)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas inorganic Phosphorus	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	35
						Bilirubin	x0lp14a	35 mg/dL
						Hemolysis index	x0lp83	300
						Hemoglobin	x0lp41	0.3 g/dL
						Lipemia	x0lp82	1250

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Other potential substances interfering	CHRIS variable names	Results
						Liposomal drug formulations (e.g. AmBisome)	x0dd*	Significantly higher values of P
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp25a	Phosphorus (P)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT Kit: Phosphorus	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥125 mg/dL	x0lp41	Higher values
						Bilirubin, direct≥30 mg/dL	x0lp14b	lower values
						Intralipid≥2000 mg/dL	-	Higher values
						Proteins≥12 g/dL	-	Lower values
x0lp26a	Magnesium (Mg)	mmol/L	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Magnesium	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	65
						Bilirubin	x0lp14a	65 mg/dL
						Hemolysis index	x0lp83	400
						Hemoglobin	x0lp41	0.4 g/dL
						Lipemia	x0lp82	400
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Altered values
x0lp26a	Magnesium (Mg)	mmol/L	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Magnesium	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥500 mg/dL	x0lp41	Lower values
						Bilirubin, direct≤60 mg/dL	x0lp14b	Interference<1%
						Intralipid≥1000 mg/dL	x0dd*	lower values
						Glucose≤1200 mg/dL	x0lp05	Interference<2%
						Ascorbic acid≤3 mg/dL	x0dd*	Interference<1%
x0lp27	Iron (Fe)	µg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Iron	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Hemolysis index	x0lp83	80
						Hemoglobin	x0lp41	0.08 g/dL
						Lipemia	x0lp82	1000

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Icteric index	x0lp84	60
						Bilirubin	x0lp14a	60
						Other potential substances interfering	CHRIS variable names	Results
						Iron supplements, metal/binding medicaments	x0dd*	falsely low values of iron
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp27	Iron (Fe)	µg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Iron	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤500 mg/dL	x0lp41	Interference<10%
						Bilirubin, direct≤15 mg/dL	x0lp14b	Interference<10%
						Triglycerides≤1000 mg/dL	x0lp19	Interference<10%
x0lp28	Ferritin	ng/mL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Ferritin	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Hemolysis index	x0lp83	500
						Hemoglobin	x0lp41	0.5 g/dL
						Lipemia	x0lp82	3300
						Icteric index	x0lp84	65
						Bilirubin	x0lp14a	65 mg/dL
						Biotin	-	50 ng/mL
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<2500 UI/mL	-	No influence
						Ferritin<100000 ng/mL	x0lp28	No Hook effect
						Extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium	-	Interference can rarely occur
x0lp28	Ferritin	ng/mL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Ferritin	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤200 mg/dL	x0lp41	Interference<10%
						Bilirubin, direct≤20 mg/dL	x0lp14b	Interference<10%
						Triglycerides≤3000 mg/dL	x0lp19	Interference<10%

