Sentara Healthcare and Data Innovations

Keith Blackshear and Jeffrey Sanders

June 22, 2020

SENTARA®

Topics

- Meet the Presenters
- About Sentara Healthcare
- Sentara Laboratory Services
- Sentara and DI
  - History
  - Disciplines
- COVID-19 Impact
- Questions

SECTION ONE

Meet the Presenters

Keith Blackshear

Jeffrey Sanders

Keith Blackshear

- Clinical Laboratory Support Coordinator, Hematology & Urinalysis
- B.S., Biology, Univ. of S. Carolina
- MLS internship at Augusta Health in Fishersville, VA
- Pursuing MBA at Univ. of Southern Indiana
- 5+ years with Sentara Healthcare

Jeffrey Sanders

- 23+ years of IT experience
- Started at UNC Health – Pardee Hospital
- 17+ years at Sentara Healthcare
- 8+ years in my current role
- Over 80 Windows based servers supported
- Over 20 applications supported
  - (ex. Instrument Manager, BioRad QC, Haemonetics SafeTrace TX, Biomerieux Myla, Roche Infinity, Abbott RALS, Systemlink Histotrac)

Sentara Healthcare At-a-Glance

Small Beginnings

- 1888: Retreat for the Sick
- 1892: School of Nursing opens
- 1903: Norfolk Protestant Hospital

Growth and Expansion

- 1972 - State's First Merger of Two Non-Profit Hospitals: Norfolk General & Leigh Memorial
- 1984 - Optima Health Plan Started
- 1987 – The "Sentara" brand name was born.
- 1988 - Hampton General Hospital Merger
- 1991 - Bayside Hospital Merger
- 1995 - Sentara Medical Group Formed
- 1998 - Virginia Beach General Hospital Merger
- 2002 - Williamsburg Community Hospital Merger
- 2006 - Obici Hospital Merger
- 2006 - Sentara Heart Hospital Opened
- 2009 - Potomac Hospital Merger
- 2011 - RMH Healthcare Merger
- 2011 - Martha Jefferson Hospital Merger
- 2011 - Opening of Sentara Princess Anne Hospital
- 2013 - Halifax Regional Health System Merger

Growth and Expansion

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Mission Statement:
We Improve Health Every Day

- Headquartered in Norfolk, Virginia
- 130 year not-for-profit history
- 12 hospitals
- 4 medical groups
- 3,800+ provider medical staff
- Nearly 30,000 Members of the Team
- Health plans (Optima Health and Virginia Premier)
- Outpatient campuses
- Advanced Imaging Centers
- Home health and hospice
- Rehab and therapy centers
- Nursing and assisted living centers
- Medical transport ambulance
- Nightingale air ambulance

SECTION THREE

Sentara Laboratory Services

Laboratory Services

- More than 700 laboratory professionals at 12 Sentara hospitals and 5 Limited Service Laboratories.
- Nearly 8 million billable lab tests performed in 2019
- Sentara Reference Laboratory is Hampton Roads' only full-service reference laboratory and operates hospital-based laboratories, ambulatory care center laboratories, dedicated Patient Service Centers and supports a wide range of physician offices, clinics, businesses, schools and insurance providers in Hampton Roads.
- Accredited by the College of American Pathologists and the Virginia Department of Health.
- Transfusion services and histocompatibility/immunology are accredited by the American Association of Blood Banks (AABB) and the American Society of Histocompatibility and Immunogenetics (ASHI), respectively.
- The only biosafety Level 3 microbiology laboratory performing mycobacteriology in the region.
- Named Medical Laboratory Observer's 2016 Lab of the Year.

SECTION FOUR

Sentara and Data Innovations

Instrument Manager Architecture

- Currently have four Production Systems
  - **Hemo/Coag**
  - **Chemistry (Roche)**
  - **Martha Jefferson Chemistry (Roche)**
  - **LIS**
  - **One stand alone Test system**
- Over of 200 Instrument Connections*
  - **Across 16 physical locations**
  - **Other instruments are running, but not interfaced**
- Servers are virtualized using VMWare virtual servers

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Sentara and Data Innovations

Two Phases of Instrument Interfacing at Sentara

- Cerner Classic
  - **Mix of Instrument Manager and Direct Connection to Cerner via Terminal Servers**
- Epic Beaker/Haemonetics SafeTrace TX
  - **Beaker Roll out Started 2015**
  - **100% Instrument Manager**

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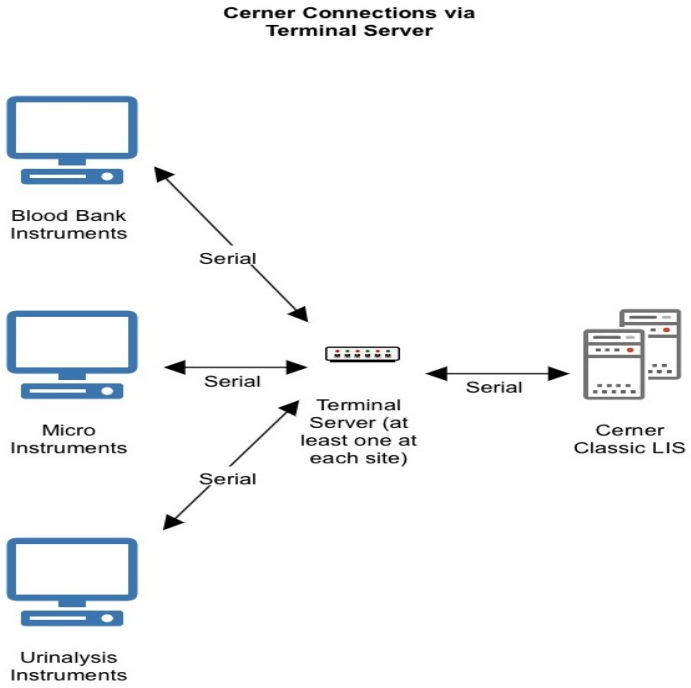
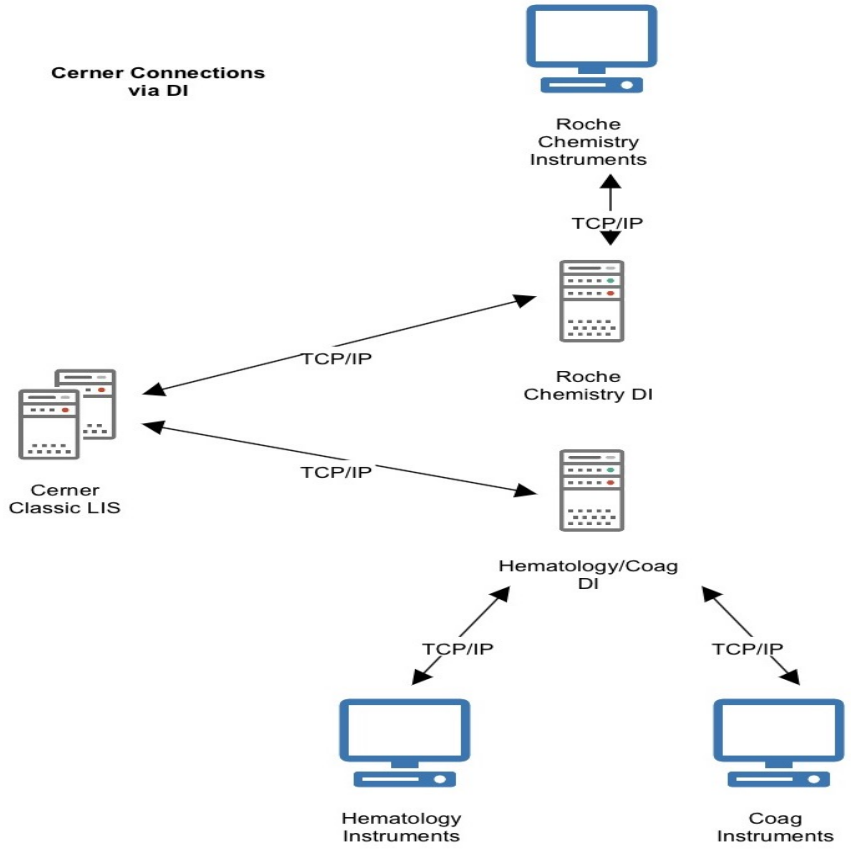
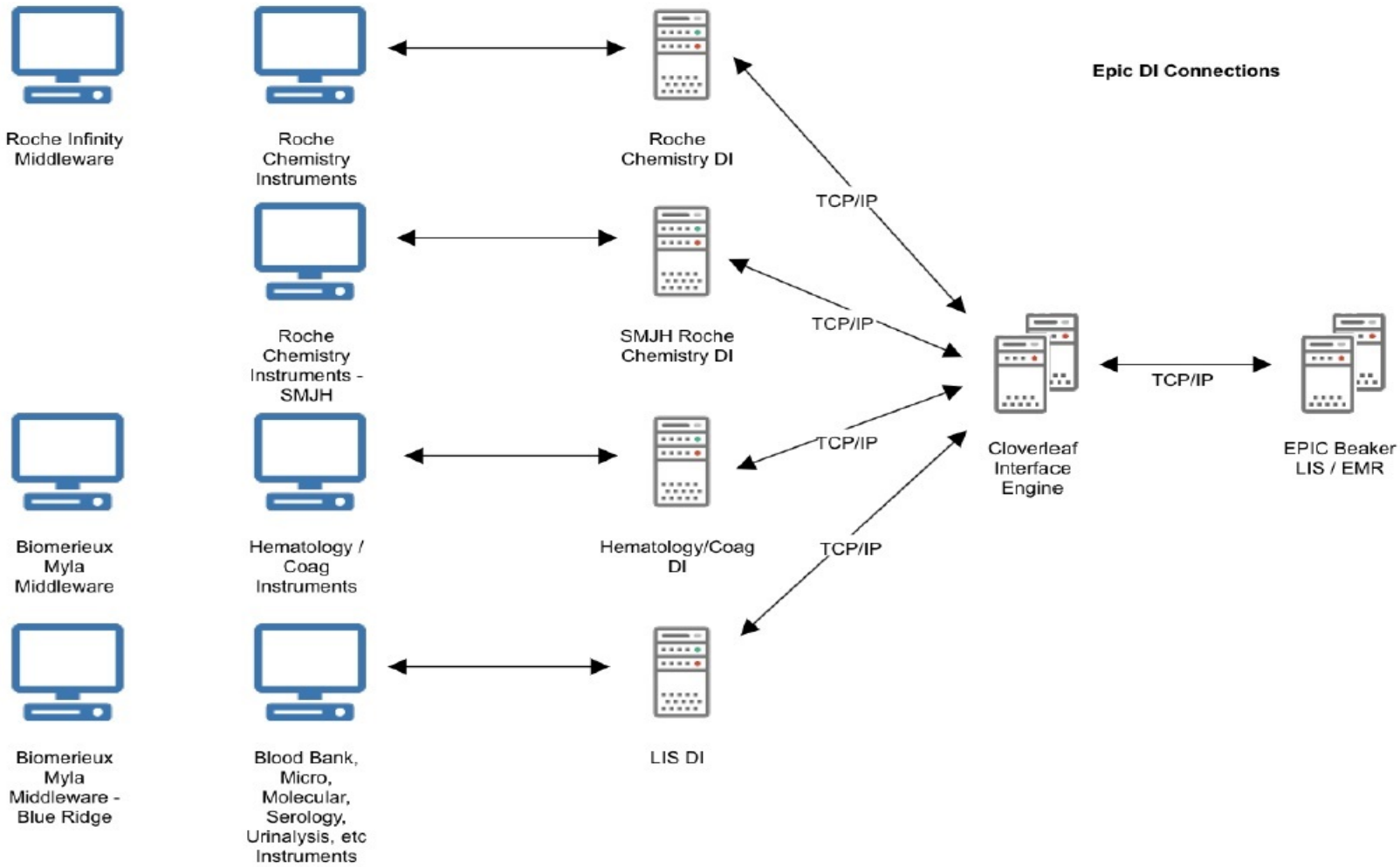
Cerner Classic





