www.INOCAInternational.com

NEWSLETTER

ISSUE 4 March - June 2021
(OXYGEN)

INOCA WEBSITE

It has been a busy few months on the INOCA International website!

INOCA INSIGHTS - the page where patients share their experiences. We started with Sally's Story followed by a dedicated Q&A evening in the INOCA CAFE where attendees from around the world delved a little deeper. We have now also launched Jane's very moving story.

This quarter also saw the release of the INOCA International video, the Patient Voices video and the Message from our Founder video, all giving insight into the difficulties that INOCA patients can face.

INOCA MATTERS Where we speak to Special Guests on matters relating to INOCA. New additions in this brand new series include video interviews with Professor Divaka Perera, Dr Aish Sinha and Professor Colin Berry.



INOCA RESEARCH We announced 3 new Trials in recent weeks all of which are now detailed on the RESEARCH page of our website. Fantastic to see all this new research!

The website can be seen at
INOCAInternational.com
(or via the QR Code above right)

For our Facebook Information Page please search for
INOCA INTERNATIONAL

We also have a Twitter page
@INOCAInternati1

COVID-19

The COVID pandemic has impacted so many lives and has sadly also taken many lives far too early. With vaccines now being available to many and with the wider roll out due to happen soon, we are all very much hoping that we are now turning a corner and that life may soon get back to a little more like normal - whatever that new normal might be.

For some INOCA patients who have been shielding for much of the last year, the thought of going out and of socialising again can feel very overwhelming, so the integration back into a busier social life may still need to be a very gradual process for many.

We wanted to take a moment here to remind INOCA patients that there is no time limit on making this journey. Take your time, small steps are good!

RECENT ARTICLES

Coronary microvascular disease: current concepts of pathophysiology, diagnosis and management
Aish Sinha, Haseeb Rahman and Divaka Perera

Today's Featured Article
(pg 2) courtesy of
Dr Christine Whitten M.D.

INOCAinternational.com/articles

INTERNATIONAL WOMENS DAY

To all you amazing women out there Thank You for everything you do! Thank You for being strong, for being brave, for being resilient and for so very much more - and if you don't feel like that person just now? Look in the mirror and say hello to the person on the inside!

DID YOU KNOW...

It is estimated around 1 in 30 people in the UK have Ischaemic Heart Disease, which equates to around 2.3 Million people. If even 1 in 3 have INOCA, this equates to 3/4 million people with INOCA in the UK alone.

FEATURED GUEST ARTICLE

What Oxygen Saturation Does Not Tell You About Coronary Blood Flow

Christine E. Whitten M.D.

One of the questions often asked is how oxygen levels can appear okay during INOCA episodes. We asked Dr Christine Whitten - anesthesiologist, educator and author, dedicated to improving patient care and safety, to explain.

Coronary Microvascular Disease, for example I.N.O.C.A., causes disruption of blood and oxygen supply in the microcirculation. It is common for pulse oximeter readings in these patients to be normal during an acute flare up. This can mislead attending staff to believe that the oxygen supply is at a good level and that there is no problem. It confuses patients who ask: "How can I have a normal oxygen saturation while at the same time my heart muscle lacks enough oxygen (is ischemic)"?

Despite the current widespread use of pulse oximetery to measure hemoglobin oxygen saturation (O2 Sat), many people don't fully understand what it does and does not measure. To better understand how oxygen saturation can be normal, while at the same time the heart or other organs may not be getting enough oxygen, we need to review:

- what is hemoglobin (Hgb)
- what oxygen saturation is, and is not
- the concept of oxygen supply and demand
- how oxygen saturation can be misinterpreted

What is Hemoglobin?

Oxygen (O2) is carried by the protein molecule haemoglobin (Hgb) inside red blood cells (RBCs). Red blood cells are basically little containers filled with Hgb molecules. Haemoglobin has a complicated structure with each Hgb molecule able to carry up to 4 oxygen molecules at specific binding sites.

A unique characteristic of Hgb is that it continually changes shape as it binds and unbinds each of the four molecules of oxygen. As each of the four binding sites on a Hgb molecule binds to an oxygen molecule, its attraction to the next oxygen molecule increases. This increased rate of binding caused by the shape changes allows Hgb to rapidly saturate with oxygen in less than a second as the RBCs pass through the lungs.