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Proteins≤12 mg/dL	-	Interference<10%
x0lp29	Transferrin	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Tina-quant Transferrin ver. 2	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	500 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<1200 IU/mL	-	No influence
						Transferrin<1700 mg/dL	x0lp29	No Hook effect
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp29	Transferrin	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Transferrin	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≥1000 mg/dL	x0lp41	Slightly higher values
						Bilirubin, direct≥30 mg/dL	x0lp14b	Lower values
						Triglycerides≥750 mg/dL	x0lp19	Interference in both directions
						Intralipid≤2000 mg/dL	x0dd*	Interference<1%
x0lp30	Total iron-binding capacity (TIBC)	µg/dL	Serum	-	-	See for x0lp29 according to the period.		
x0lp31	Transferrin saturation (TSat)	%	Serum	-	-	See for x0lp27 and x0lp29.		
x0lp32	Homocysteine (HCY)	µmol/L	Heparin Plasma	Until 02/12/2015, since 16/03/2016	SIEMENS HEALTHCARE NEFELOMETER BnProSpec , then SIEMENS HEALTHCARE BN II System. Same kit: Siemens Latex HCY	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	600
						Bilirubin direct	x0lp14b	600 mg/dL
						Triglycerides	x0lp19	2.21 mmol/L
						Total proteins	-	88 g/L
						Lipemic samples or samples containing particles that cannot be clarified by centrifugation must not be tested.		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Other potential substances interfering	CHRIS variable names	Results
						Antiepileptics, antifolates, nitrous oxide anesthesia, antagonists of vitamin B6	x0dd*	Higher values
						Rheumatoid factors	-	False high or low results
						Heterophilic antibodies	-	False high or low results
x0lp32	Homocysteine (HCY)	μmol/L	Heparin Plasma	03/12/2015-15/03/2016	Roche MODULAR ANALYTICS. Kit: Cobas Sentinel	Potential substances interfering	CHRIS variable names	Results
						Hydroxylamine	x0dd*	Falsely low values
						High Protein levels	-	Interference >10%
						S-adenosyl-methionine therapy	x0dd*	Falsely high values
						Therapies based on methotrexate, carbamazepine, phenytoin, nitrous oxide, anticonvulsants or 6-azauridine triacetate	x0dd*	High values
x0lp33	C-Reactive Protein (CRP)	mg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Tina-quant C-Reactive Protein	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1 g/dL
						Lipemia	x0lp82	1000
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<1200UI/mL	-	They do not affect results
						Monoclonal mouse antibodies therapies	x0dd*	False results
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp33	C-Reactive Protein (CRP)	mg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT.	Potential substances interfering	CHRIS variable names	Results
						Hemoglobin≤500 mg/dL	x0lp41	Interference<5%

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
					Kit: CRP vario	Bilirubin, direct≤30 mg/dL	x0lp14b	Interference<5%
						Rheumatoid factors≤550 IU/mL	-	Interference<5%
						Intralipid≤1500 mg/dL	-	Interference<5%
x0lp35	Thyroid-stimulating hormone (TSH)	μUI/mL	Serum	Until 07/04/2014	Cobas Thyreotropin	Potentially interfering substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Icteric index	x0lp84	41
						Bilirubin direct	x0lp14b	41 mg/dL
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	1500 mg/dL
						Biotin	-	25 ng/mL
						IgG	-	2 g/dL
						IgM	-	0.5 g/dL
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<3250 IU/mL	-	No influence
						TSH<1000 μIU/mL	x0lp35	No Hook effect
						Antibodies to analyte-specific antibodies, streptavidin or ruthenium	-	Interference can rarely occur
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	Unreliable results
x0lp35	Thyroid-stimulating hormone (TSH)	μUI/mL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: TSH	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤500 mg/dL	x0lp41	Interference<10%
						Bilirubin, direct≤20 mg/dL	x0lp14b	Interference<10%
						Triglycerides≤3000 mg/dL	x0lp19	Interference<10%
						Proteins≤12 g/dL	-	Interference<10%
x0lp36	Thyroxine free (FT4)	ng/dL	Serum	-		See below for x0lp36a		
x0lp36a	Thyroxine free (FT4)	pg/mL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE Kit: Cobas FT4 Free Thyroxine	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	41
						Bilirubin	x0lp14a	41 mg/dL

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Hemolysis index	x0lp83	1000
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	2000
						Biotin	x0dd*	20 ng/mL
						IgG	-	7 g/dL
						IgA	-	1.6 g/dL
						IgM	-	1 g/dL
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<1200 IU/ml	-	No interference observed
						Furosemide and Levothyroxine at dosage level	x0dd*	Elevated findings
						Autoantibodies to thyroid hormones	-	interference
						Lipid-lowering agents containing D-T4	x0dd*	The test should not be performed
						extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium	-	Interference can rarely occur
						Conditions interfering	CHRIS variable names	Results
						Non thyroid illness, familial dysalbuminemic hyperthyroxinemia	x0th*	Altered results
x0lp36a	Thyroxine free (FT4)	pg/mL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Free T4	Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤500 mg/dL	x0lp41	Interference<10%
						Bilirubin, direct≤20 mg/dL	x0lp14b	Interference<10%
						Triglycerides≤3000 mg/dL	x0lp19	Interference<10%
						Proteins≤12 g/dL	-	Interference<10%
x0lp37	Free triiodothyronine (F T3)	pg/mL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE Kit: Cobas Free triiodothyronine	Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	66
						Bilirubin	x0lp14a	66 mg/dL
						Hemolysis index	x0lp83	1000