Epic Beaker


Epic DI Connections
Roche Infinity Middleware
Roche Chemistry Instruments
Roche Chemistry DI
TCP/IP
Roche Chemistry Instruments - SMJH
SMJH Roche Chemistry DI
TCP/IP
Biomerieux Myla Middleware
Hematology / Coag Instruments
Hematology/Coag DI
TCP/IP
Cloverleaf Interface Engine
TCP/IP
EPIC Beaker LIS / EMR
Biomerieux Myla Middleware - Blue Ridge
Blood Bank, Micro, Molecular, Serology, Urinalysis, etc Instruments
LIS DI
TCP/IP

Lab Disciplines

- Coagulation
- Hematology
- Urinalysis
- Chemistry
- Processing/Total Lab Automation
- Transfusion Services
- Microbiology

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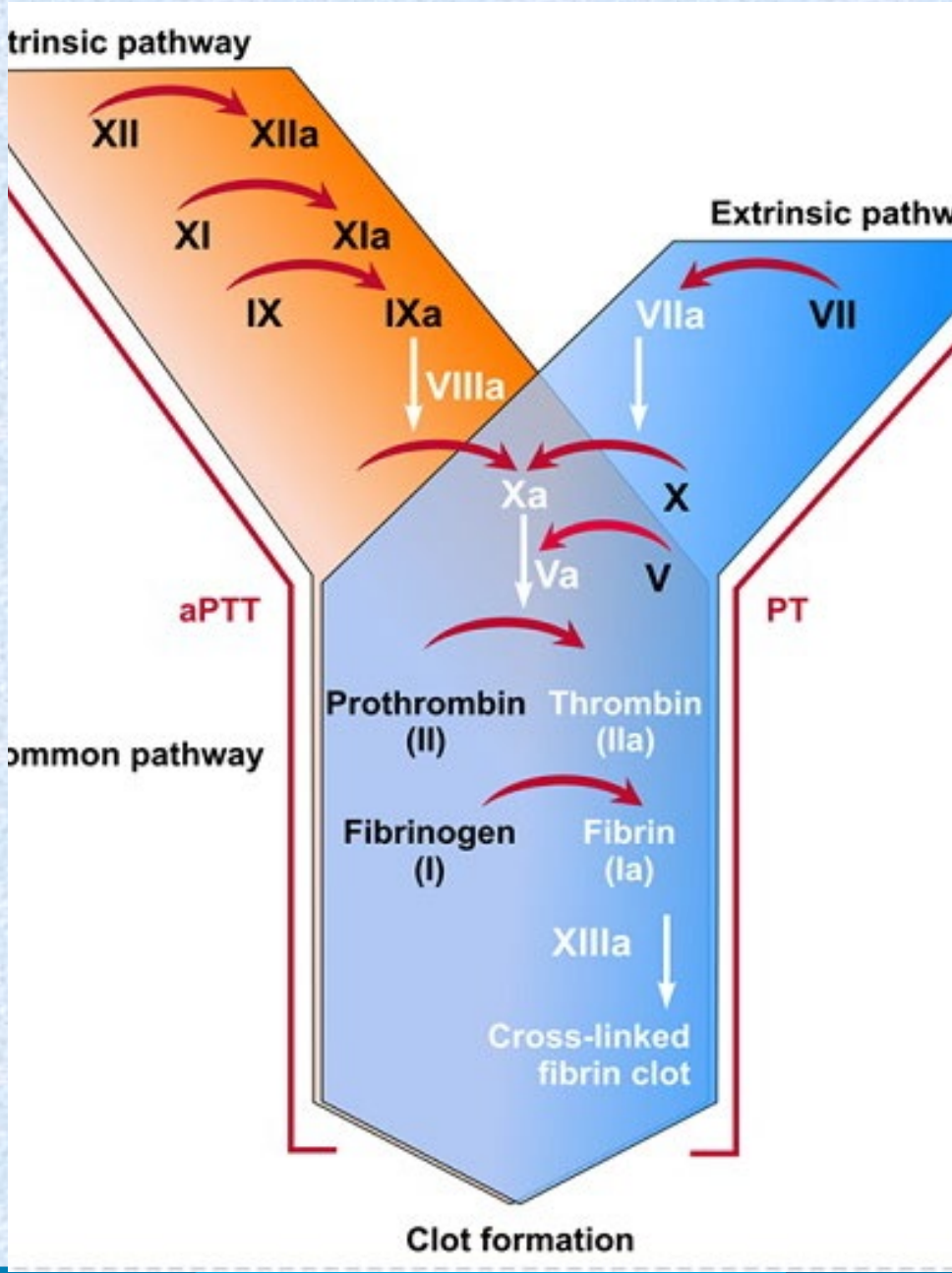
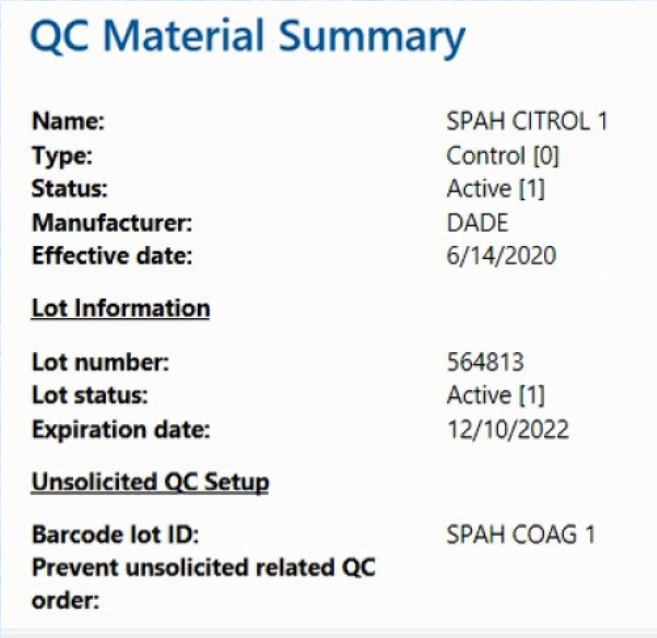
Coagulation

- Analyzers
- Outgoing requests
- Incoming results
  - **QC ID**
  - **Error Codes**
  - **Resolution of non-numeric results**
  - **Test dilution results**
  - **Test comments**
  - **“No value” rule**



Coagulation – QC ID

- Utilizing unsolicited QC in Epic Beaker
- IM converts analyzer QC file name to Epic Beaker barcode lot ID



QC Material Summary

Name:	SPAH CITROL 1
Type:	Control [0]
Status:	Active [1]
Manufacturer:	DADE
Effective date:	6/14/2020
Lot Information	
Lot number:	564813
Lot status:	Active [1]
Expiration date:	12/10/2022
Unsolicited QC Setup	
Barcode lot ID:	SPAH COAG 1
Prevent unsolicited related QC order:	

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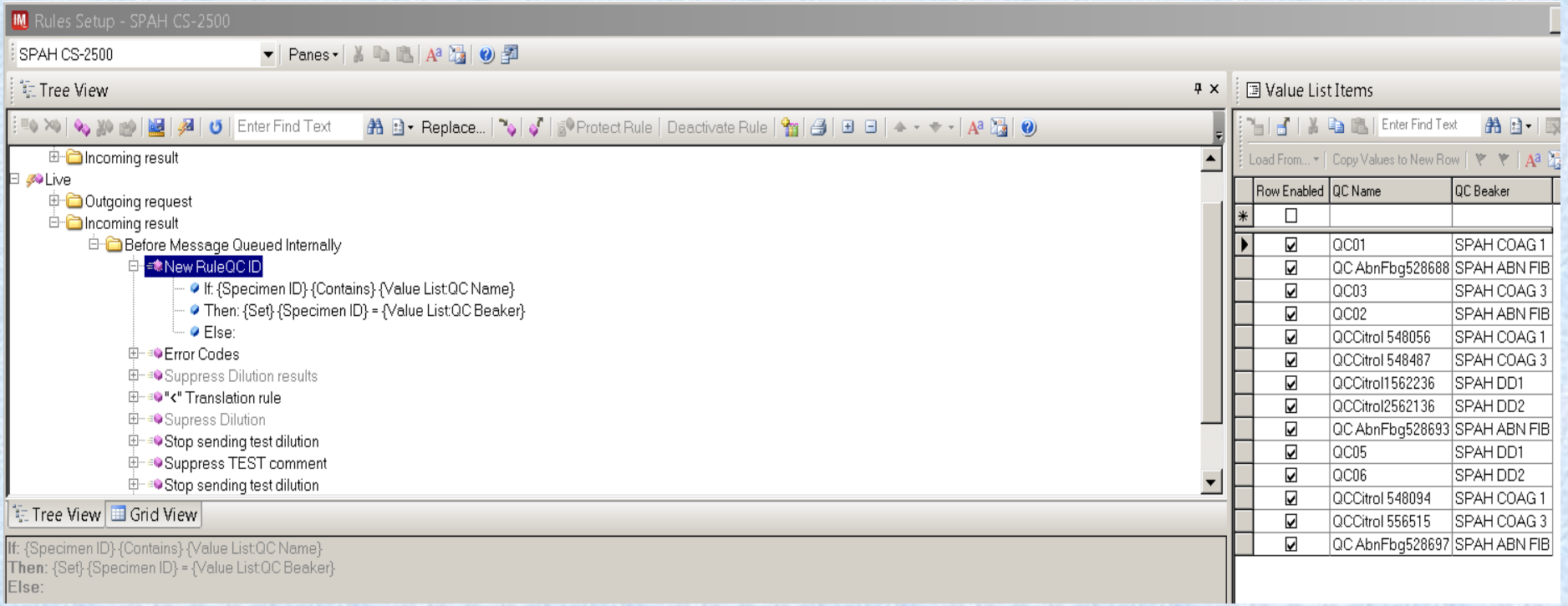
Coagulation – QC ID



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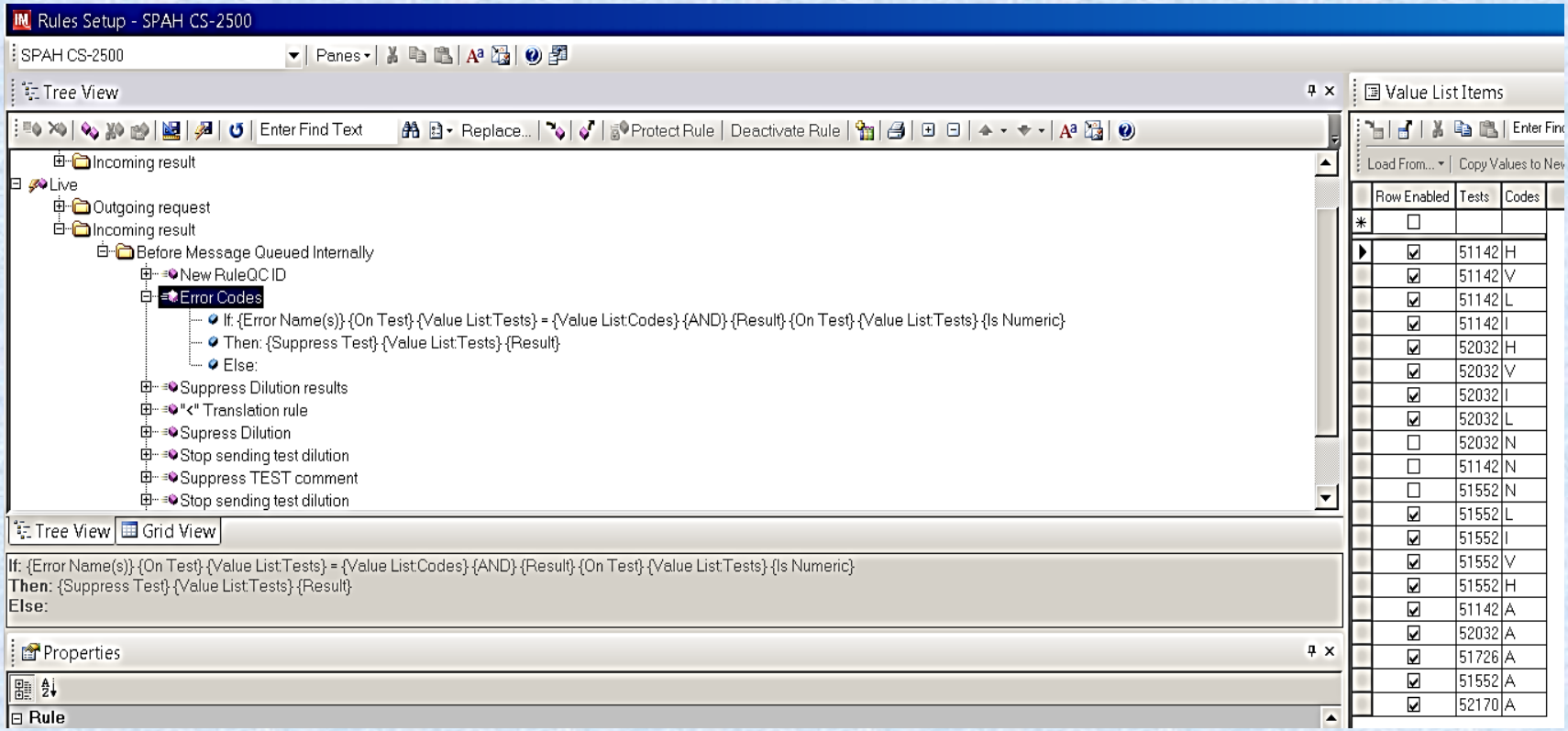
Coagulation – Error Codes

