How to interpret labs

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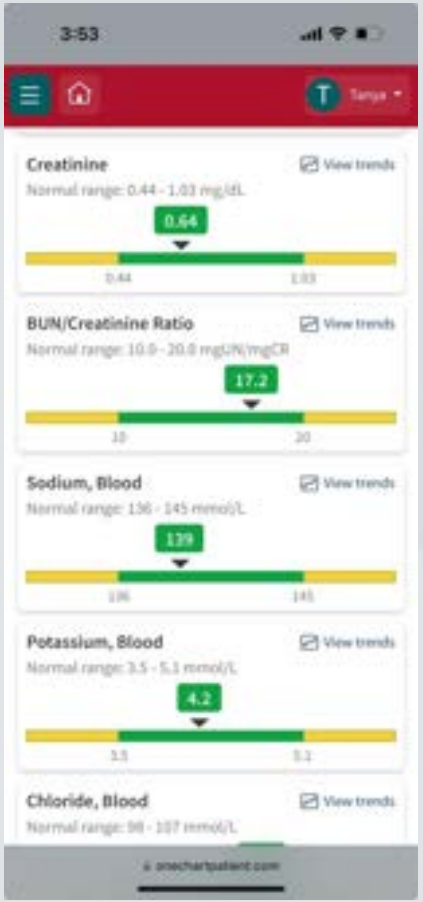
-Or-

“Normal is just a setting on the dryer”

Labs at your fingertips

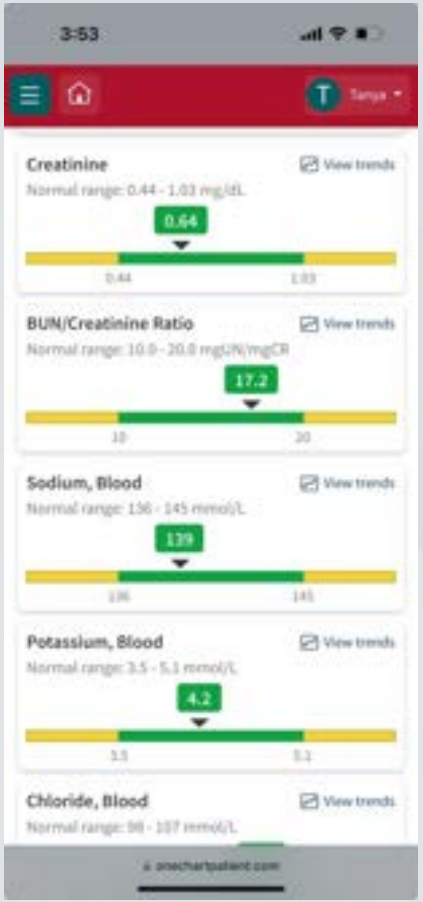
- If **Green** means good, is anything outside of green BAD?
- Must abnormal labs all be fixed for everything to be alright?



Labs at your fingertips

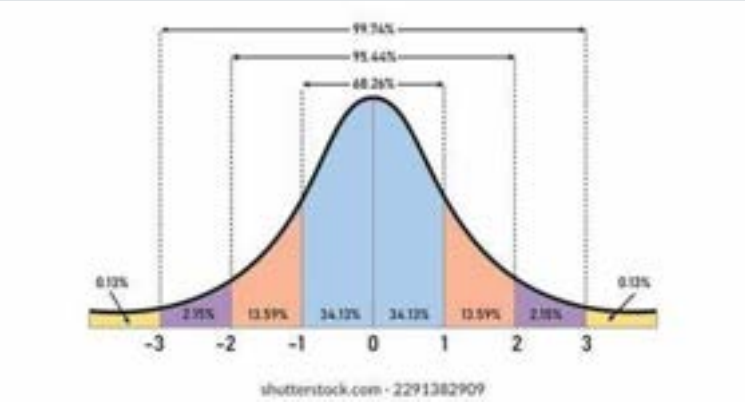
- If **Green** means good, is anything outside of green BAD?
- Must abnormal labs all be fixed for everything to be alright?