The reverse is also true. When an RBC enters a less oxygen-rich environment, like peripheral tissue, the Hgb starts to release oxygen. As Hgb releases each molecule of oxygen, its ability to stay bound to the remaining oxygen molecules decreases. The loss of each oxygen molecule makes it easier to release the rest. Oxygen is rapidly delivered where it's needed.

What Is Oxygen Saturation?

To accurately measure how much oxygen is in a patient's blood stream we would need to draw a blood sample and run a lab test on it. Clearly doing that sort of procedure is not practical, or even possible, outside of a hospital setting.

Instead, a simple, non-invasive, point of care device called a pulse oximeter is used to measure the percentage of Hgb binding sites that are bound to oxygen. We call this oxygen saturation. Oxygen saturation is often simply called O2 Sat, pronounced "Oh Two SAT", or as abbreviated in medical journals, SPO2. When all the Hgb binding sites are filled, Hgb is said to be 100% saturated.

The majority of people have an oxygen saturation between 95-100%. Some people live a normal life with O2 Sats below 95%. It's common for saturation to fall to slightly lower values while sleeping.

However, we optimally want oxygen saturation to always be above 90%. An O2 Sat of at least 90% is the minimum to maintain normal circulation of oxygen to the organs and tissues. Below 90% organs will suffer from lack of oxygen.

(A more complete discussion of the difference of oxygen saturation compared to lab measured arterial oxygen content can be found on my blog here - [https://airwayjedi.com/2015/12/09/difference-oxygen-saturation-pao2/])

Oxygen Supply and Demand.

The body needs oxygen (O2) to metabolize, or burn, food to release the energy stored in it.

N.B. Nothing in this newsletter should be considered in any way as advice or recommendation. All information contained in this newsletter is an opinion only and is shared here only in the hope that is it of interest to other patients and medical professionals. Always consult your own medical practitioner before trying any new medications or therapies and before changing any of your current routines.

FEATURED GUEST ARTICLE - continued

Factor	Conditions That Alter Oxygen Delivery
How well are the lungs are working?	Pneumonia, asthma, chronic bronchitis, emphysema, COVID-19 and other diseases, airway obstruction
How well is the patient is breathing?	Trauma, drug overdose, sedation
How much oxygen is the patient breathing?	High altitude, oxygen poorer environment (mountains, airplanes), supplemental oxygen
How many RBCs are available?	Anemia from many causes
How well is the heart pumping?	Heart failure, slow heart rate, abnormal heart rhythm, cardiac arrest
How well does blood flow through the organ?	Heart attack or ischemia from coronary stenosis or coronary artery spasm, microcirculation obstruction, systemic shock, blood clot, stroke
Is Hgb bound to something else other than oxygen?	Carbon monoxide (CO) poisoning: Hgb bound to CO rather than O2 can still reads as 100% saturated
Is there abnormal Hgb present?	One example: Sickle cell anemia, where the abnormal Hgb literally kinks up when it releases all its oxyger molecules, causing the RBCs to form a sickle shape which then block the circulation

A waste product of this metabolism is carbon dioxide (CO2). When we breathe, we inhale air containing O2 into our lungs and we exhale CO2. However, that oxygen needs to be supplied to the organs and tissues in order to be used. The heart and circulation perform that delivery role.

The right side of the heart pumps O2 poor, CO2 rich blood into the lungs. In the brief pause between inhaling and exhaling two exchanges occur. CO2 leaves the blood and enters the lung air sacs to be exhaled. O2 leaves the inspired gas and passes into the bloodstream. There, O2 binds to haemoglobin.

The now O2 rich blood flows out of the lungs and back toward the left side of the heart. The left heart then pumps it out into the tissues. As the blood enters this relatively oxygen poor environment, the Hgb rapidly releases its oxygen. Then the cycle repeats. O2-poor, CO2 rich blood returns to the right heart to pass through the lungs again.

The body tries to match oxygen supply and demand. If we are resting in front of the TV, our oxygen needs are less and our breathing and cardiac output are relaxed. If we are active or sick, our oxygen demands increase.

If oxygen supply fails to meet oxygen demand, the body will try everything it can to increase the supply. When we run up a flight of stairs, we breathe faster and deeper in order to increase oxygen supply and eliminate the additional CO2. Our hearts pump faster and more forcefully, increasing cardiac output to circulate more O2.

However, each of us only has so much reserve built into the system. If the demand is high enough, or an individual's delivery systems are weak enough, the system can fail.