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Hemoglobin	x0lp41	1.0 g/dL
						Lipemia	x0lp82	2000
						Biotin	-	70 ng/mL
						IgG	-	7 g/dL
						IgA	-	1.6 g/dL
						IgM	-	1 g/dL
						Other potential substances interfering	CHRIS variable names	Results
						Rheumatoid factors<1200 IU/ml	x0dd*	No interference observed
						Any influence that might affect the binding behaviour of the binding proteins	x0dd*, interview	Altered results
						extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium	-	Interference can rarely occur
x0lp37	Free triiodothyronine (F T3)	pg/mL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Free T3	Conditions interfering	CHRIS variable names	Results
						Non thyroid illness, familial dysalbuminemic Hyperthyroxinemia	x0th*	Altered results
						Potential substances interfering	CHRIS variable names	Results
						Hemoglobins≤500 mg/dL	x0lp41	Interference<10%
						Bilirubin, direct≤20 mg/dL	x0lp14b	Interference<10%
x0lp38	Cortisol	µg/dL	Serum	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE Kit: Cobas Cortisol	Triglycerides≤2000 mg/dL	x0lp19	Interference<10%
						Proteins≤12 g/dL	-	Interference<10%
						Potential substances interfering	CHRIS variable names	Potentially Interfering Substance Concentration
						Icterus index	x0lp84	60
						Bilirubin direct	x0lp14b	60 mg/dL
						Hemolysis index	x0lp83	1900
						Hemoglobin	x0lp41	1.9 g/dL
						Lipemia	x0lp82	2700
						Other potential substances interfering	CHRIS variable names	Results

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
						Therapies with high biotin (>5mg/day)	x0dd*	Significantly higher values of Cortisol
						Rheumatoid factors>1100 IU/ml	x0dd*	Disturbed assessment of Cortisol
						Medicaments with high titer of analytic-specific antibodies, streptavidin, ruthenium	x0dd*	Disturbed assessment of Cortisol
						Contraceptives, oestrogen replacement therapies	x0wo02, x0wo09	Higher values of cortisol
						Prednisolon, methylprednisolon, prednison	x0dd*	Falsely higher cortisol values
						Conditions interfering	CHRIS variable names	Results
						Gammopathy	x0ot*	
						Pregnancy	x0wo05	Higher values of cortisol
						Stress condition	x0pc* stress module	Higher values of cortisol
						21-hydroxylase deficiency	-	Falsely higher cortisol values
						Potential substances interfering	CHRIS variable names	Results
x0lp38	Cortisol	µg/dL	Serum	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT Kit: Cortisol	Hemoglobin≤500 mg/dL	x0lp41	Interference<15%
						Bilirubin, direct≤20 mg/dL	x0lp14b	Interference<15%
						Triglycerides≤2000 mg/dL	x0lp19	Interference<15%
						Proteins (low)≤3 g/dL	-	Interference<15%
						Proteins (high)≤10 g/dL	-	Interference<15%
x0lp39- x0lp50j	White Blood Cell Count (WBC)- Basophils (absolute basophil count)	various	EDTA Plasma	Until 24/02/2014	ABBOTT CD SAPPHIRE Cell-Dyn Sapphire reagents: 1) Diluent/Sheath Reagent: principal diluent for the measurement of RBC/PLT and RET 2) Hemoglobine	Interference from lipids and lyseresistant RBCs reported in literature.		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences
					reagent 3) WBC reagent part A 4) WBC reagent part B 5) reagent for reticulocytes	
x0lp39- x0lp50j	White Blood Cell Count (WBC)- Basophils (absolute basophil count)	various	EDTA Plasma	Since 25/02/2014	SYSMEX XN-1000 e XN-2000 No reagents used.	From the machine brochure: "No need for a special reagent or sample prep, and no mathematical corrections. Virtually eliminates interference from lipids or lyseresistant RBCs."
x0lp51a	Antinuclear antibodies (ANA)	-	Serum		Until 13/05/2014: EUROIMMUN	No interferences are reported
x0lp51b	ANA fluoroscopic patterns		Serum		EUROIMMUN ANALYZER 1	
x0lp51c	ANA titre		Serum		Kit: Aesku Diagnostics ANA HEp-2	
x0lp51d	ANA pattern		Serum		Since 14/05/2014: INOVA DIAGNOSTIC - Quanta Lyser. Kit: NOVA Lite(R) HEp-2 ANA Kit with DAPI	
x0lp51e	ANA titre		Serum		Until 13/05/2014: EUROIMMUN	No interferences are reported
x0lp51f	ANA chromosomes metaphase				EUROIMMUN ANALYZER 1	
x0lp51g	ANA titre chromosomes		Serum		Kit: Aesku Diagnostics ANA HEp-2	
x0lp51h	ANA observation		Serum		Since 14/05/2014: INOVA	
x0lp51i	ANA pattern2		Serum		DIAGNOSTIC - Quanta Lyser. Kit: NOVA Lite(R)	
x0lp51j	ANA pattern3		Serum		HEp-2 ANA Kit with DAPI	