- Thankfully, NO



How is normal defined?

- Distribution based
  - Large sample of “healthy people”
  - Sometimes stratified by factors like sex



- Physiologic ranges
  - Is there a cutoff above or below which there are impact on health/disease risk?
  - Example: Cholesterol levels

Pitfalls of “normal”

	Latest Ref Rng & Units
Ferritin	23 - 340 ng/mL

	Latest Ref Rng & Units
Ferritin	11 - 310 ng/mL

Pitfalls of “normal”

Why do we have 2 different reference ranges on the same lab test the same day???

	Latest Ref Rng & Units
Ferritin	23 - 340 ng/mL

	Latest Ref Rng & Units
Ferritin	11 - 310 ng/mL

Pitfalls of “normal”

References ranges for ferritin are:

1. Different by gender
2. Reflect high prevalence of iron deficiency in women

Men

	Latest Ref Rng & Units
Ferritin	23 - 340 ng/mL

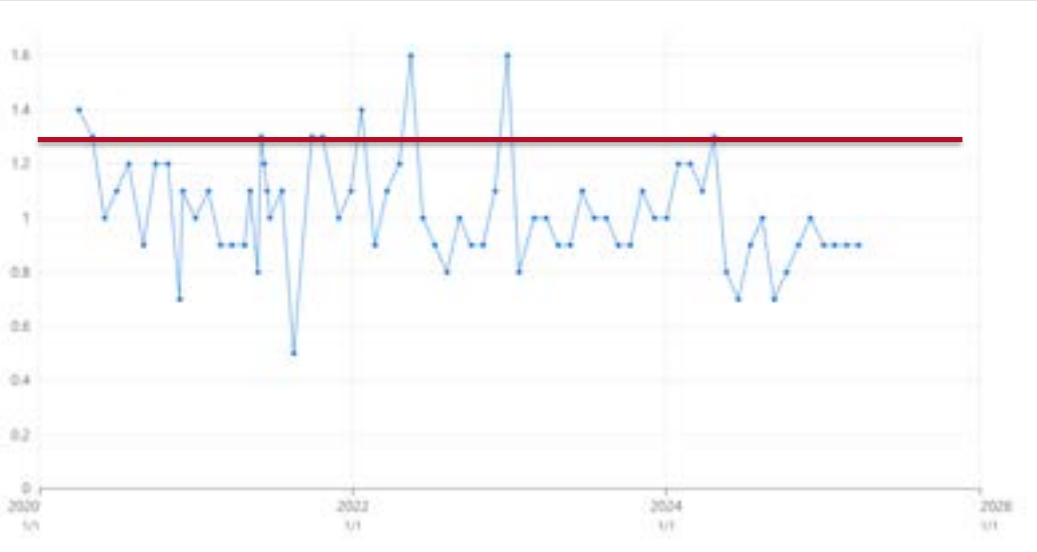
Women

	Latest Ref Rng & Units
Ferritin	11 - 310 ng/mL

Pitfall #1: what if “normal” population has a high prevalence of disorder? -> Need Physiology-based normal

Pitfalls of “normal”

