

### **Pitocin: How do you administer it?**

Pitocin (oxytocin) is the most common medication in obstetrics and has been used for nearly 100 years. In fact, in some parts of the world, which includes Iowa, it is given to every woman following delivery and many women receive it for inducing or augmenting labor. Vincent du Vigneaud discovered oxytocin in 1906 and was the first polypeptide hormone synthesized. He was awarded the Nobel Prize in chemistry in 1955 for this discovery. The precise physiologic role of the hormone has been difficult to pin down because it is released in a pulsatile manner at 3-5 minute intervals and it is difficult to measure. Oxytocin is released from the posterior pituitary gland and is also made in the deciduas and the placenta. It promotes the decidua's release of prostaglandins. We know that oxytocin stimulates myometrial contractions during labor, but it does not seem to directly initiate spontaneous labor in women. Oxytocin receptors in the decidua do increase throughout labor and peak at delivery and stimulate the formation of prostaglandin receptors and production. Maternal plasma levels do not increase before or during the early stages of labor. However the oxytocin levels are higher in the umbilical artery than in the umbilical vein which suggests a fetal source. Levels of maternal plasma oxytocin do rise during the second stage of labor, when the fetus is expelled. After the placenta is delivered oxytocin assists in re-establishing hemostasis.

The goal of labor induction (stimulation of uterine contraction before the onset of labor) and augmentation (stimulation of inadequate uterine contractions) is basically the same: achieving regular uterine activity to bring about cervical dilation and fetal descent, while avoiding hyperstimulation. Oxytocin helps accomplish this goal.

### **What Dose Should be Given?**

How the uterus responds to pitocin depends on gestational age, myometrial sensitivity to oxytocin, preexisting uterine activity and cervical status. Oxytocin protocols for labor induction or augmentation are quite varied and there is some

confusion regarding how it works. The majority of the literature today considers the half-life of oxytocin to be 10-12 minutes. Recent work has shown that approximately 40 minutes are required for any particular dose of oxytocin to reach a steady state in the plasma.

In 1984, O'Driscoll and colleagues reported a "high dose" oxytocin protocol for active management of labor. Starting the drug at 6mU/min and increasing the dose by 6mU/min every 20 minutes and showed a lower cesarean delivery rate with a comparable neonatal outcome. In the last 10 years studies have focused on doses, rate of increase, and pulsatility versus continuous infusions. In 1999 researchers at the University of Iowa (Merrill & Zlatnik) showed that the high dose protocols had shorter labors and fewer failed inductions with neonatal outcomes remaining similar. Currently ACOG endorses both low dose and high dose protocols.

### **Main Issues**

- Oxytocin, oxytocin receptors, and prostaglandins all have a role in human parturition; however, the mechanism of labor is still not fully understood.
- Both low and high dose oxytocin protocols have been found to be effective and safe for labor induction and augmentation. 90% of women will respond to 16mU/minute or less.
- The most common side effect of oxytocin is hyperstimulation and is dose related. Hyperstimulation is defined as greater than 5 contractions in 10 minutes, contractions that last longer than 90 seconds, and increase in baseline uterine tone. 50% of hyperstimulation cases will have nonreassuring fetal tracings, therefore oxytocin should be discontinued.
- Physiologic doses (low dose) of oxytocin may be safer in patients at high risk for hyperstimulation, fetal distress, or both. Examples include: preeclampsia, chronic hypertension, oligohydramnios, multiple gestation, prematurity, fetal growth restriction, placental abruption or any fetus that is already compromised and has little reserve.
- Oxytocin is administered as a dilute solution intravenously via an infusion pump. The pitocin tubing should be inserted as close to the IV site as possible. The beginning dose may range from 0.5mU/minute to 6mU/minute with increments of the same at intervals between 15-40 minutes. Fetal heart rate and uterine activity should be evaluated every 15 minutes in the first stage of labor and every 5 minutes in the second stage of labor while pitocin is infusing. This is most easily accomplished with continuous electronic fetal monitoring but may be done by auscultation. Establish protocols for your institution and follow them.

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