- Prevents release of questionable results



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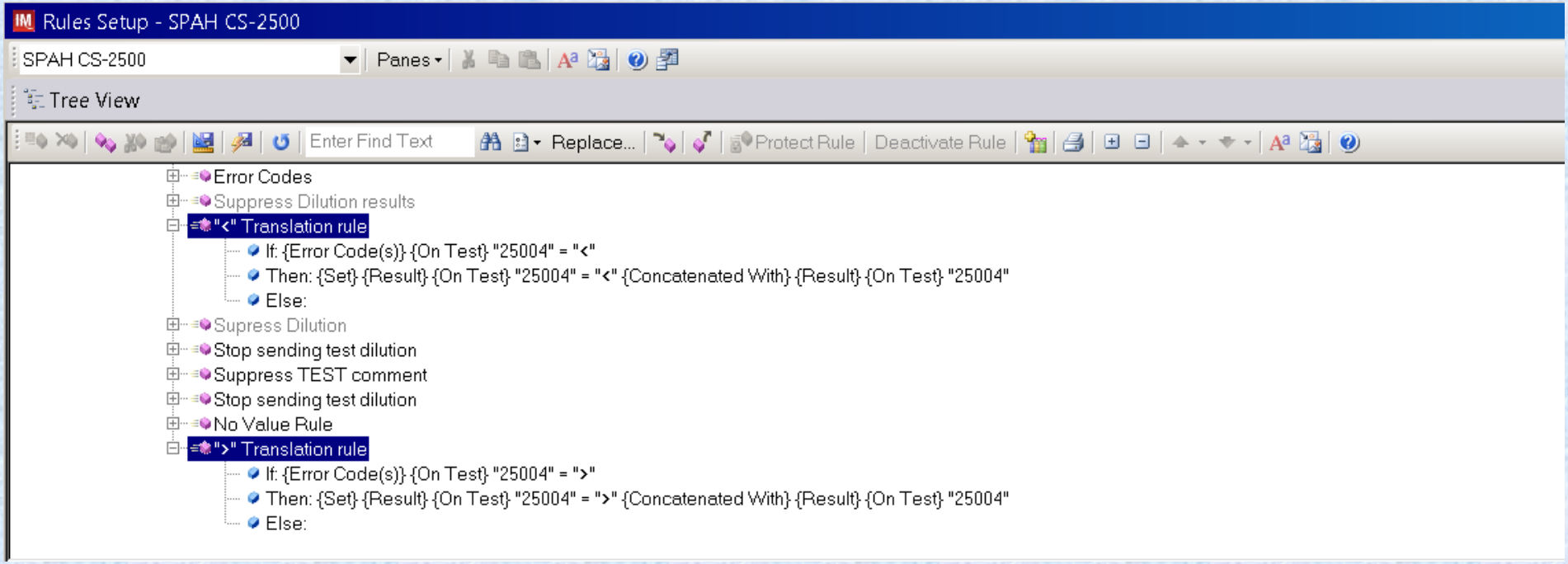
Coagulation – Resolution of “<“ or “>” Results

- Non-numeric values accompanying results are treated as error codes



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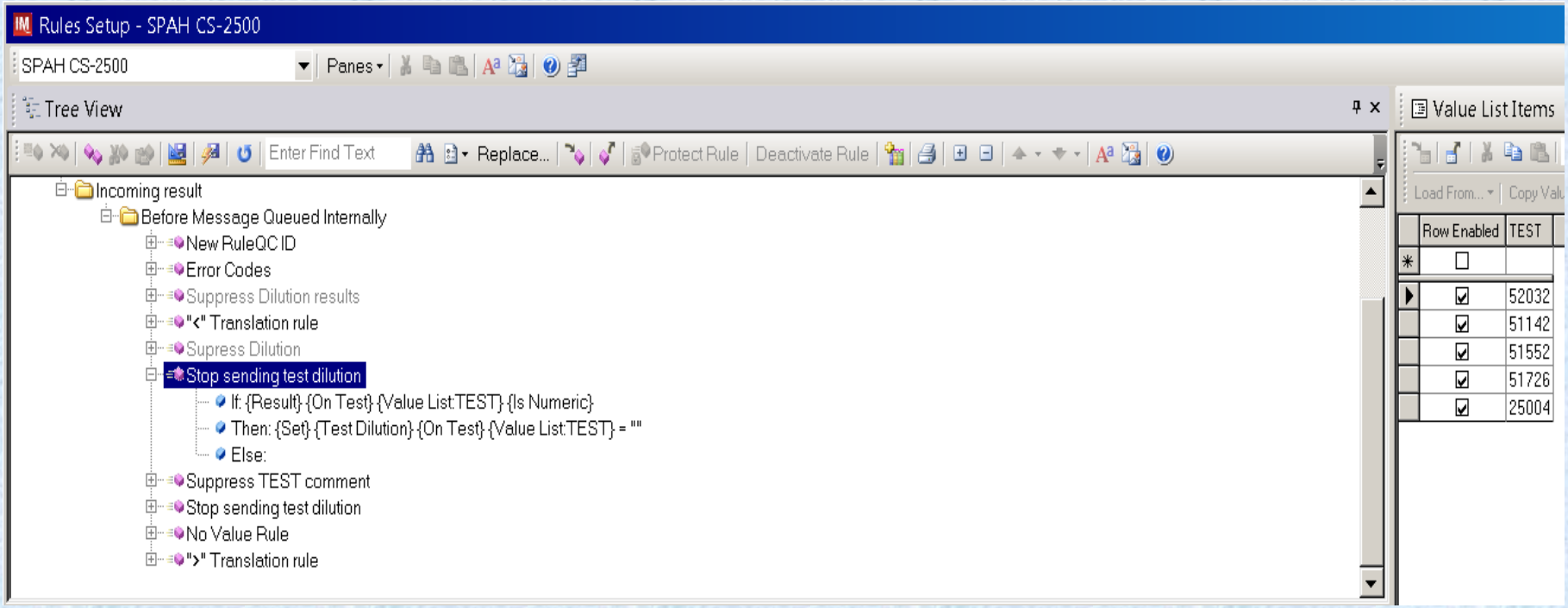
Coagulation – Test Dilution Results

- Analyzer sends a dilution value with every test result
- Dilution result interferes with results posting to Epic Beaker



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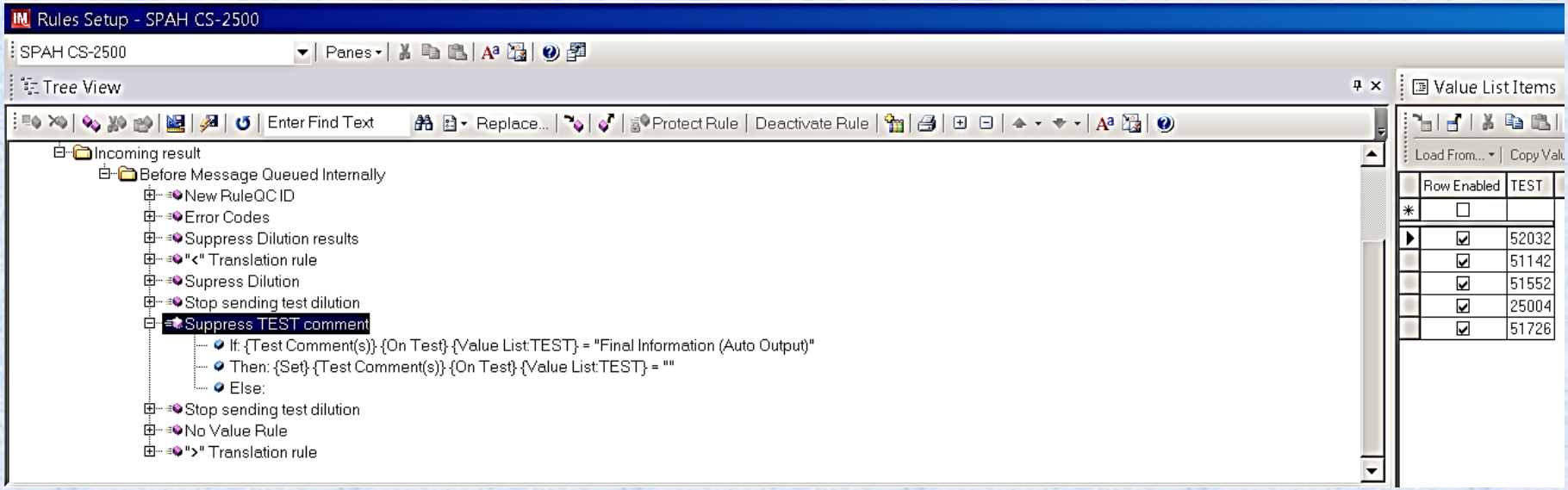
Coagulation – Test Comments

- Siemens CS-2500 analyzer sends a “Final Information (Auto Output)” comment with test results
- Causes confusion for nurses and physician



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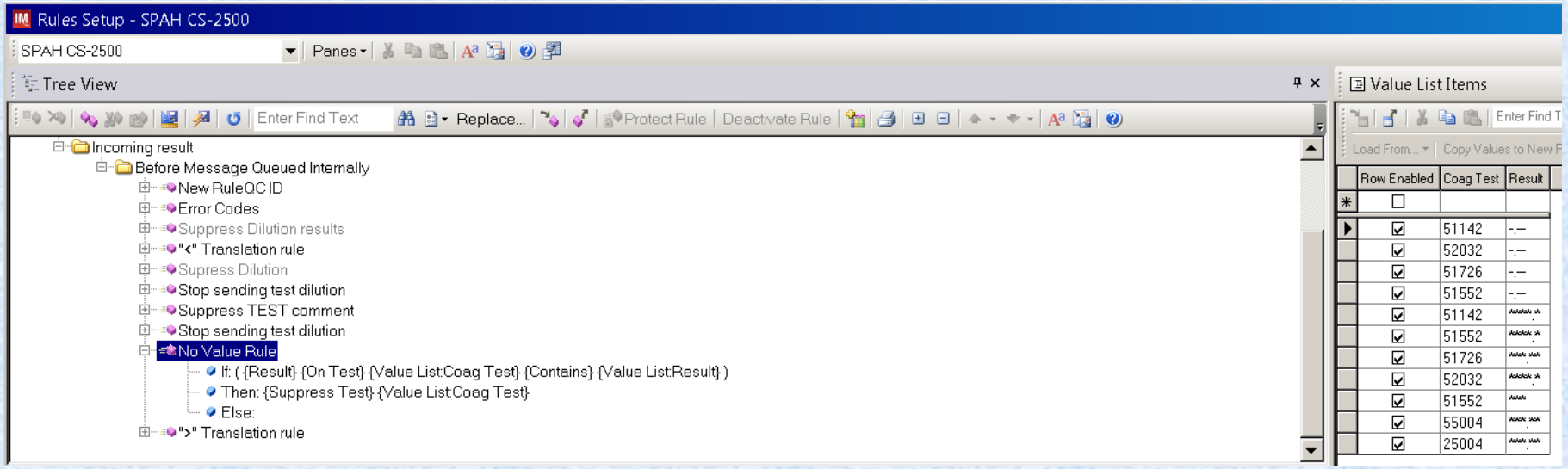
Coagulation – No Value

