



Imported Case of *Plasmodium malariae*

COURTNEY WELP & KAREN GOLEMBOSKI, PHD, MLS (ASCP)^{CM}

BELLARMINE UNIVERSITY MEDICAL LABORATORY SCIENCE

Introduction

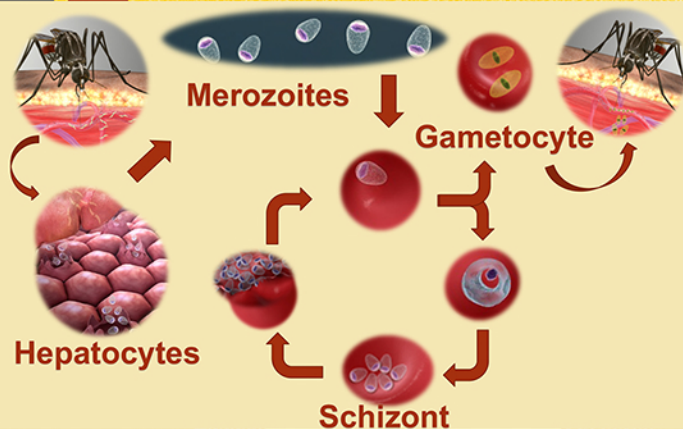
Malaria infections are caused by any of the five species of *Plasmodium*. It is essential to identify the parasite and determine the type of species because the severity and clinical course vary among the five.

Malarial infections are known to present with fever, chills, sweating, headache, weakness, and other symptoms that may mimic viral infections. The symptoms of malaria are not specific and can be misdiagnosed in non-endemic areas. Changes in hematological parameters play a vital role in malaria diagnosis.

Patient case

- A 16-year-old boy presented to the emergency room after emigrating from Tanzania two months prior.
- Symptoms included:
 - Intermittent head and neck pain
 - Dizziness
 - Fatigue
- He was referred by another hospital with concerns for his laboratory results demonstrating pancytopenia

Life Cycle of Malaria Parasite



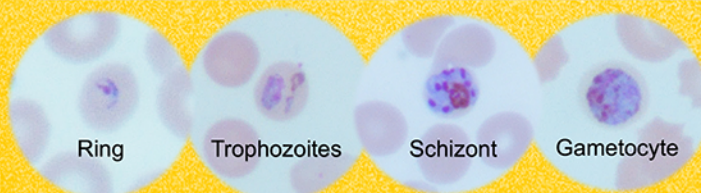
Laboratory Results

Chemistry		
	Results	References
Aspartate Aminotransferase	33	15 – 46 U/L
Alanine Aminotransferase	24	13 – 69 U/L
Alkaline Phosphatase	137 ↑	38 – 126 U/L
C-reactive protein	4.9 ↑	<1.0 mg/dL
LDH	807 ↑	313- 618 U/L

Urinalysis results can tell us a lot about **dehydration**. The color, and urine clarity, specific gravity, and the presence of ketones are suggestive of dehydration.

An increase of urobilinogen in urine can mean the liver isn't working correctly. Too much urobilinogen in the urine can indicate liver disease such as hepatitis or cirrhosis.

Complete Blood Count			
	Results	Hydrated	Reference
WBC	2.81 ↓	2.31 ↓	4.5 - 13.0 x 10 ³
RBC	4.33 ↓	4.06 ↓	4.5 - 5.3 x 10 ³
Hgb	10.6 ↓	9.6 ↓	13.0 - 16.0 g/dL
HCT	31.9 ↓	29.6 ↓	37.0 - 49.0 %
MCV	73.7 ↓	72.9 ↓	78.0 - 98.0 fL
MCH	24.5 ↓	23.6 ↓	25.0 - 35.0 pg
MCHC	33.2	32.4	31.0 - 37.0 g/dL
RDW	17.0 ↑	17.1 ↑	12.0 - 16.8 %
PLT	123 ↓	114 ↓	140 – 440 x 10 ³



Alkaline phosphatase (ALP) and C-reactive protein (CRP) are proteins made in the liver.

- High levels of CRP in the blood is significant for **inflammation**.
- Elevated levels of ALP in the blood is significant for **liver complications**.

Elevated lactate dehydrogenase (LDH) indicates **damage** to the body. LDH is released when any cell in the body is destroyed.

Urinalysis

	Results	Reference
Color	Dark yellow	
Appearance	Cloudy	
Sp. gravity	1.042 ↑	1.003-1.035
pH	6.0	5-8
Ketone	Trace ↑	Negative
Urobilinogen	2.0 ↑	0.1-1.0 EU/DL

Why does anemia occur?

- Not enough red blood cells made
- Too many red blood cells are destroyed
- Too many red blood cells are lost (from bleeding)

Too many red blood cells being destroyed: If the life of a red blood cell is cut short, the bone marrow may not be able to keep up with the increased demand for new ones.

- **Mean cell Volume (MCV)**
 - The measure of the average volume of RBCs
- **Mean cell hemoglobin (MCH)**
 - The measurement of the average weight of hemoglobin in individual erythrocytes.
- **Mean cell hemoglobin concentration (MCHC)**
 - The average concentration of the hemoglobin in erythrocytes
- **Red cell distribution width (RDW)**
 - The measure of the variability of RBC size

Malaria cases reported by May 2019

Reporting Area	Previous 52 weeks	YTD 2019	YTD 2018
Indiana	1	-	5
Illinois	3	11	22
Kentucky	2	-	2
Missouri	3	3	3
Tennessee	2	5	1
Virginia	5	20	11
West Virginia	1	-	2

National Notifiable Diseases Surveillance System of malaria cases from surrounding states.

Conclusion

- The changes in red blood cell indices and blood smear morphology are the first parameters to evaluate anemia.
- Identification of the cause of anemia by the physician with the support of laboratory data is an important step to diagnose, treat, and monitor the underlying pathological process.
- The patient was diagnosed with pancytopenia (deficiency of all blood cells) due to *Plasmodium malariae* and treated with antimalarial medication, Chloroquine and Atovaquone-proguanil.

References

- Life Cycle Of Malarial Parasite. (2017, September 25). Retrieved from <https://www.scientificanimations.com>
- Weekly cases of notifiable diseases, United States, U.S. Territories, and Non-U.S. Residents weeks ending May 4, 2019 (week 18). (n.d.). Retrieved from <https://wonder.cdc.gov/nndss/static/2019/18/2019-18-table1v.html>