

[MUSIC PLAYING]

**FRANCESCA**

Something to remember is that in pregnancy, there are some important changes. There is an increase in

**FACCO:**

[INAUDIBLE] ventilation, but this is not because of an increase in your respiratory rate. There is an increase in tidal volume, and that is about a 50% increase, and it's at an expense of about an 18% decrease in the functional residual capacity.

And so this is kind of the classic slide we all review as obstetricians about what to expect in a pregnant woman. As you can see, the total capacity, total lung capacity, [INAUDIBLE] capacity, [INAUDIBLE] capacity. They don't change very much. The tidal volume can be up about 30% to 50%, depending on what you need. And as you can see, this comes at an expense of the respiratory reserve volume [INAUDIBLE] are decreased about 20% there.

So we know there's an increase in this minute ventilation. And this results in a compensated respiratory alkalosis. So PaCO<sub>2</sub> in a pregnant woman who is healthy, should be less than or equal to 30. A PaO<sub>2</sub> of 100 to 104. And the response to this is an increase in renal secretion of bicarb with a decrease in plasma bicarb. So the pH is not altered.

And this is all thought to be triggered by the progesterone effect of the respiratory stimulant. And this is important. I always tell our residents and fellows to remember when we have a person coming in in some sort of respiratory or cardiac issue where we're checking blood gas, and normally, if you see something around 30 to 35, you might be thinking, OK. You know, we're doing OK. But in a pregnant woman, no.

You want to make sure that she's maintaining her drive, which is normally to be less than or equal to 30. Because just remember, the pregnant woman is blowing off her CO<sub>2</sub>, but also the baby's CO<sub>2</sub>. And this is where this all comes in, right? The respiration of the mom has to also deal with the gas change at the placental level, right? So this is kind of evolutionary to help with placental perfusion and oxygenation.

So oxygen delivery and consumption in a pregnant woman, well, pregnant women have a marked increase in their plasma volume as pregnancy progresses. And it's actually a physiologic anemia of pregnancy, because the plasma volume increases more than the red cell count. So there's a reduction in hemoglobin concentration, and therefore, arterial O<sub>2</sub> content.

So a normal pregnant woman in the third trimester, it's very normal to see hemoglobins of 10 to 11. Most of the time, not necessarily [INAUDIBLE] iron deficiency, but just because of the physiologic hemo dilution. But despite this decrease in the oxygen content, oxygen delivery is maintained at or above normal, because there is a 50% increase in cardiac output during pregnancy. And that's here, as you can see, resulting both from an increase in stroke volume as pregnancy progresses across gestation, as well as an increase in heart rate.

Oxygen consumption increases steadily throughout pregnancy, but with a further increase in labor. Because during labor, there is increased demand on the mom for oxygen. In a normal pregnant woman, oxygen delivery is still greater than oxygen consumption, even during labor.

But we have to always remember when we're taking care of someone with cardiovascular respiratory disease that baseline, that there can be a compromise in oxygen delivery, given the increased needs in labor. So especially [INAUDIBLE] during the second stage of labor, where there's active pushing. And so some of these moms will come into issues with having either maternal or fetal distress because of lack of being able to compensate for the increased oxygen [INAUDIBLE] number.