- Suppresses non-numeric results



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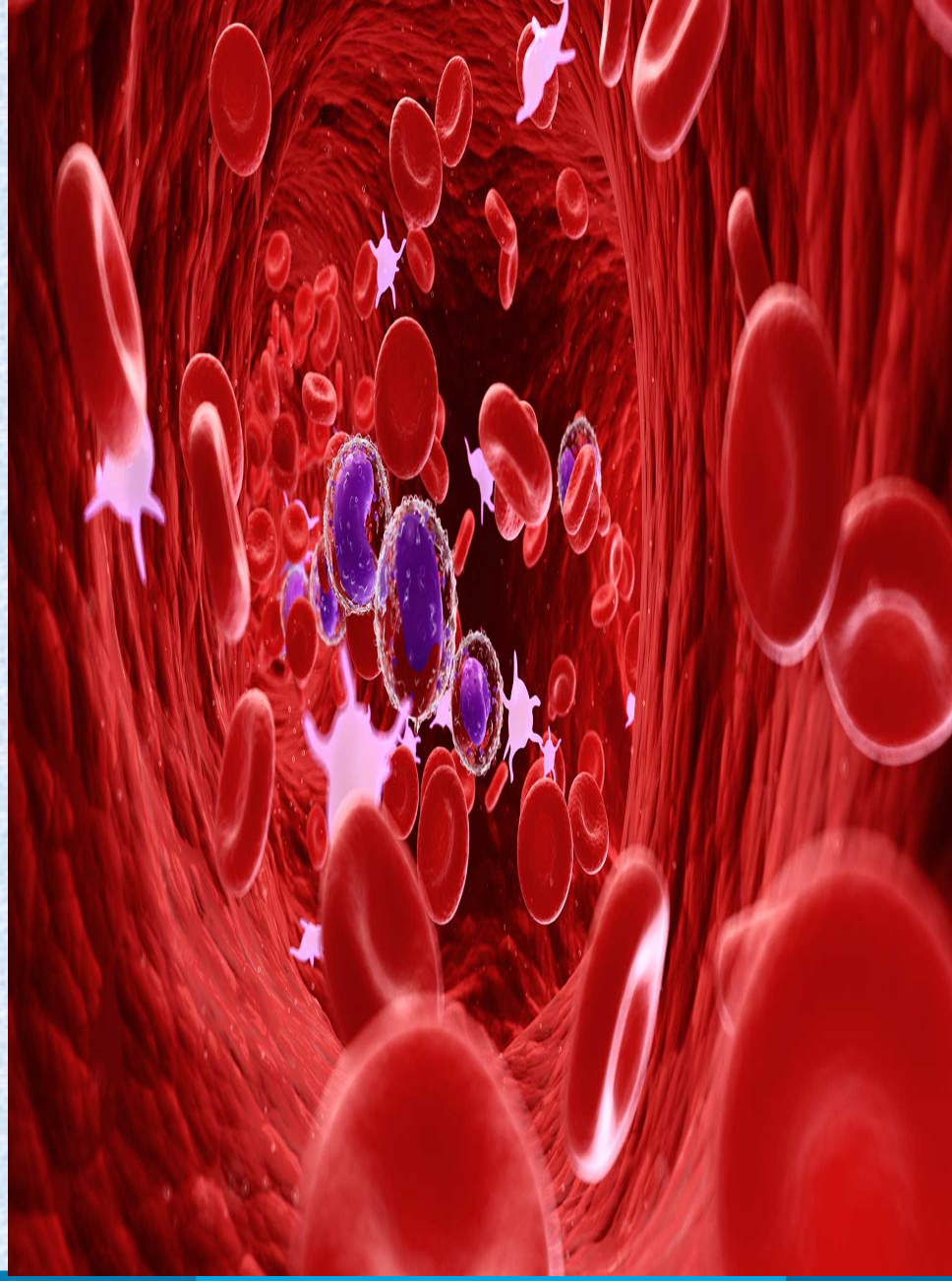
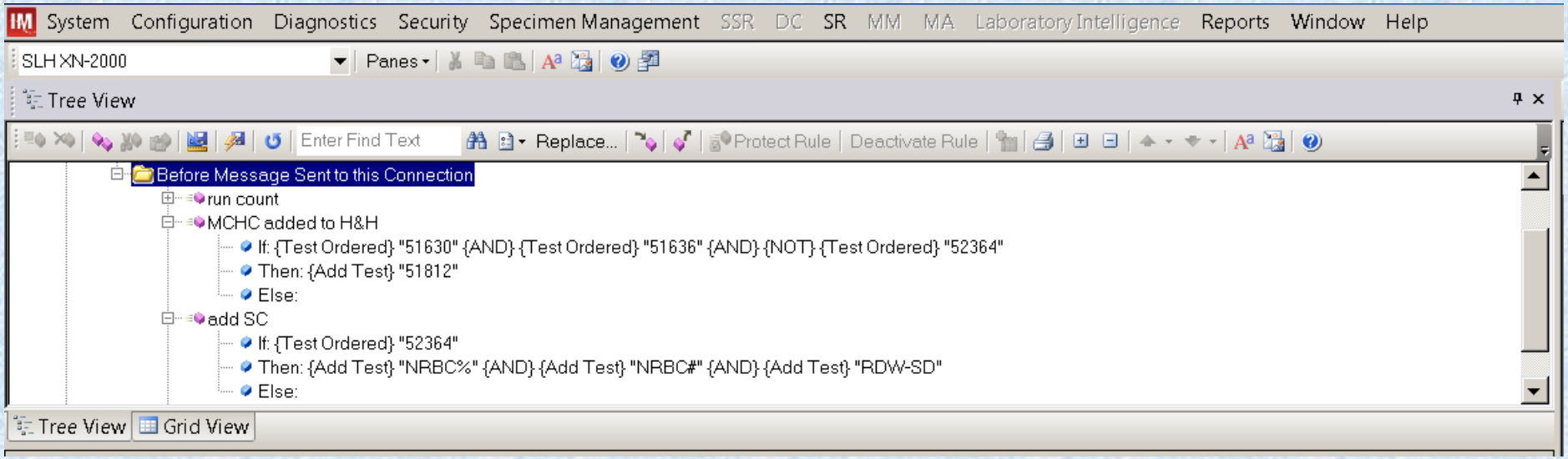
Hematology

- Instrumentation
- CBC Components
- Outgoing request rules
  - **H&H&MCHC**
  - **WBC & nRBC**
  - **Run Count**
- Sysmex analyzer flagging
- Error code resolution



Hematology – Outgoing Requests

- Add MCHC to H&H
- Add nRBC% and nRBC# to WBC



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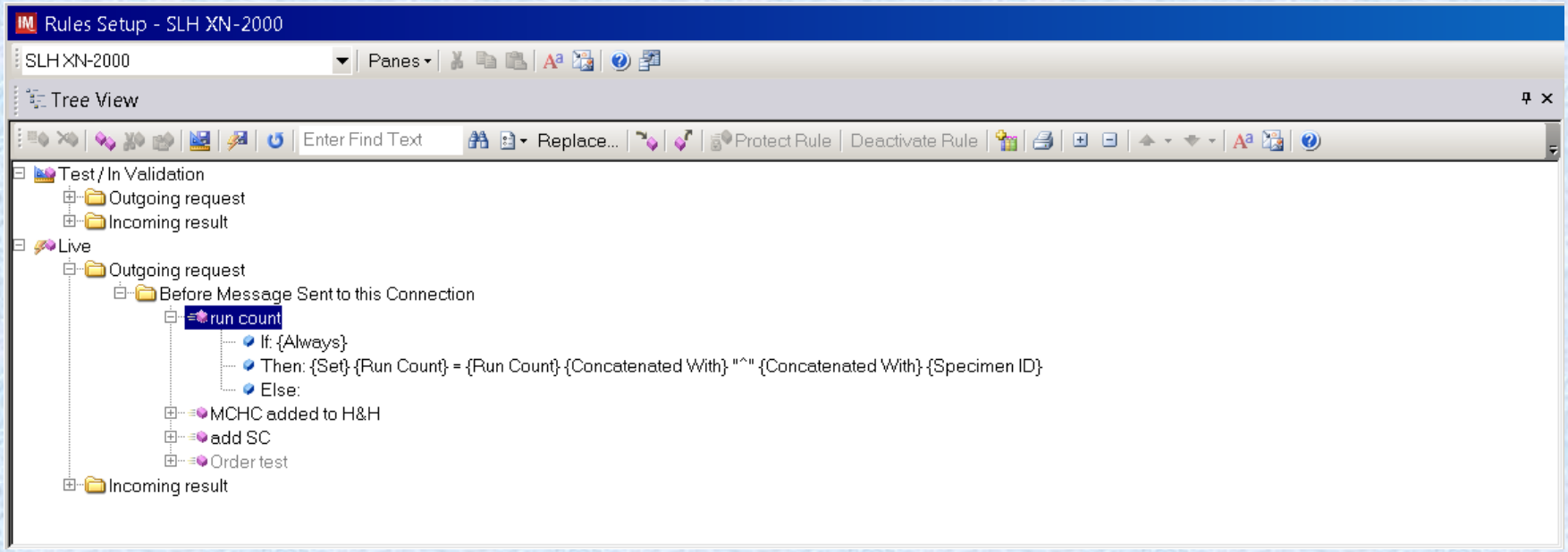
Hematology – Run Count

