

Evoked Potential Monitoring

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Not only does the brain generate electrical signals, but the nerves and muscles do, too. When you stimulate the skin, an electrical signal goes up the nerves, through the spinal cord, and up into the brain. This is called an Evoked Potential (EP) because it is an electrical potential (or voltage) that is caused (“evoked”) by the stimulation. If you attach wires along the nerves (either with sticky pads or with tiny needles just through the skin), you can measure the signals as they go along the nerves, spinal cord, and brain. Think of an electrician as he measures the resistance in a circuit to check for problems with your house wiring. If the signal goes through fine, everything is okay and the system works. However, if the nerve gets injured, the signal doesn’t go through as well, and these changes can be seen in the display on the monitor and alert the surgical and anesthesiology teams that there may be a problem. Sometimes, this change goes along with other signs, sometimes the only suggestion that there is a problem is that the EPs are changing. We can even see if our treatment is helping by seeing if the EPs get better!

When would we use EPs? One of the common uses is during spine surgery, especially if there are going to be rods, plates, or screws put in to stabilize the spine. Besides the chance of poking a screw through a nerve, straightening out the spine (whether to treat bad arthritis, scoliosis, or a fracture) can squeeze or stretch the nerves and spinal cord; EPs allow us to see if that is happening. There are other types of EPs, such as Brainstem Auditory Evoked Responses (BAERs). Instead of using a tiny electric current to stimulate the nerves, this technique looks at the ear, so it simply has a “clicker” in the ear to stimulate the hearing nerve. This is used in certain operations involving the brainstem or middle of the brain and in surgery for a tumor called an acoustic neuroma. We can now reliably send signals down the nerves to the muscles to make sure those kinds of nerves are also working. These motor evoked potentials look at tiny electrical signals from nerves stimulating muscles to contract. These contractions are far too small to see by eye, so only the sensitive electrical detectors can see them. Your surgeon and/or anesthesiologist can discuss with you when they think these types of monitors will be useful in your operation.