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp52	Antibodies to thyroid peroxidase (Anti-TPO)	IU/mL	Serum	Until 28/05/2015	EUROIMMUN EUROIMMUN ANALYZER 1. Kit: Euroimmun cod. EA 1012-9601G	Potentially Interfering Substance	CHRIS variable names	Results
						Bilirubin, direct≤40 mg/dL	x0lp14b	No interference
						Hemoglobins≤1000 mg/dL	x0lp41	No interference
						Triglycerides≤2000 mg/dL	x0lp19	No interference
x0lp52	Antibodies to thyroid peroxidase (Anti-TPO)	IU/mL	Serum	Since 29/05/2015	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Anti-TPO	Potentially Interfering Substance	CHRIS variable names	Potentially Interfering Substance Concentration
						Bilirubin	x0lp14	20 mg/dL
						Hemoglobin	x0lp41	1000 mg/dL
						Total Protein (Low)	-	4 g/dL
						Total Protein (High)	-	10 g/dL
						Triglycerides	x0lp19	1000 mg/dL
						Clinical Condition	CHRIS variable names	Mean Absolute % Interference
						Anti-Nuclear Antibody (ANA)	x0lp51*	1.6
						Rheumatoid Arthritis (RA)	x0cd07=inflammatory joint disease	1.6
						Systemic Lupus Erythematosus (SLE)	x0cd14=vasculitis (including lupus erythematosus)	1.1
						Insulin Dependent Diabetes Mellitus (IDDM)	x0dm* diabetes module	1.0
						Crohn's Disease	x0cd04=inflammatory bowel disease	2.4
						Multiple Sclerosis	x0ne07*	1.7
						Ulcerative Colitis	x0cd04	1.5
						Hyperglobulinemia (high IgG)	-	0.9
						Other Potential Interferents	CHRIS variable names	Mean Absolute % Interference
						HAMA positive	-	2.1
						Rheumatic Factor positive	-	1.6
x0lp82	Lipemic index	mg/dL			ABBOTT DIAGNOSTIC ARCHITECT	-		
x0lp83	Hemolytic index	mg/dL				-		
x0lp84	Icteric index	mg/dL				-		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences
x0lp85	HIL ABBOTT					-
x0lp86a	estimated Glomerular filtration rate (eGFR) CKDEPI crea	mL/min /1.73 m2				See interferences for x0lp07
x0lp86b	estimated Glomerular filtration rate (eGFR) MDRD4	mL/min /1.73 m2				See interferences for x0lp07