- Creates a list of tests that IM will accept from analyzer



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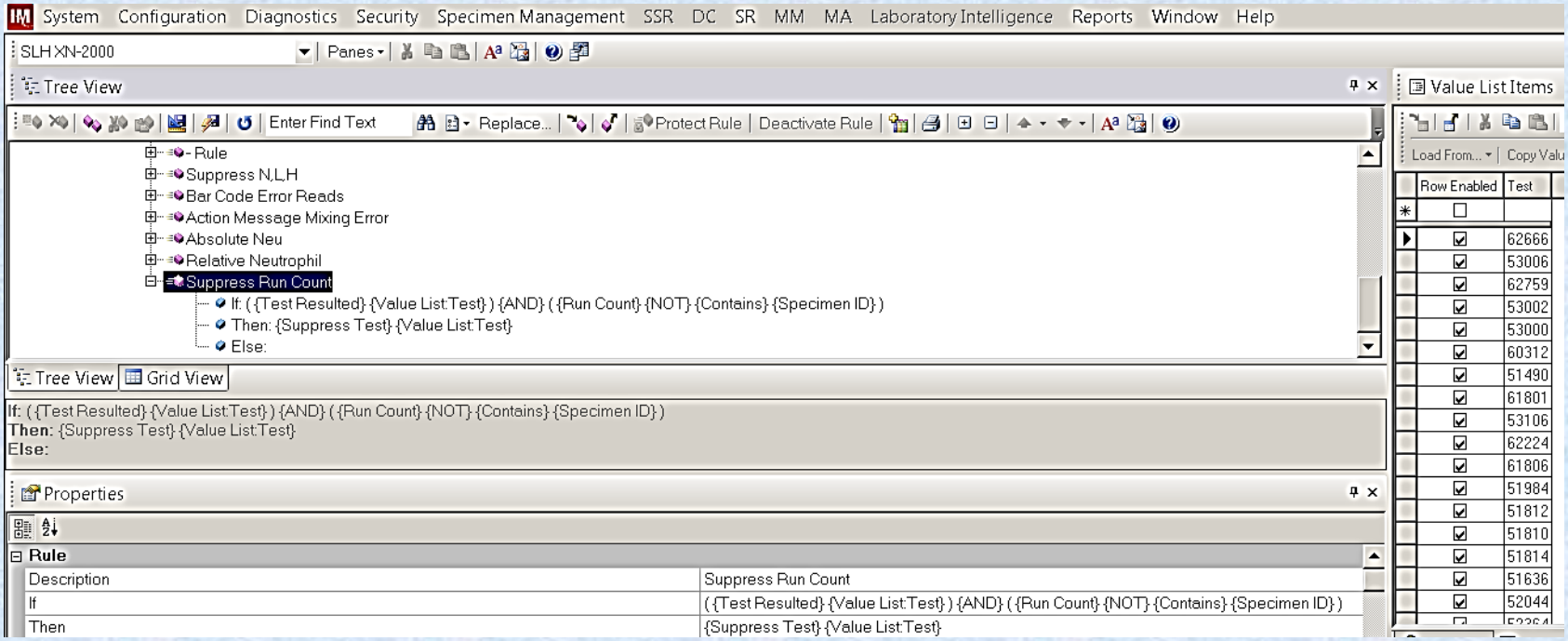
Hematology – Run Count

- Tests not in the run count are suppressed



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Hematology – Sysmex Flagging

- Added flagging components to CBC test
  - **667: Instrument Flag**
  - **668: Linearity flag**
  - **927: Slide Review Flag**
- Purpose is to logically organize analyzer flags so proper test is reflexed

CBC with Differential

Result reported: Hemogram(1) + Auto diff(1)

Res	Component	Value	Units	!	Δ	L	IE	R	Ref. Range
1	INSTRUMENT FLAG	No							
1	LINEARITY FLAG	No							
1	SLIDE REVIEW FLAG	No							
1	**WBC**	9.6	K/uL						4.0-11.0
1	**RBC**	4.26	M/uL						3.80-5.80
1	**HGB**	13.3	g/dL						13.1-17.2
1	**HCT**	38.7	%	⌄					39.3-51.6
1	**MCV**	91	fL						80-95
1	**MCH**	31	pg						26-34
1	**MCHC**	34	g/dL						31-36
1	**RDW**	13.4	%						10.0-15.5
1	**PLT**	111	K/uL	⌄					140-440
1	**MPV**	11.1	fL						9.0-13.0

CBC with Differential

Result reported: Hemogram(2) + No diff

Linked manual diffs: Manual Differential

Res	Component	Value	Units	!	Δ	L	IE	R	Ref. Range
2	INSTRUMENT FLAG	Yes							
	Comment:								
	Lymphopenia								
	Leukocytopenia								
2	LINEARITY FLAG	No							
2	SLIDE REVIEW FLAG	Yes							
	Comment:								
	Thrombocytopenia								
2	**WBC**	1.8	K/uL	⌄					4.0-11.0
2	**RBC**	5.20	M/uL						3.80-5.80
2	**HGB**	16.4	g/dL						12.6-17.1
2	**HCT**	46.7	%						37.8-52.2
2	**MCV**	90	fL						80-95

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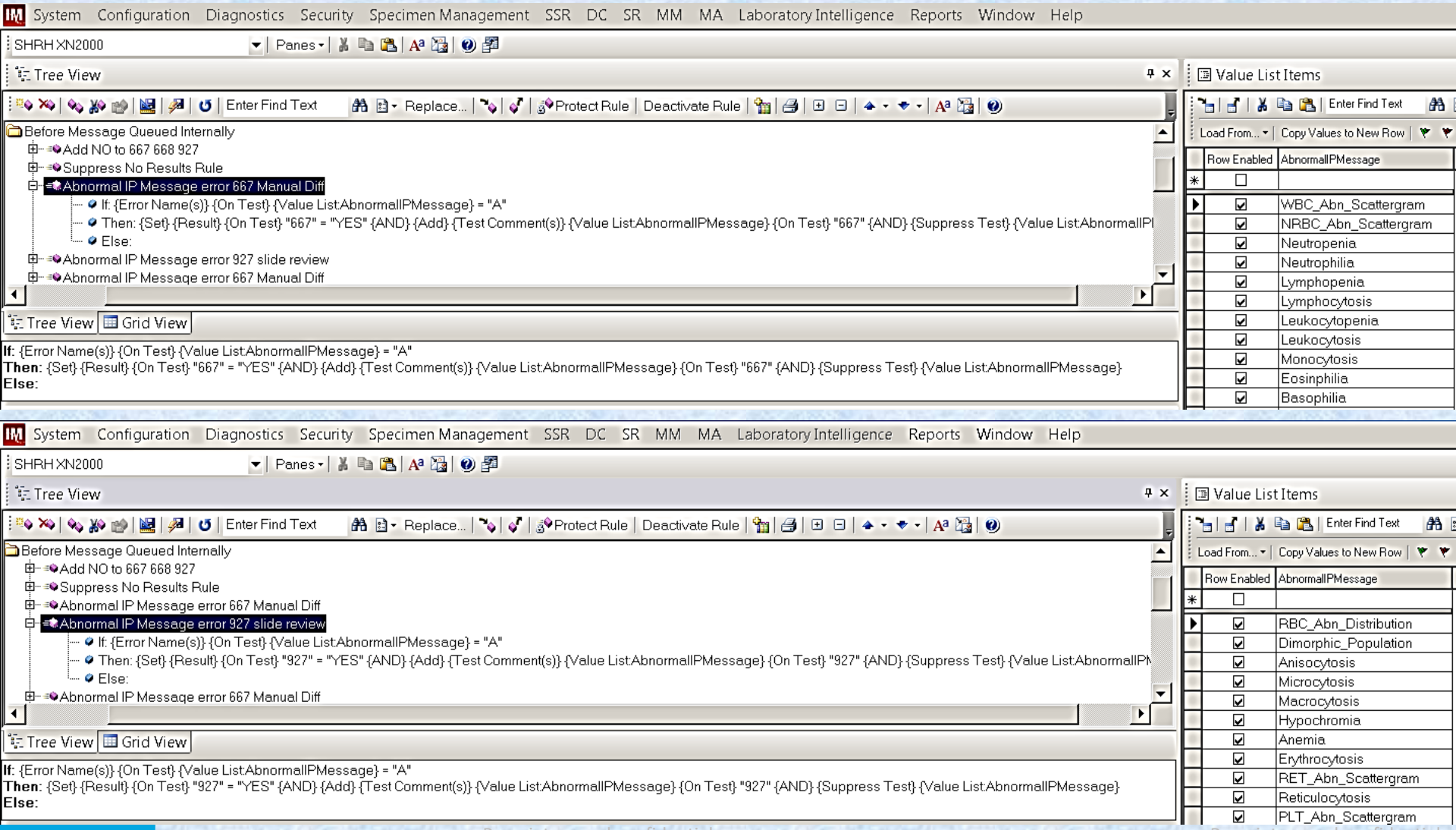
Hematology – Sysmex Flagging



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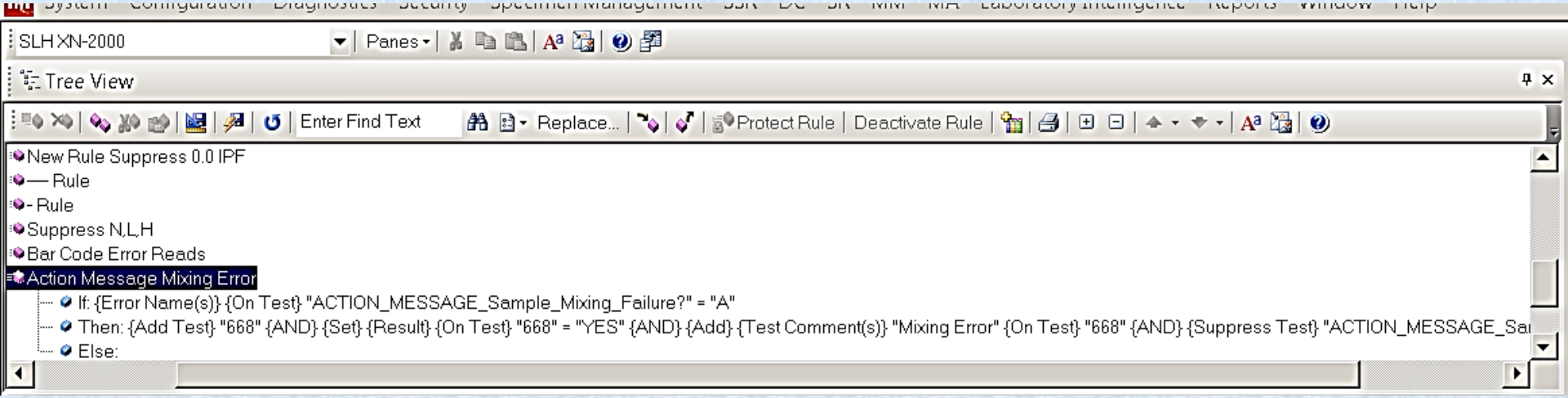
Hematology – Sysmex Flagging/Mixing Error

- Mixing Error action message converted to a Linearity flag



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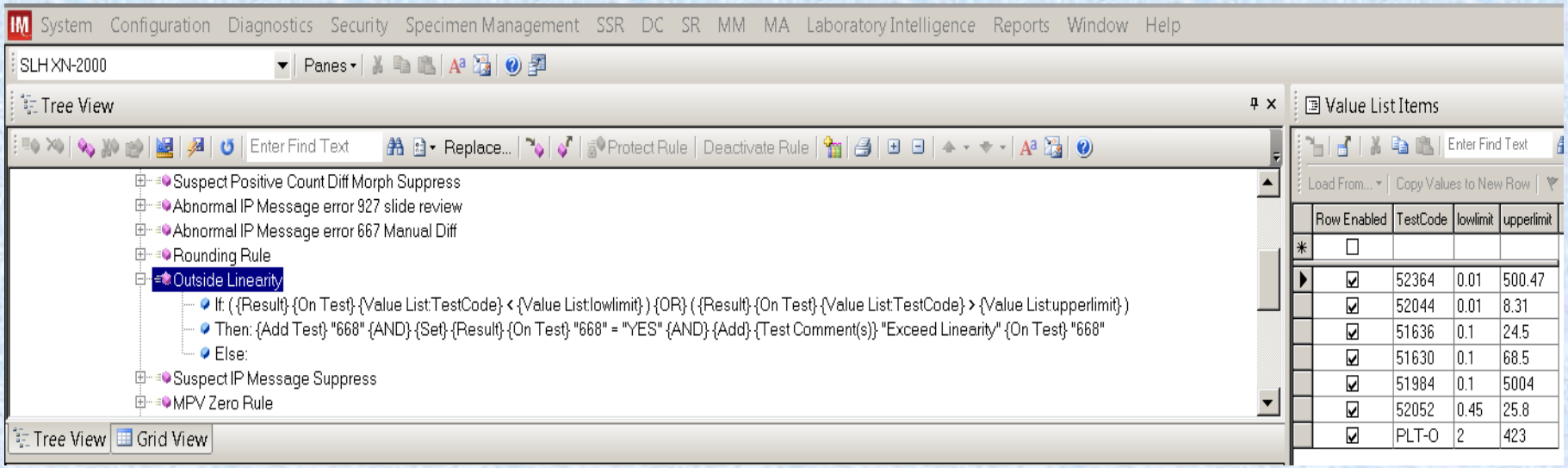
Hematology – Outside Linearity

