Feet of Astrocytes read molecules passing through capillaries that never enter the brain, then balance brain levels to match them, acting like a glial gauge with releases in specific brain areas.

Even most physicians are not aware of what makes up the Blood Brain Barrier. We know that it protects the brain from viral and bacterial attack, as well as large molecules that might kill us if they were allowed to pass from the body into the brain. What is not as clear is that this is a physical barrier, part of our brain’s immune system and a way for the brain to change itself without anything entering into it at all. Everywhere in our bodies, capillaries riddle all of our tissues, bringing nutrients, oxygen and other necessary substances to sustain our lives and provide us with energy. In the body capillaries are one cell thick and are comprised of cells called endothelium. Everywhere except the brain these cells either sit tightly against each other or have larger gaps between them. The largest molecules and particles pass from the bloodstream into the body through these Loose Junctions, while smaller particles go through Tight Junctions. In the brain capillaries there are only Tight Junctions, preventing larger molecule, virus and bacterial invasion. In addition astrocytes surround all of the capillaries adding a second layer of physical barrier between the blood vessels and the brain. For a smaller molecule to get through it has to find its way through the tight junctions of the endothelial cells and the astrocytic feet. If something comes through that is not recognized as safe, the astrocytes mount a massive inflammatory release calling forth and activating microglia, which attack and devour the foreign invader. There is another function of these astrocytic feet. They read molecules that pass through all of the regions of the brain in the capillaries. This allows them to pass information to the rest of the brain to release specific substances to match molecules flowing through the body’s bloodstream with very specific releases in areas of deficiency in the brain. This way the brain can then balance it’s nutrition, activity and energy with the needs of the body. Subsequently it instructs the body to redirect its own activity and release of various naturally occurring compounds into the tissues and bloodstream.