

Scientific American, June 2013:

Blood-Brain Barrier:

“Is made up of endothelial cells that line the walls of the blood cells. In the brain, these cells are joined very closely together by tight junctions.

Doctors have known for ages that Multiple Sclerosis MS is caused by the breakdown of myelin, a rubbery sheath that encases and insulated the axioms (the signal-emitting “wires”) of the neurons just as rubber encases telephone wire. But why these attacks occur in episodes and what triggers those episodes have remained a bit of mystery. A growing roster of magnetic resonance imaging studies suggest that breaches in the blood-brain barrier precipitate MS attacks. These aberrant openings allow too many white blood cells to cross from the capillaries into the brain and attack the myelin...”We have always thought of MS as a disease of the immune system,” (Lester) Drewes (vascular biologist and BBB specialist at the University of Minnesota) remarks, “Now we’re starting to think of it as a disease of the blood-brain barrier.”

Scientists elsewhere have identified two barrier proteins whose malfunctioning might play a role in Alzheimer’s disease. One protein (known as RAGE) shepherds the molecule beta-amyloid into the brain from the bloodstream; the other (called LRP1) shoos it out. When the balance between these two is disturbed – when too much beta-amyloid is let in or too little is expelled – the brain plaques associated with Alzheimer’s arise.

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Recent studies have shown that tight junctions form almost as soon as blood vessels begin to penetrate the embryonic brain. In fact, investigators have begun to suspect that the barrier plays a crucial role during development by providing the brain with a specialized internal environment without which neurons might not be able to grow and connect.

Then as we grow old, that specialized environment may start to come apart. Researchers have begun to suspect that subtle changes in the blood-brain barrier – a reordering of cerebral vasculature, perhaps, or small, slow leaks in the barrier itself – are what clear the path for age-related neurodegeneration, in all its malevolent permutations.”