Pitfall #2: Reference population does not represent YOU…

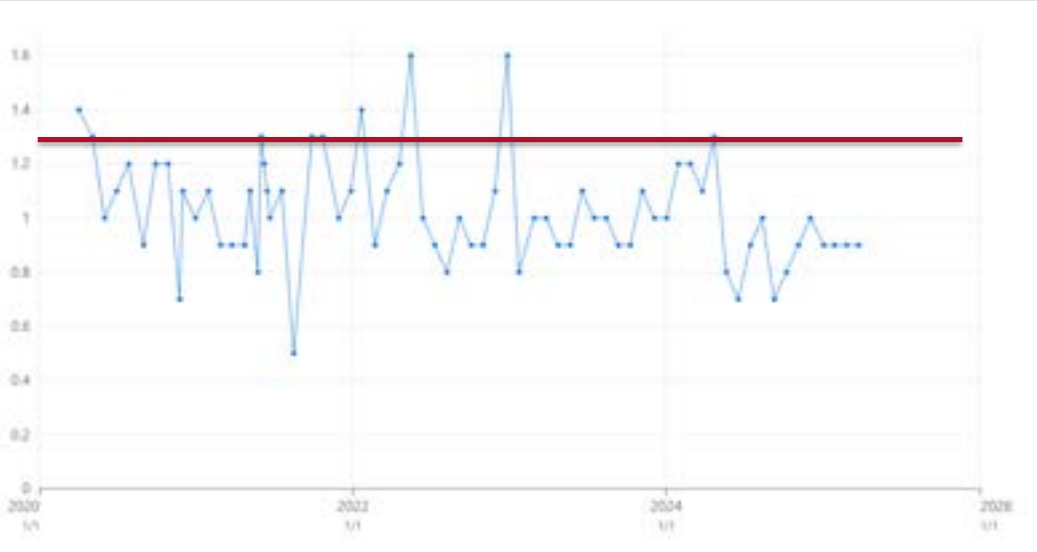


Automated Abs Neutrophil Cnt

1.3 - 7.5 X10E3/uL

Pitfalls of “normal”

Pitfall #2: Reference population does not represent YOU…



Automated Abs Neutrophil Cnt
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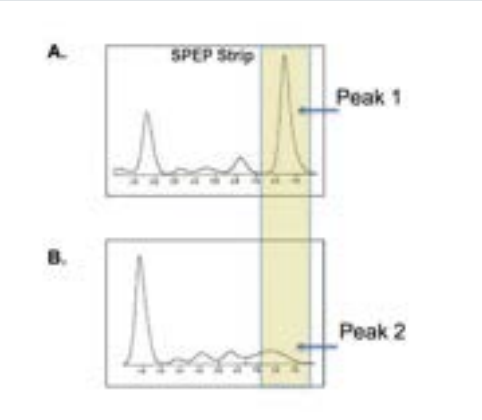
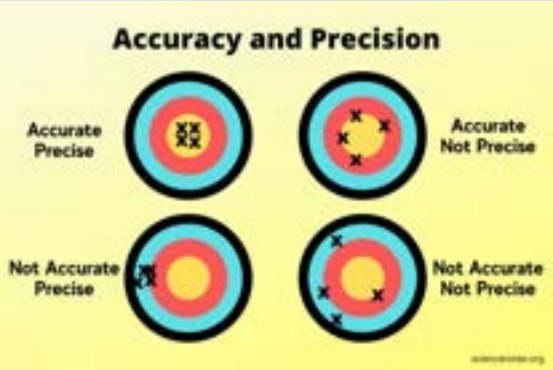
Example: Duffy Null phenotype

Pitfalls of “normal”

#3. Test accuracy and precision





CLIA (federal lab standards) has % variation they consider acceptable.
Usually ~10% but
Can be 30%!!!

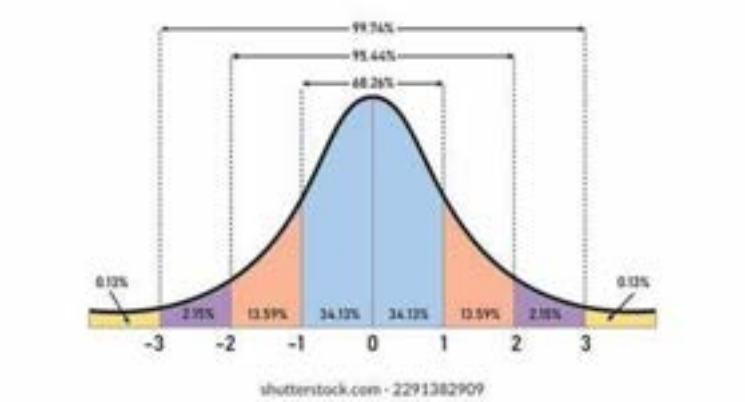
Pitfalls of “normal”