- CBC results outside linearity will create a linearity flag in Epic Beaker to prevent auto-verification



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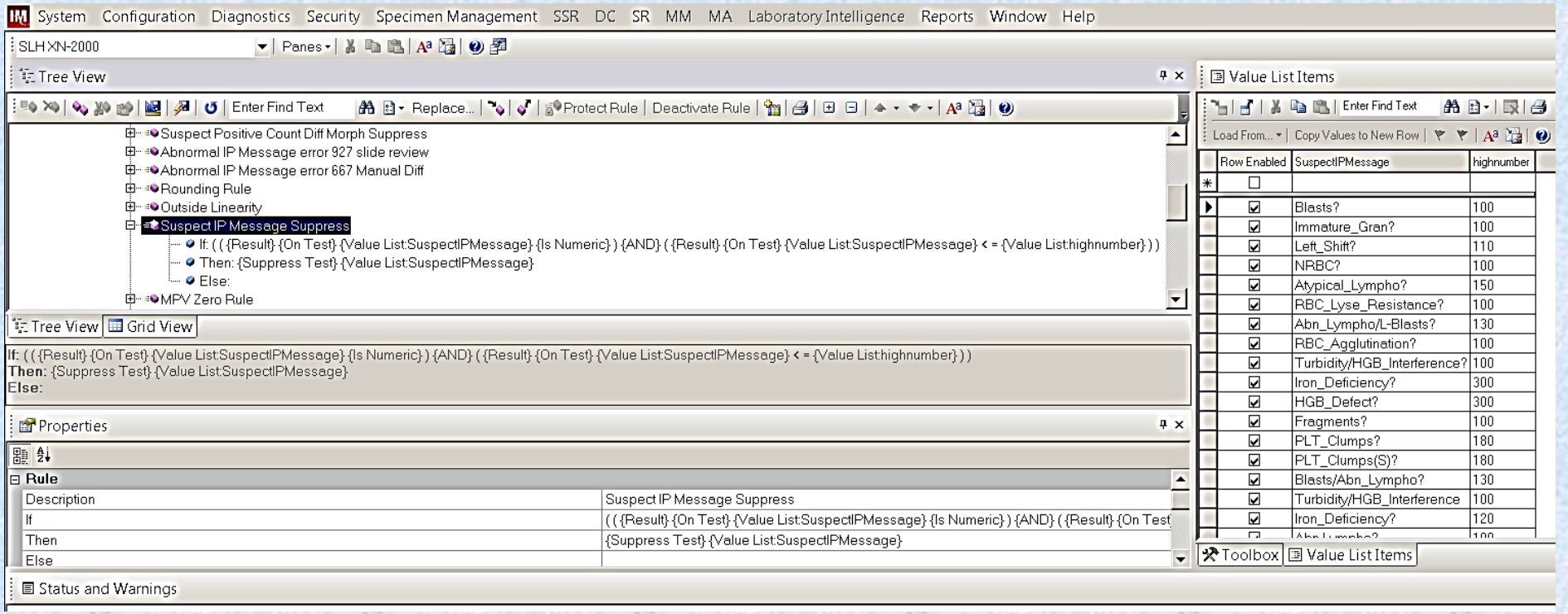
Hematology – "Q" Scores

- "Q" Score: Probability of presence of abnormal cells in a sample



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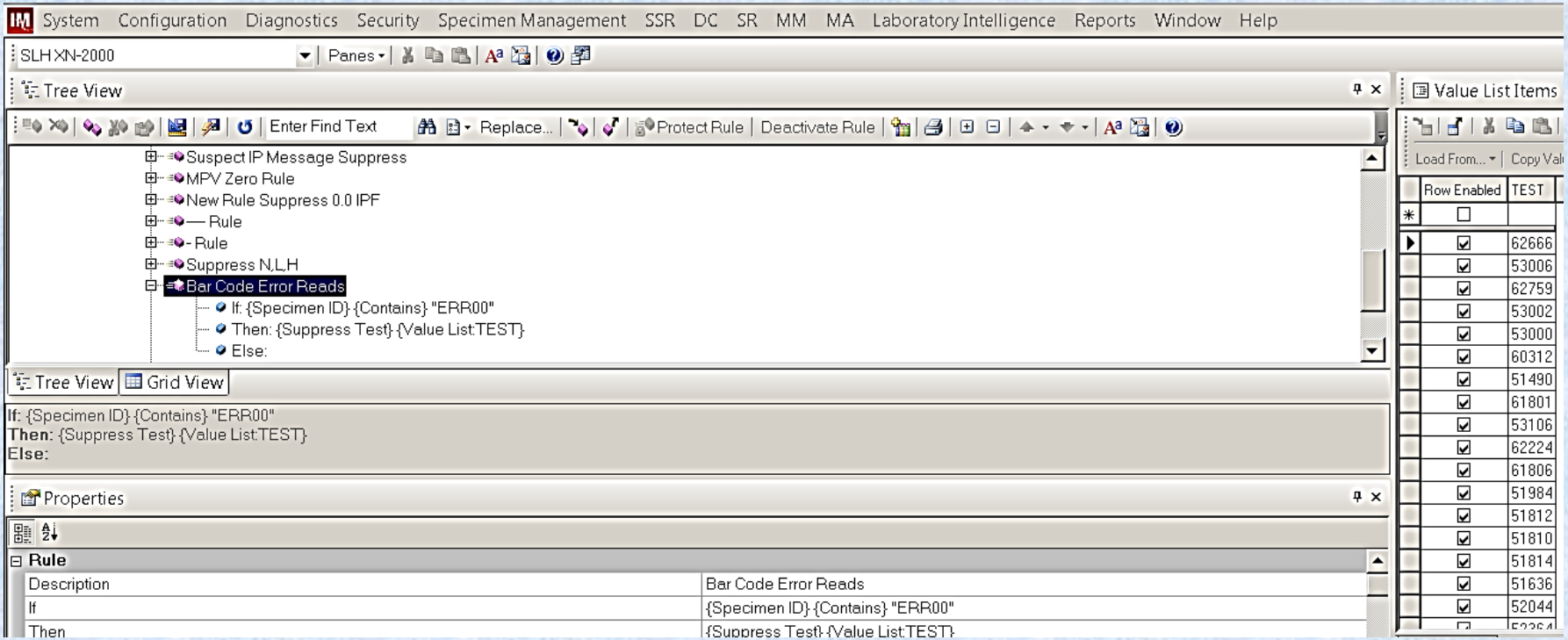
Hematology – Bar Code Read Errors

- Results are suppressed if bar code read fails



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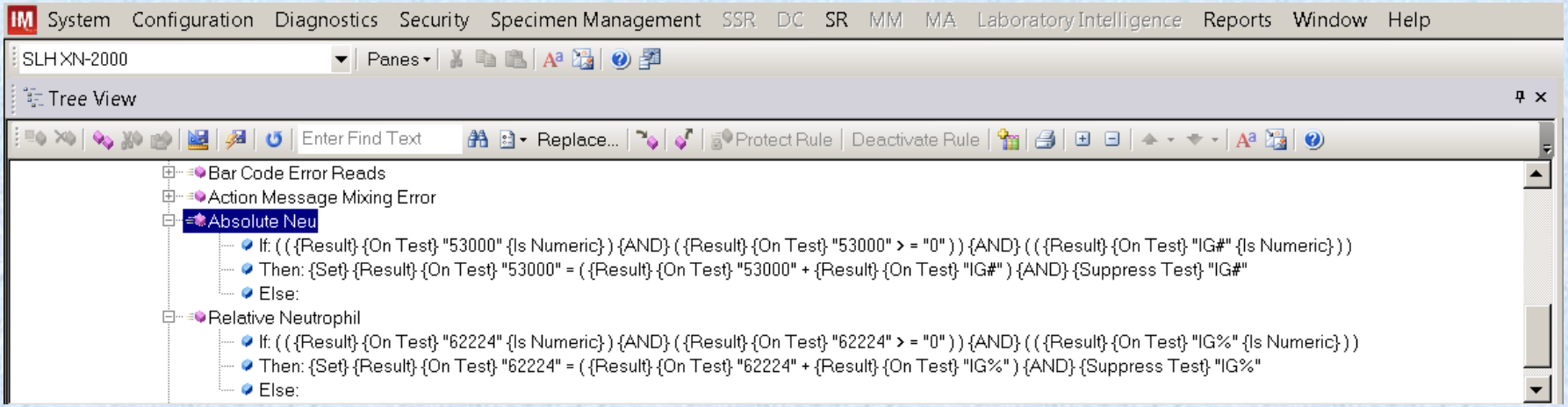
Hematology – Immature Granulocytes (IG)

- Sentara currently not reporting IG
- Rule adds IG% and IG# to Neut% & Neut#



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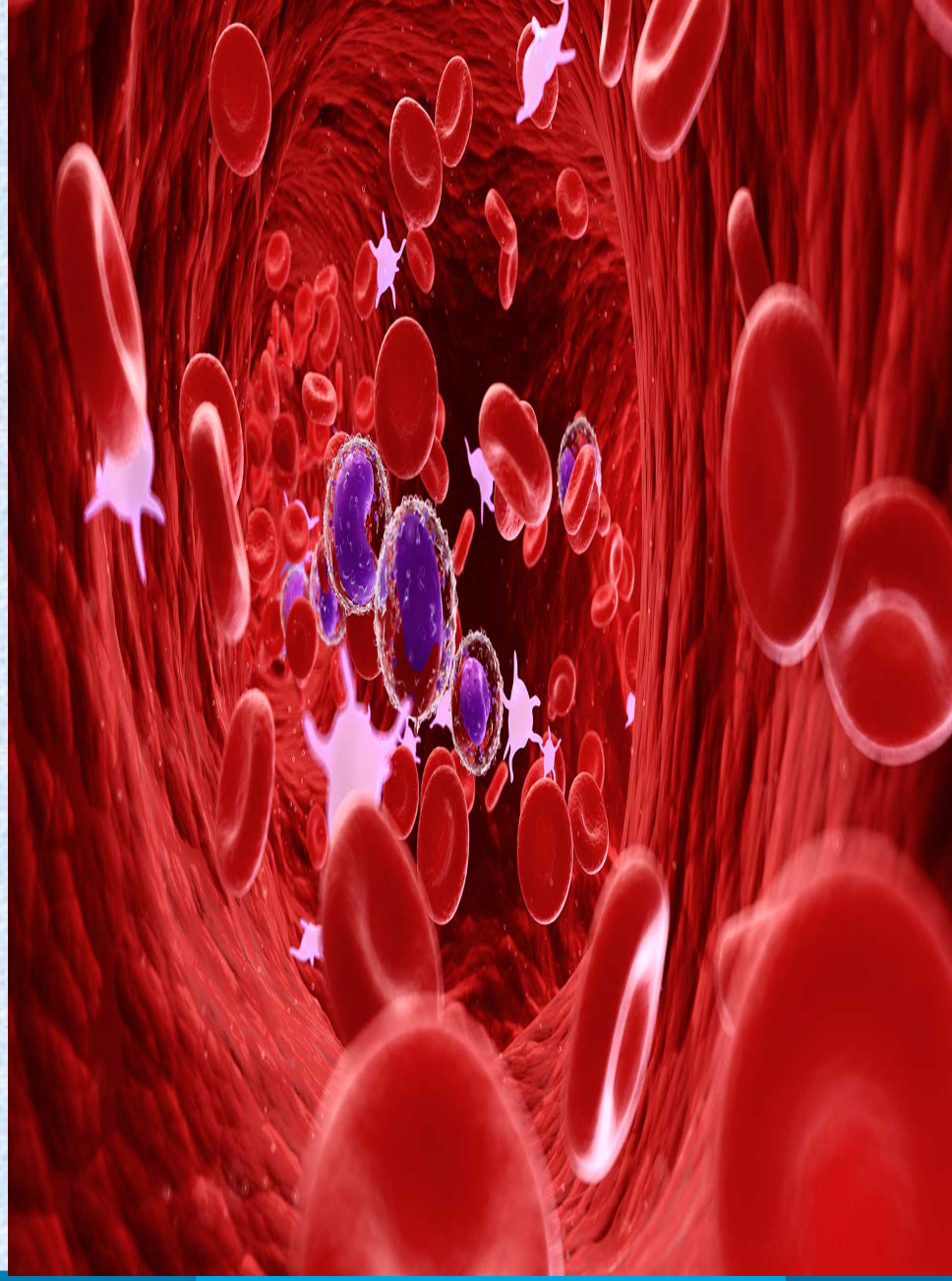
Hematology