Oxygen delivery can be interrupted at multiple places. Some of the major processes that affect oxygen delivery include those in the table seen above.

All of these conditions can be associated with either low or normal oxygen saturations depending on the severity of the condition, the status of the patient, whether the patient is receiving supplemental O2, and other treatment at the time.

Oxygen Saturation Can be Misinterpreted

As a point of care test, oxygen saturation can alert us when there are problems with the oxygen delivery system. However, it can't tell us which part of that delivery system is malfunctioning.

Oxygen saturation can be low because the patient has pneumonia, the patient has heart failure, or the patient is standing on top of Mt. Everest. You need context to figure out what is causing a decrease in oxygen saturation. Sometimes that diagnosis takes time because the cause can be multi-factorial.

There are also conditions like a stroke or heart attack, where oxygen saturation might be normal, but oxygen can't be delivered to where it needs to go because the circulation is blocked or because the heart is beating poorly.

Oxygen saturation can also change over time: it can get better or it can get worse. A falling oxygen saturation can be a warning sign that a sick patient, who has been stable up to this point, is about to decompensate and needs urgent treatment. Trends can be more valuable than single values.

Oxygen Saturation and INOCA

INOCA is the acronym for Ischemia and No Obstructive Coronary Artery Disease. With INOCA, for example, .spasm of the coronary arteries and microcirculation of the heart prevent oxygenated blood from reaching the heart muscle. Even when the blood oxygen saturation is 100%, if the blood can't reach the heart muscle, the heart muscle will suffer from lack of oxygen. Its as though a fire truck is

FEATURE GUEST ARTICLE
continued

full of water, but the fire hose can't spray enough of that water because there's a kink in the hose. In this case having a normal oxygen saturation could mislead the patient, or even the provider, into believing everything is fine even when the heart muscle is ischemic.

If heart ischemia continues long enough then the heart will start to fail. A failing heart no longer pumps enough blood through the lungs or provides adequate oxygen to the rest of the body. At this point, oxygen saturation will drop.

Oxygen saturation is a valuable tool. But it always needs to be interpreted based on the clinical circumstances, and in the context of what other signs and symptoms are present to diagnose the problem.

Note: some of the material has previously been published in my book "Anyone Can Intubate: a Step by Step Guide to Airway Management", as well as on my blog airwayjedi.com.

OXYGEN QUICK QUIZ

- Which major organ of the body uses most oxygen?
- Which holds more oxygen, warm or cold water?
- Do trees create the majority of the oxygen we breathe?
- Is pure oxygen combustible/ does pure oxygen burn?
- Oxygen as a gas is colourless and odourless. Does liquid oxygen have a colour?

Answers on the INOCA website at the bottom of the patient Information page

https://www.inocainternational.com/patient-information/

EVERY BREATH WE TAKE

In her regular GP spot, Dr Ailsa Care talks to us about breathing

We take breathing for granted, it just happens. We breathe in oxygen and we breathe out carbon dioxide. What could be simpler than that!

Actually the way that we breathe can alter our mind and body in so many ways. Altering the way we breathe is an easy way to make a big difference to our physical, mental and cognitive health and it costs nothing!

Lots of conditions affect the way we breathe, like asthma, allergies, COPD, heart conditions, anxiety, obstructive sleep apnoea. What if changing the way we breathe could help us to manage such conditions?

I first became aware of the science behind breathing when I was sitting in my dentist's waiting room about 10 years ago. I picked up a book called Close Your Mouth by Patrick McKeown. It was all about a method called Buteyko breathing which it claimed could help with anxiety, cure snoring and manage asthma without medications. Even back then I was interested in finding drug free ways that patients could help themselves to manage their chronic health conditions.

There are a number of problems with the way that most people breathe.

The first is that 25-50 % of people breathe through their mouth rather than their nose. Our noses are designed to warm, moisten, filter and condition the air we breathe so that we are able to extract more oxygen from the air. A nasal breath results in 20% more oxygen than a breath through the mouth. .

When we breathe through our mouth we are exposing our lungs to everything in the environment that the nose would usually filter out. One of the main instructions with Buteyko breathing is to spend as much time as possible breathing through your nose.

Mouth breathing at night is associated with snoring and obstructive sleep apnoea (OSA). OSA has associations with depression, cognitive problems, metabolic issues like diabetes, increased risk of cardiovascular disease and raised blood pressure.