Table 2. Interferences for urine parameters

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp01	Creatinine, urine	mg/dL	Urine	Until 07/04/2014	ROCHE MODULAR PPE MODULAR PE. Kit: Cobas Creatinine Jaffé Method	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Bilirubin, urine	x0lp59	50 mg/dL
						Hemoglobin, urine	x0lp56	1.1 g/dL
						Glucose, urine>2100mg/dL	x0lp54	1000
						Urobilinogen, urine	x0lp60	40 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						cefoxitin	x0dd*	Falsely high values
						High homogentisic acid concentrations	x0dd*	False results
						Potentially Interfering Substance	CHRIS variable names	Results
						Bilirubin, urine≥30 mg/dL	x0lp59	Lower values
x0lp01	Creatinine, urine	mg/dL	Urine	Since 08/04/2014	ABBOTT DIAGNOSTIC ARCHITECT. Kit: Creatinine	Hemoglobin ≥1000 mg/dL	x0lp56	Higher values
						Glucose, urine≥300 mg/dL	x0lp54	Higher values
						Intralipid≥1000 mg/dL	x0dd*	Lower values
						Proteins, urine≥10.6 g/dL	x0lp55	Higher values
						Ascorbate≤3 mg/dL	x0dd*	No interference
						No interferences reported		
x0lp53	Urine pH	pH	Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	No interferences reported		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences			
x0lp53	Urine pH			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported			
x0lp54	Glucose, urine	mg/dL	Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results	
						High ascorbic acid	x0dd*	Interference has been largely eliminated	
x0lp54	Glucose, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported			
x0lp55	Proteins, urine	mg/dL		Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results	
						Infusions of polyvinylpyrrolidone	x0dd*	False positive values	
						Chlorohexidine	-	False positive values	
						Disinfectants with quarterly ammonium groups	-	False positive values	
x0lp55	Proteins, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported			
x0lp56	Hemoglobin, urine	mg/dL		Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	No interferences reported			
x0lp56	Hemoglobin, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030	No interferences reported			

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences				
					Kit: ARKRAY - AUTION Sticks 10PA					
x0lp58	Ketone bodies, urine	mg/dL		Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results		
						Phenylketones, phthalein	-	False positive results		
						Captopril, mesna (2-Mercaptoethanesulfonic acid sodium salt), other substances with sulphydryl groups	-	False positive results		
x0lp58	Ketone bodies, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported				
x0lp59	Bilirubin, urine	mg/dL	Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results		
						Large amounts of ascorbic acid	-	Lowered sensitivity		
x0lp59	Bilirubin, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported				
x0lp60	Urobilinogen, urine	mg/dL		Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results	
							Nitrite>5 mg/dL	x0lp61d	Decrease in the colour reaction	
x0lp60	Urobilinogen, urine		Urine	Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported				