- Honorable Mentions
  - **Positive_Diff, Positive_Morph, Positive_Count**
  - **Rounding rule**
  - **IPF 0.0 rule**
  - **“-” rules**



Urinalysis

- Clinitek Specimen ID/Patient ID issue
- Result “fixes”
  - **Trace Blood results**

Chemistry

- Special Roche/DI build
- Auto-verification
- Dilutions
- Calculations
- Linear limits

Chemistry

Patient Name	Specimen ID	Sequence Number	Rack	Position	Specimen Dilution /	Priority	Specimen Completion Status
[redacted]			5051	3		R	Tests Held
[redacted]			4014	2		S	Tests Held

Patient Name: [redacted]
Patient ID: [redacted]
Date of Birth: [redacted]
Sex: M
Location – Facility: EPICHBOC
Ordering Physician:
Collection Date/Time: 6/12/2020 11:10:58
Specimen Comment(s):
Specimen Type: P

Test Worksheet

Connection Name	Test Name	Result	Re...	Units	Result Date/Time	Test Comment(s)	Error Code(s)	Previous Result	Previous Result Date/Time	Test Status	Error Name(s)
SNVMC-C6000-2	TP-UR RAN...	150.7	F	mg/dL	6/12/2020 12:27:47 PM	Wait For Dilution				Held for Verification	>ABS
SNVMC-C6000-2	TP-UR RAN...	570.3	C	mg/dL	6/12/2020 12:27:47 PM					Held for Verification	N

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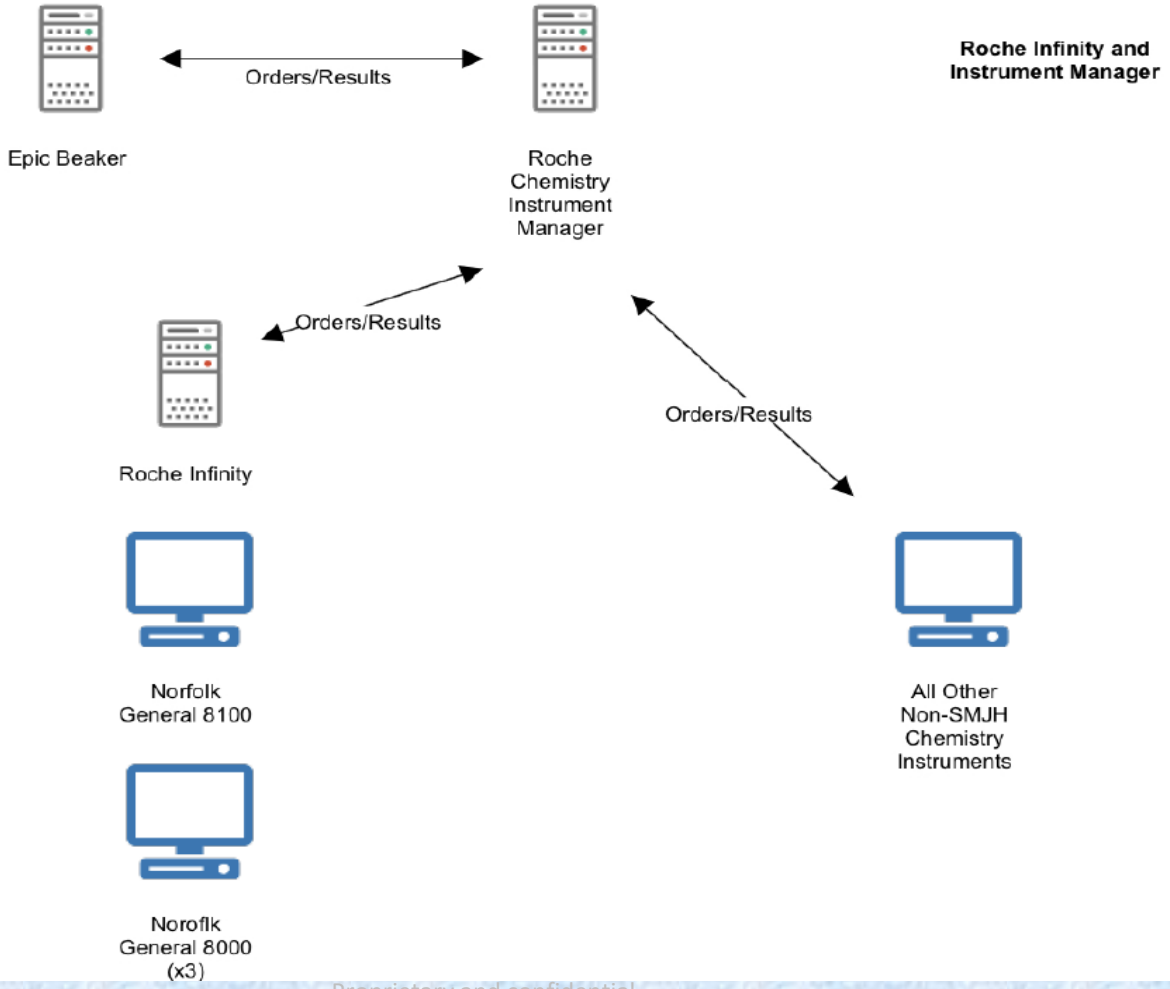
Specimen Processing

- Coming in 2020…Total Lab Automation!!!
- Roche 8100
  - **Infinity software (SNGH)**
    - Sending orders/results
    - Roche DI

Specimen Processing/Total Lab Automation



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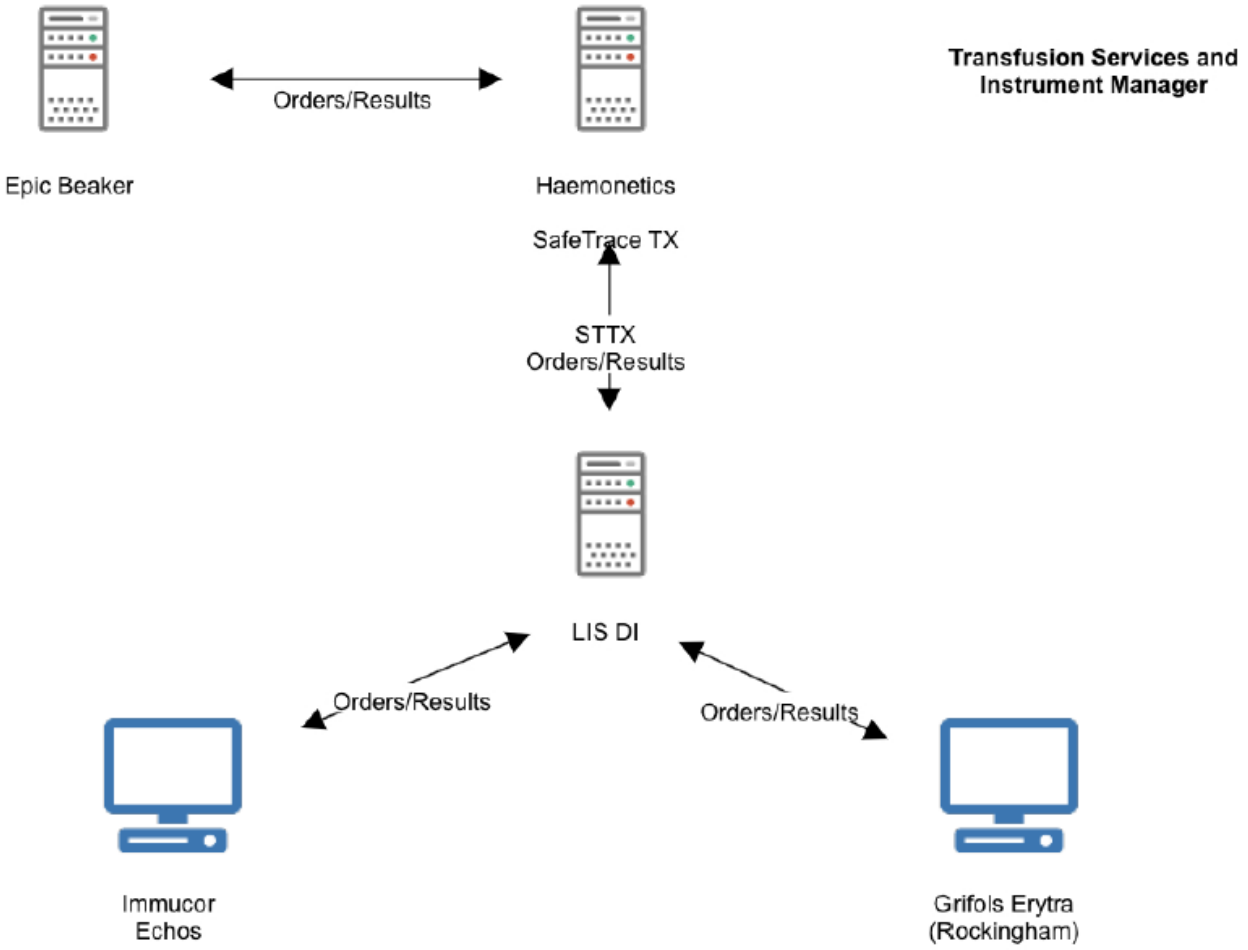
Transfusion Services



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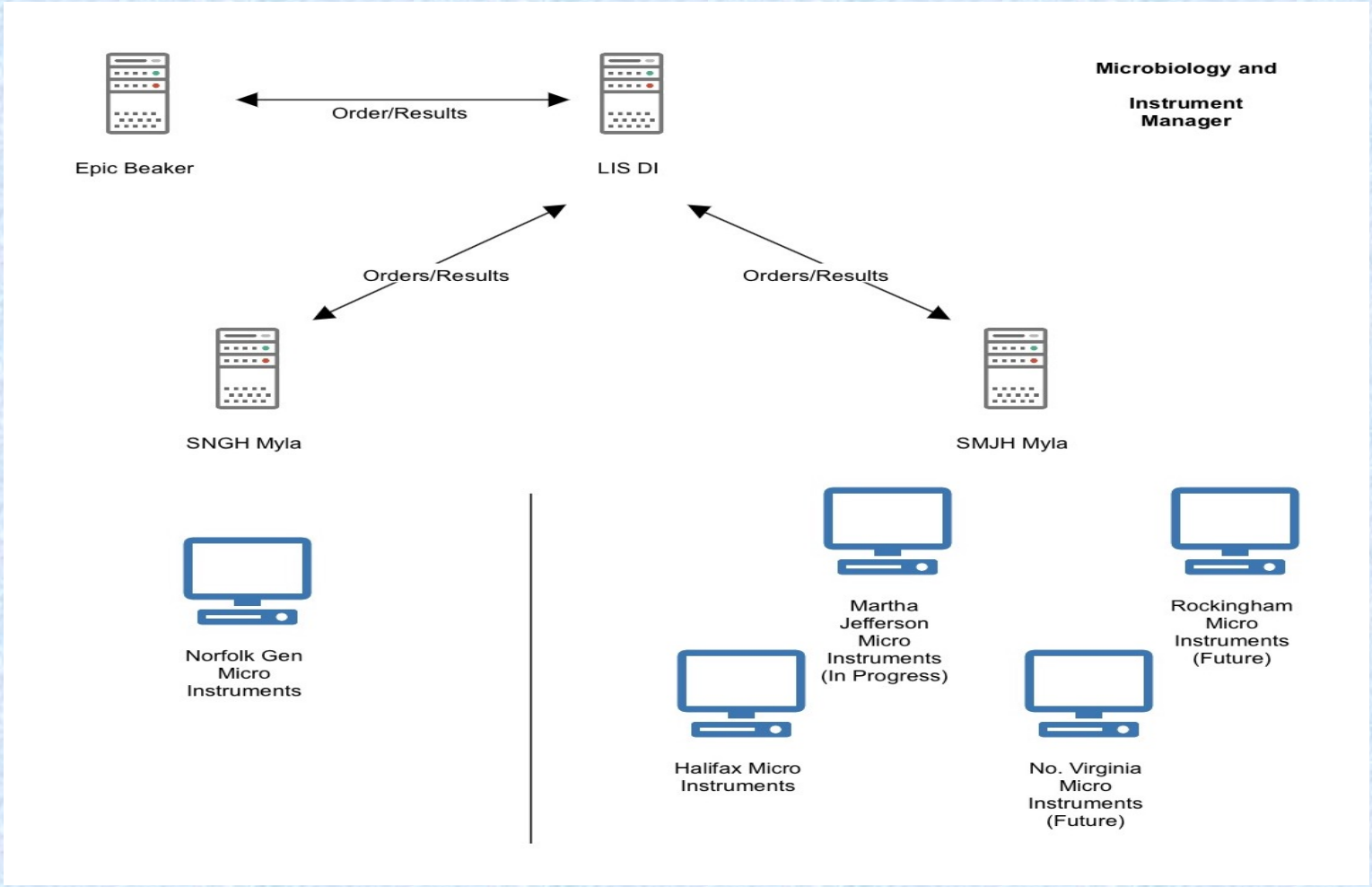
Transfusion Services