Breathing difficulty at night causes poor quality sleep, teeth clenching and grinding, waking with headaches and temporomandibular joint pain (due to clenching and grinding)

The second problem with the way we tend to breathe is that our breaths are too rapid so there is less time for the crucial gas exchange across the air sacs of the lungs.

The third issue is that along with this rapid breathing we tend to only use the upper parts of our lungs so not using them to their full capacity. This may be alright in a relaxed state when our muscles (including our heart) don't need as much oxygen but we want to be able to take in oxygen more efficiently when we are active to provide oxygen to our muscles.

What can we do to improve our breathing?

Be aware of whether you are breathing through your nose or your mouth and try to breathe more of the time through your nose. It won't

change overnight but the more you can breathe through your nose the better you will feel. When you breathe through your nose the tip of your tongue should lightly rest on the roof of your mouth just behind your front teeth.

Some people find that sticking a 1cm strip of tape such as micropore across your lips at night is enough to remind yourself to keep your mouth shut. Just using a tiny piece of tape is not enough to stop you talking or breathing through your mouth if you need to. It shouldn't feel claustrophobic. I tried this and for a few nights I found in the morning I had removed the tape at some point in the night. I sleep much better when I manage to keep the tape on all night and I'm less likely to need to get up to use the toilet.

Count how many times in a minute you take a breath. Try to slow it down aiming for around 6 breaths per minute. As a rule, try to make your exhale slightly longer than your inhale, for example inhale for a count of 4 and out for a count of 6 or 8. It shouldn't be too difficult, if it is start with fewer counts and gradually build up. There are lots of simple phone apps that can instruct you in various breathing patterns e.g Breathly, Breathe.

Think about breathing into all parts of your lungs. Remember they are a 3 dimensional structure so fill them in all directions. Start by placing a hand on each side of your chest, take a deep breath and feel the sides of your chest move outwards. Next place a hand at the top of your chest and at the bottom, take a deep breath and feel your hands move further apart. Lastly, put a hand on the front and the back of your chest and as you take a deep breath feel your chest expanding front and back.

When you visit your dentist ask them to assess for dental problems that might affect your breathing especially if you snore at night. They can make you a night splint which holds your lower jaw forward when you sleep so that you are less likely to snore.

Explore Buteyko breathing. Apart from breathing through your nose it involves training to pause on the exhale and lengthening this pause before inhaling again. Try exhaling gently and hold your breath for a few seconds until you feel a strong desire to inhale. Practice this multiple times per day.

If you want to find out more about breathing you may find the following resources useful:

- www.buteykobreathing.org
- Close Your Mouth by Patrick McKeown
- Breath by James Nestor

We were both honoured and delighted to hear that The Festival of Functional Medicine 2021 had very kindly selected INOCA International as one of their chosen causes.

Many aspects of Functional Medicine are already used by INOCA patients to help in the management of their condiiton. From breathing techniques, to mindfuness, to Yoga, meditation and more, so it was great to hear about even more options that might be of help in the management of INOCA condiitons.

A very informative day by a very warm, welcoming and informative team - A HUGE THANK YOU to Dr Indra and to all her team!

OXYGENATION

10 foods reputed to help oxygenate the body

1.Water. Make sure you keep your body well hydrated - it is recommended to drink around 1.5 to 2 litres every day.
2. Dark leafy greens. spinach, kale, watercress, collard greens.
3. Tofu - made from soy beans and is another great source high in iron.
4. Broccoli - delivers well-balanced nutrition and is rich in iron.
5. Bell peppers (in particular red and yellow) are great sources of beta-carotene and iron.
6. Carrots are another fabulous source of beta-carotene.
7. Green beans are a great source of folate and iron,, also containing antioxidants (Vitamin A and C), potassium and fibre.
8. Berries are nutrient dense, and blueberries are high in iron.
9. Red kidney beans are high in iron, folate and a good source of protein.
10. Walnuts are fabulous sources of Vitamin E, and are also iron-rich.

DONATIONS

All funds raised by patients via the GoFundMe crowdsourcing page go towards covering the costs of the Meeting of Minds. They also cover other costs such as website hosting. The donations are managed entirely by GOFUNDME who keep a very strict record of all monies paid into the fund, providing an independent audit trail of all monies received. No member of the INOCA team is paid.

If you feel that INOCA International has helped you, please consider contributing so that we can continue to help others, just like yourself and can continue to raise awareness and to further education in INOCA.

THANK YOU!

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