Rainbow Frequently Asked Questions

1. What is Methemoglobin?

Methemoglobin (MetHb) is an oxidized form of hemoglobin that is unable to carry oxygen. MetHb normally exists in small concentrations in blood, 1- 2% of the total available hemoglobin. Methemoglobinemia is defined as elevated levels of methemoglobin in the blood, can be difficult to diagnose and is lethal at high levels. With a methemoglobin of 3-15%, the skin can turn to pale gray or blue (cyanosis). With levels of 25%, additional symptoms can include headache, weakness, confusion and chest pain. Levels above 70% may result in death if not treated immediately.

What causes Methemoglobinemia?

Methemoglobinemia can be congenital (rare), caused by a defect in the body's systems to reduce methemoglobin to hemoglobin, but it is more commonly acquired. Acquired methemoglobinemia can be caused by local anesthetics, such as benzocaine or lidocaine, ingestion of poisonous substances, such as acetone (nail polish remover) or nitrates/nitrites from contaminated well water, meat preservatives or silver nitrate burn therapy. Other potential causes can include industrial solvents, gun-cleaning products, prescribed medications, such as pyridium, nitroglycerin or antimalarials, room deodorizer propellants, mothballs, fungicides and matches, explosives or pyrotechnics.

Elevated levels of Methemoglobin (MetHb) will lead to inaccurate SpO_2 and SpCO measurements.

What is Carboxyhemoglobin?

CO competes with oxygen for the oxygen-binding sites on hemoglobin. The binding of CO to hemoglobin results in the formation of the compound called Carboxyhemoglobin (COHb). This compound is unable to transport or transfer oxygen. Lack of oxygen can lead to tissue inflammation, reduced cardiac function and vasodilatation.

What causes CO poisoning?

Small amounts of CO are produced from normal metabolism, however most CO exposure is from exogenous causes such as house fires, automobile exhaust fumes, heaters, indoor stoves, cigarettes and ovens.

Elevated levels of Carboxyhemoglobin(COHb) will lead to inaccurate SpO_2 and SpMet measurements.

2. What are the benefits of having a monitor with both SpCO and SpMet parameters over a monitor with just SpCO?

Elevated SpMet levels in the blood can result in a false elevated SpCO reading. A true high SpCO can be distinguished from a falsely-elevated SpCO, when the SpMet reading is not elevated above normal levels, usually 3% or less.

3. Sometimes the readings fluctuate; what might be causing this?

If you are outside in direct sunlight or you are near flashing lights from emergency vehicles, you may experience some interference from these external light sources. Cover the sensor site to shield from the light. Also, verify that the sensor site is experiencing little or no motion.

Do not use a damaged sensor or cable. Do not alter the sensor or cable in any way. Alterations or modification may affect performance and/or accuracy. Never use more than one cable between the pulse oximeter and sensor to extend length.

4. What should I do if I receive a 'Sensor off' reading?

Verify correct sensor placement, verify patient is not moving, verify no contaminant on sensor site, verify LED light is emitting from sensor, or verify connection of sensor into unit and/or into cable.

5. What could cause a higher than expected SpCO reading?

A high SpMet reading could result in falsely high SpCO reading. You may also need to verify that the patient is not moving and that the sensor is shielded from intense light. Try the sensor on another finger on the other hand to see if your readings are consistent.

6. Will my Rainbow sensors read through motion like my old SpO_2 sensors did?

Motion will interfere or delay the Rainbow sensor's ability to acquire a reading. The patient should remain still during the reading.

7. Why does it take longer to get a reading?

Rainbow parameters can require a longer acquisition time to obtain both readings. Movement can increase the amount of time required to get a reading, so having the patient remain still can also help minimize acquisition time.

8. Why do I need to shield the sensor from ambient light?

Ambient light can interfere with the sensor's ability to read the signal correctly. An unshielded sensor may cause inaccurate readings.

9. How do I know that the Rainbow sensor is clinically accurate?

We do not have a calibrated tester. If there is a question about accuracy, one option would be to compare spCO values with your sensor to an arterial blood gas analysis.

10. Why does my monitor not measure any Rainbow parameters?

Please confirm that your monitor has Rainbow parameters installed.

To confirm what parameters are installed on your LIFEPAK 15:
- use the speed dial to select the SPO_2 area
- select parameter from the menu
- the parameters that your LIFEPAK can monitor will be displayed

11. ADDITIONAL INFORMATION ABOUT RAINBOW

In addition to the above frequently asked questions relating to Rainbow Technology, here are some excerpts from the Radical 57 Color Screen Operator's Manuals appropriate to Rainbow technology:

- High intensity extreme lights (such as pulsating strobe lights) directed on the sensor, may not allow the Pulse CO-Oximeter to obtain vital sign readings.
- High ambient light sources such as surgical lights (especially those with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, and direct sunlight can interfere with the performance of the sensor.
- To prevent interference from ambient light, ensure that the sensor is properly applied, and cover the sensor site with opaque material, if required. Failure to take this precaution in high ambient light conditions may result in inaccurate measurements.
- For increased MetHb: the SpO_2 may be decreased by levels of MetHb of up to approximately 10% to 15%. At higher levels of MetHb, the SpO_2 may tend to read in the low to mid 80s. When elevated levels of MetHb are suspected, laboratory analysis (CO-Oximetry) of a blood sample should be performed.
- Elevated levels of Methemoglobin (MetHb) will lead to inaccurate SpO_2 and SpCO measurements.
- Elevated levels of Carboxyhemoglobin (COHb) will lead to inaccurate SpO_2 measurements.
- Motion artifact may lead to inaccurate SpMet and SpCO measurements.
- Very low arterial Oxygen Saturation (SpO_2) levels may cause inaccurate SpCO and SpMet measurements.
- Do not use the defibrillator or sensors during magnetic resonance imaging (MRI) scanning. Induced current could potentially cause burns. The Pulse CO-Oximeter may affect the MRI image and the MRI device may affect the accuracy of the Pulse CO-Oximetry parameters and measurements.
- If using Pulse CO-Oximetry during full body irradiation, keep the sensor out of the radiation field. If the sensor is exposed to the radiation, the reading might be inaccurate or the device might read zero for the duration of the active radiation period.
- The Pulse CO-Oximeter can be used during defibrillation, but the readings may be inaccurate for up to 20 seconds.

Masimo SET® rainbow

For further information, please contact your sales representative at 800.442.1142 or visit our website at www.physio-control.com

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