- IM, SafeTrace and Epic Beaker
  - **No Epic BB module**
  - **SafeTrace serves as BB module**
  - **SafeTrace integrates to instrumentation via DI**
- No reflex testing
- Rules Processing
  - **No blood type, DI will hold results**
  - **Crossmatch results cross**
  - **Incompatible results held**
    - Comments held

Microbiology



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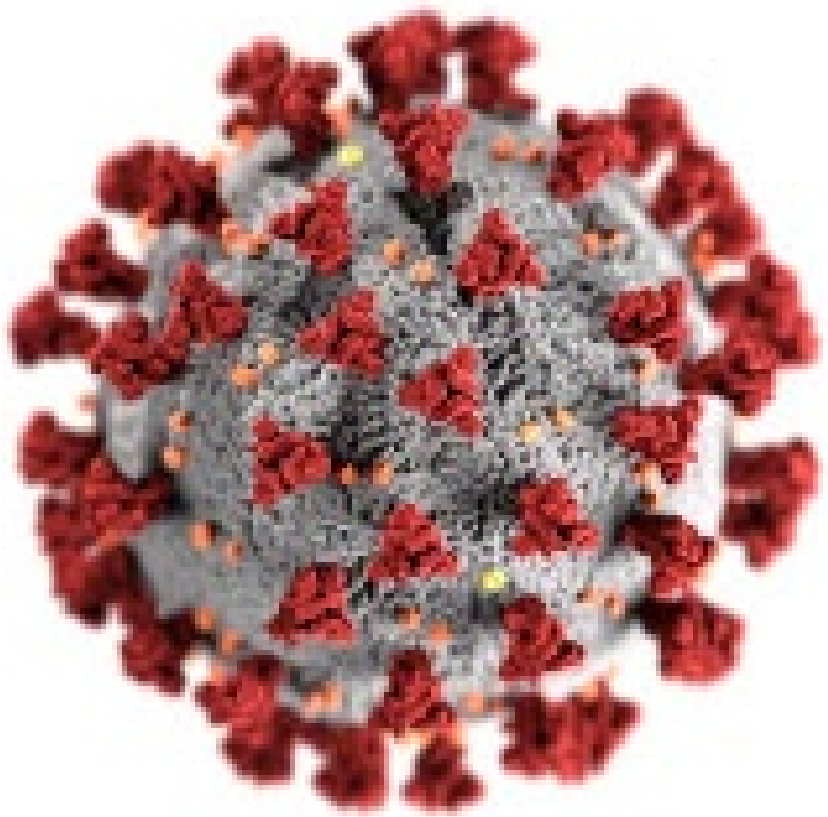
Microbiology

- Integration of Myla as middleware
  - **Order sent to DI, then to Myla, then to instrument**
  - **Myla doesn't integrate directly to Epic**
- Rules Processing
  - **SNGH: One of first sites to integrate Myla & DI**
    - DI rep on site to assist w/ build
  - **Sending/receiving orders**
  - **BCI Codes/Tables**
    - Antibiotics
    - Organism IDs

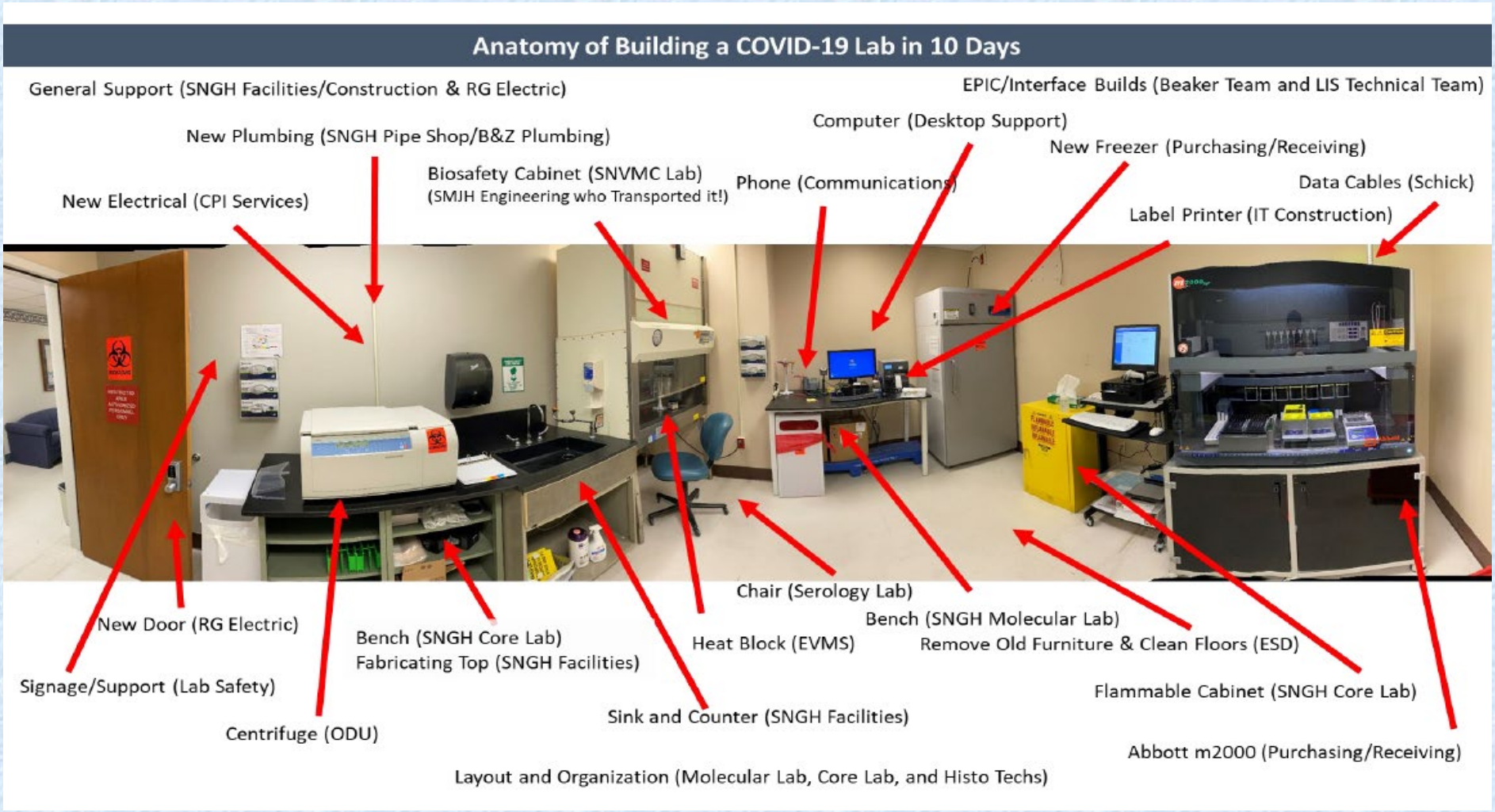
COVID-19 Impact

Test are currently run on:

- **Abbott m2000 (SNGH)**
  - **Purchased specifically for Covid-19**
  - **Used in the COVID Lab**
- **Roche Cobas 6800 (SNGH)**
  - **Used in the Molecular Dept**
- **GeneXpert DX (SNGH, SNVMC, SMJH, SRMH)**
  - **Used in the Microbiology Dept**
- **Diasorin Liaison MDX (SNGH) (Non-Interfaced)**
  - **Used in the Molecular Dept**
- **Diasorin Liaison XL (Fall 2020)**
  - **Purchased Specifically for Covid-19**
- **Hologic Panther (SNGH) (Possible)**



COVID Lab



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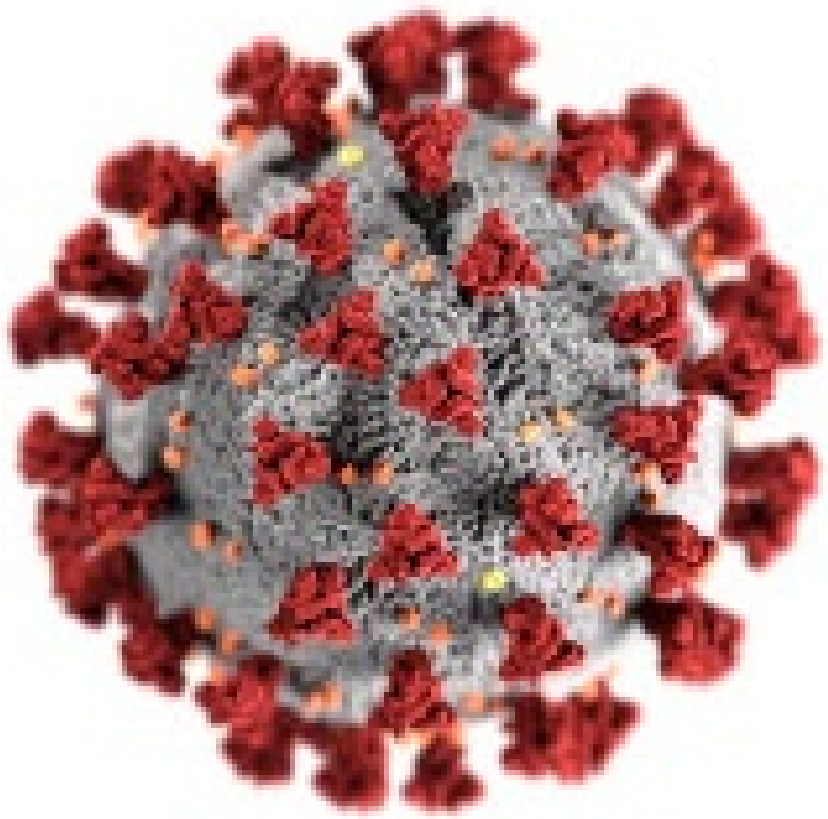
COVID-19 Testing

- **Testing sent out to LabCorp initially**
- **First in-house testing limited to 30 tests/day**
- **Up to 5,500 – 6,000 PCR tests/week**
- **Currently over 40,000 in-house tests performed**



Sentara's Future with DI

- Retire the SMJH Chemistry
  - **Merge into Enterprise Chemistry DI Server**
- Upgrade the Hemo/Coag Server
  - **Upgrade OS and DI Version**
- Cloud Based Servers
- Immulink
  - **Immucor Echo Instruments in Blood Bank**

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THANK YOU!!! QUESTIONS???

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