#4. Regression to the mean

In statistics, **regression toward the mean** (also called **regression to the mean**, **reversion to the mean**, and **reversion to mediocrity**) is the phenomenon where if one sample of a random variable is extreme, the next sampling of the same random variable is likely to be closer to its mean

Pitfalls of “normal”

#5. Abnormal due to chance alone.



Complete Blood Counts (CBC)

	Latest Ref Rng & Units	4/1/2025
WBC	4.0 - 11.0 X10E3/uL	6.9
RBC	3.70 - 5.30 X10E6/uL	3.40 ↓
Hemoglobin	11.0 - 15.1 g/dL	10.2 ↓
Hematocrit	33.1 - 44.5 %	32.2 ↓
MCV	79.0 - 97.0 fL	94.7
MCHC	32.0 - 36.0 %	31.7 ↓
RDW	11.3 - 15.5 %	15.2
Platelet Count	150 - 400 X10E3/uL	325
Type of Diff Done		Automated Diff
Automated Abs Neutrophil Cnt	1.3 - 7.5 X10E3/uL	6.1
NRBC	0 /diff	0
Neutrophils Relative	%	89
Lymphocytes percent	%	8
Monocytes Relative	%	2
Eosinophils Relative	%	0
Basophils Relative	%	1
Immature Neutrophil Relative	%	0
Lymphocytes Absolute	0.7 - 3.9 X10E3/uL	0.6 ↓
Monocytes Absolute	0.1 - 1.0 X10E3/uL	0.1
Eosinophils Absolute	0.0 - 0.5 X10E3/uL	0.0
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Total white blood cell count = sum of types of white blood cells (absolute neutrophils, lymphocytes, eosinophils, basophils and monocytes)

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Anemia

- MCV – mean corpuscular volume
- MCHC – mean corpuscular hemoglobin concentration
- RDW – red blood cell distribution width

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Platelets –

- Many forms of treatment for cancer can lower platelets
- Risk of bleeding due to low platelets doesn't really increase until <30
- In hospital, we don't transfuse unless <10

