

## CBC Meaning and Interpretation (Part 3)

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(Alcohol continued)

- MCV, MCH (mean cell volume, mean cell hemoglobin) - These red cell indices are frequently helpful. A small red blood cell with low hemoglobin (low MCV, MCH) is seen with chronic blood loss with resultant iron loss. This is diagnosed as iron deficiency anemia. Large red blood cells (a high MCV) is considered megaloblastic anemia and can be caused by alcohol toxicity alone or B12/folate deficiency seen as a result of malnutrition. If the latter goes untreated and the patient is given a challenge of IV glucose, the patient can develop irreversible Wernicke's Korsakoff Dementia.
- RBC Morphology - During severe bone marrow stress there are times that nucleated RBCs can be seen in the peripheral blood smear. Howell Jolly bodies (clusters of DNA) can also be noted at times. These are seen due to spleen dysfunction that can be a result of splenic enlargement due to portal hypertension when the liver is cirrhotic and blood is blocked from getting through it. This is also the cause of

esophageal varicies and hemorrhoids in the alcoholic. Spur cells and target cells can be seen with liver disease such as cirrhosis. Spherocytes can be seen in acute alcohol poisoning and elliptocytes are seen in megaloblastic anemia.

### IV Drug Abuse:

The drugs most frequently used by the intravenous route are heroin, cocaine and methamphetamine. In addition to those drugs, many pharmaceutical drugs in the form of pills (most often opioids such as oxycontin) are crushed, dissolved, and injected. The perils of this route of administration are profound. Along with the drug itself are injected all the impurities and fillers that are included with the drug. These can include both inert substances such as talc, silica, cellulose, gelatin, parabens, titanium dioxide, and various color and flavor additives. These can cause allergic reactions with some individuals and others have been reported as carcinogens. Talc and silica in particular can circulate to the microcapillary vascular system in the lungs, liver and bone marrow causing scarring and fibrosis. The damaged blood vessels and fibrin strands break up and damage the red blood cells and show up as schistocytes in the CBC.

The inevitable bacteria which contaminate the drugs that are injected are usually viable despite efforts by the addicted individual to heat what they inject. There have been cases where heroin has been cut with extremely contaminated substances or contaminated with botulism organisms. This can cause abscesses or sepsis and can be seen as an increase in WBC count with a left shift in the differential. Disseminated intravascular coagulation can also occur due to infection or drug reaction causing severe RBC morphological abnormalities as well as life threatening decrease in platelets.

Reactions to the drugs themselves, or other foreign substances utilized to cut that which is being purchased, can cause CBC abnormalities as well. Heroin and cocaine are, at times, cut with quinine that can cause hemolytic anemias. Recently there has been an outbreak of using levamisole, which is a deworming agent, to cut cocaine and can cause life threatening agranulocytosis (a decrease in the WBC component called neutrophils). In 2008 and 2009 69% of cocaine seized by the DEA contained levamisole. Lead contamination which in the CBC causes microcytic anemia (low MCV) and basophilic stippling of the RBCs is sometimes seen with heroin and cannabis.

### ??? Did You Know ???

A 2011 analysis by the Centers for Disease Control and Prevention found that opioid analgesic (painkiller) sales increased nearly four-fold between 1999 and 2010. This was paralleled by an almost four-fold increase in opioid (narcotic pain medication) overdose deaths as well as substance abuse treatment admissions almost six times the rate during the same time period. Prescription drug abuse-related emergency department visits and treatment admissions have risen significantly in recent years. Source: SAMHSA

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### Question of the Month

**Question:** What do the peak and trough values reveal?

**Answer:** The peak and trough methadone values show how the patient has absorbed and is utilizing their dose. Trough values, when compared at different times, can determine dose reduction or dose skipping. When the peak and the trough values are the same or very similar, the methadone is being absorbed by the patient in the daily dose and distributed uniformly throughout the day. When the values differ greatly, there is an increased metabolism and excretion by the patient. This may result in a patient's claim of withdrawal. Dose timing and/or increase should be considered as options.