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp61a	Specific weight, urine			Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	No interferences reported		
x0lp61a	Specific weight, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4030 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported		
x0lp61b	Color, urine		Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	No interferences reported		
x0lp61b	Color, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4033 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported.		
x0lp61c	Appearance, urine			Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	No interferences reported		
x0lp61c	Appearance, urine			Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4033 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported		
x0lp61d	Nitrites, urine			Urine	Until 08/09/2015	HITACHI-ROCHE URISYS2400. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names
			Antibiotics				x0dd*	They should be stopped 3 days before the test
			Ascorbic acid				-	Decreased sensitivity
x0lp61d	Nitrites, urine			Since 09/09/2015	A.MENARINI diagnostics	No interferences reported.		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
					ARKRAY AUTION MAX AX-4033 Kit: ARKRAY - AUTION Sticks 10PA			
x0lp61e	Leukocytes- esterase, urine			Until 08/09/2015	HITACHI-ROCHE URISYS2409. Kit: Cobas URISYS 2400 Cassette	Potential substances interfering	CHRIS variable names	Results
						Formaldehyde	x0dd*	Falsely high values
						Medication with imipenem, meropenem, clavulanic acid	x0dd*	False positive reactions
x0lp61e	Leukocytes- esterase, urine		Urine	Since 09/09/2015	A.MENARINI diagnostics ARKRAY AUTION MAX AX-4033 Kit: ARKRAY - AUTION Sticks 10PA	No interferences reported.		
x0lp62b	Erythrocytes, urine			Until 08/09/2015	SYSMEX CORPORATION SYSMEX UF-1000i Kit: Sysmex UF II SEARCH -SED	Potential substances interfering	CHRIS variable names	Results
						Erythrocytes>5-50 /μL	x0lp62b	Higher values
						Conditions interfering	CHRIS variable names	Results
						Between 3 days before and 3 days after the period	-	Decrease in the color reaction
x0lp62b	Erythrocytes, urine			Since 09/09/2015	A.MENARINI diagnostics SediMax conTRUST	No interferences reported		
x0lp62c	Leukocytes, urine	/μL	Urine	Until 08/09/2015	SYSMEX CORPORATION SYSMEX UF-1000i Kit: Sysmex UF II SEARCH -SED	Potential substances interfering	CHRIS variable names	Results
						Abnormal samples	-	Inaccuracy of results
						Preservatives in tubes	-	Inaccuracy of results
						Gross hematuria or pyuria	-	Inaccuracy of results
						Medication with fluorescence properties	x0dd*	Inaccuracy of results
x0lp62c	Leukocytes, urine	/μL		Since 09/09/2015	A.MENARINI diagnostics SediMax conTRUST.	No interferences reported		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
					No kit			
x0lp62d	Epithelial cells, urine	/μL	Urine	Until 08/09/2015	SYSMEX CORPORATION SYSMEX UF-1000i Kit: Sysmex UF II SEARCH -SED	Potential substances interfering	CHRIS variable names	Results
						Abnormal samples	-	Inaccuracy of results
						Preservatives in tubes	-	Inaccuracy of results
						Gross hematuria or pyuria	-	Inaccuracy of results
						Medication with fluorescence properties	x0dd*	Inaccuracy of results
x0lp62d	Epithelial cells, urine	/μL		Since 09/09/2015	A.MENARINI diagnostics SediMax conTRUST. No kit	No interferences reported		
x0lp62e	Bacteria, urine			Until 08/09/2015	SYSMEX CORPORATION SYSMEX UF-1000i Kit: Sysmex UF II SEARCH -BAC			
						Potential substances interfering	CHRIS variable names	Results
						Abnormal samples	-	Inaccuracy of results
						Preservatives in tubes	-	Inaccuracy of results
						Gross hematuria or pyuria	-	Inaccuracy of results
Medication with fluorescence properties	x0dd*	Inaccuracy of results						
x0lp62e	Bacteria, urine		Urine	Since 09/09/2015	A.MENARINI diagnostics SediMax conTRUST. No kit	No interferences reported		
x0lp63	Ratio Albumin Urine/Creatinine Urine (ACR)	mg/mmol	Urine	Until 07/04/2014	x0lp64: SIEMENS BN ProSpec System x0lp01: ROCHE MODULAR PPE MODULAR PE	See interferences for x0lp64 and x0lp01.		
x0lp63	Ratio Albumin Urine/Creatinine Urine (ACR)	mg/mmol		Since 08/04/2014 to 15/03/2016	x0lp01: ABBOTT DIAGNOSTIC ARCHITECT	See interferences for x0lp64 and x0lp01.		
x0lp63	Ratio Albumin Urine/Creatinine Urine (ACR)	mg/mmol		Since 16/03/2016	x0lp64: SIEMENS BN II	See interferences for x0lp64 and x0lp01.		

Variable	Parameter	Unit	Substrate	Period of use	Machine/Kit	Known interferences		
x0lp64	Albumin, urine	mg/L		Until 15/03/2016	SIEMENS BN ProSpec System Kit: N Antiserum to Human Albumin	Potentially Interfering Substances	CHRIS variable names	Potentially Interfering Substance Concentration
						Bilirubin, urine	x0lp59	50 mg/dL
						Hemoglobin, urine	x0lp56	1.1 g/dL
						Glucose, urine>2100mg/dL	x0lp54	1000
						Urobilinogen, urine	x0lp60	40 mg/dL
						Other potential substances interfering	CHRIS variable names	Results
						Cefoxitin	x0dd*	Falsely high values
						High homogentisic acid concentrations	x0dd*	False results
x0lp64	Albumin, urine	mg/L		Since 16/03/2016	SIEMENS BN II. Kit: same as before	See above for x0lp64 with machine SEIMENS BN ProSpec System		

3. References

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