Complete Metabolic Profile

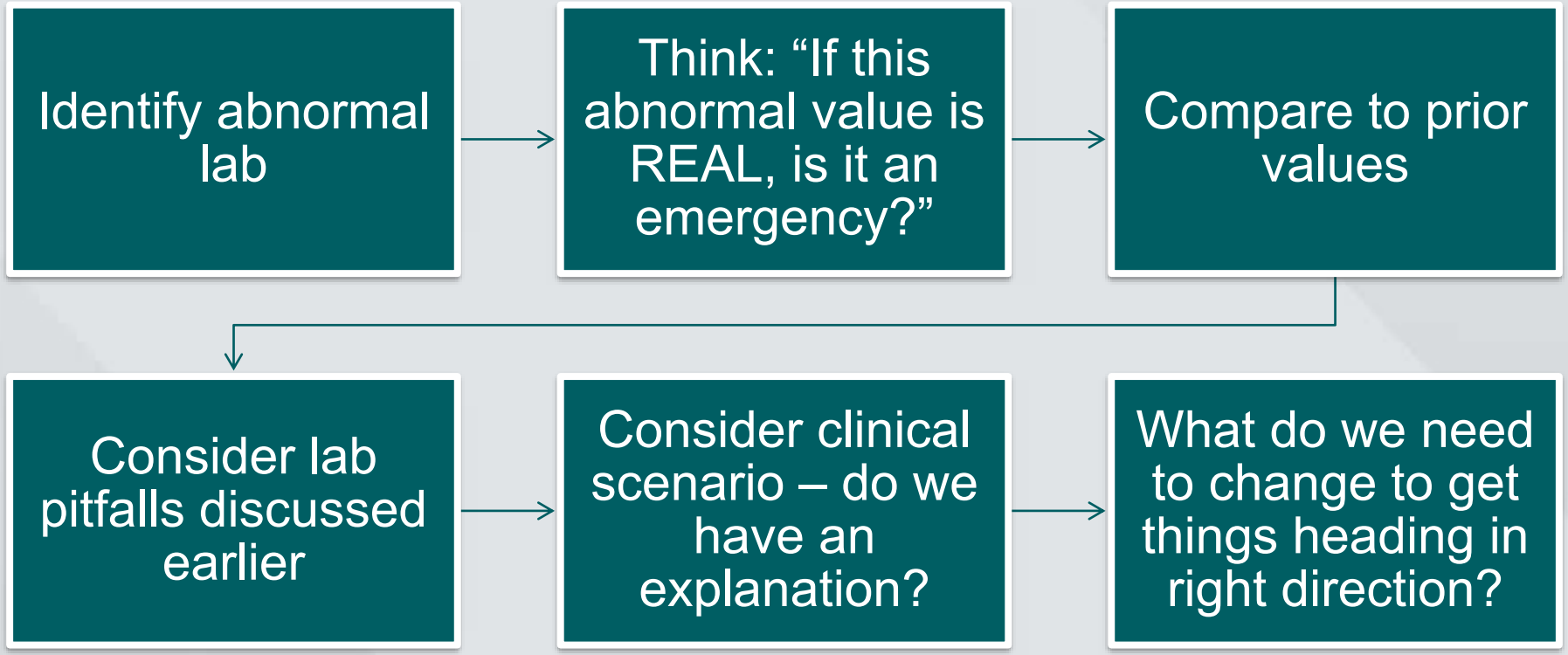
AST	15 - 41 U/L	25
Alkaline Phosphatase	32 - 91 U/L	127 ▲
Total Bilirubin	0.3 - 1.0 mg/dL	0.5
Calcium	8.6 - 10.4 mg/dL	8.8
Total Protein	5.8 - 8.2 g/dL	6.5
Albumin	3.5 - 5.1 g/dL	4.0
Glucose, Blood	70 - 139 mg/dL	113
BUN	6 - 20 mg/dL	25 ▲
Creatinine	0.44 - 1.03 mg/dL	1.86 ▲
BUN/Creatinine Ratio	10.0 - 20.0 mgUN/mgCR	13.4
Sodium, Blood	136 - 145 mmol/L	137
Potassium, Blood	3.5 - 5.1 mmol/L	4.4
Chloride, Blood	98 - 107 mmol/L	105
Osmolality, Calculated	275 - 295 mOsm/kg	289
CO2	22 - 32 mmol/L	22
Anion Gap	4 - 15 mmol/L	10
ALT	7 - 52 U/L	17
CKD-EPI eGFR	>59 mL/min/1.73 m2	32 ▼

Huge topic to understand all…

Top thoughts

- Creatinine – trend is really important
- BUN/Cr>20 ratio is a marker of dehydration

How a doctor looks at your labs



PLOS One

PLoS One. 2016 Jun 23;11(6):e0154743. doi: 10.1371/journal.pone.0154743

Direct Release of Test Results to Patients Increases Patient Engagement and Utilization of Care

Francesca Pillemer [1,*], Rebecca Anhang Price [1], Suzanne Paone [3], G Daniel Martich [2,3], Steve Albert [2], Leila Haidari [2], Glenn Updike [3], Robert Rudin [1], Darren Liu [6], Ateev Mehrotra [1,4,5]

Pros:

Portal access to test results felt to be “very useful” and increases engagement

Cons:

Increased anxiety

Increased visits to provider

Reviewing your labs

Consider how reviewing results is impacting you

Do you feel empowered or do they make you feel anxious?

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