

Vaccines, Depression and Neurodegeneration After Age 50

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It has been estimated that 14.8 million Americans suffer from major depressive disorder and of this number 6 million are elderly. If we include anxiety disorders, which commonly accompany depression, the number jumps to 40 million adults. At a cost of \$44 billion dollars a year just for care of the seniors, this impacts the national budget as well.

Depression later in life tends to last longer and be more severe than at younger ages. It is also associated with a high rate of suicide.

Previously, it was thought that major depression was secondary to a deficiency in certain neurotransmitters in the brain, particularly the monoamines, which include serotonin, norepinephrine and dopamine. While alterations in these important mood-related neurotransmitters is found with major depression, growing evidence indicates that the primary culprit is low-grade, chronic brain inflammation.

In addition, we now know that inflammatory cytokines can lower serotonin significantly and for long periods by a number of different mechanisms.

MSG and Depression

Researchers have also discovered that most people with major depressive disease (MDD) have higher levels of the neurotransmitter **glutamate** in their spinal fluid (CSF) and blood plasma. This is the same glutamate found as a food additive—for example, MSG (monosodium glutamate), hydrolyzed proteins, calcium or sodium caseinate, soy protein isolate, vegetable protein concentrate or isolate, etc.

Much of the free glutamate in the brain of depressed people comes from within, that is it escapes from special cells within the brain itself (microglia and astrocytes). Free glutamate, that is, existing outside the neurons, is very toxic to brain connections and brain cells themselves -- mainly by a process called excitotoxicity.

This connection between high brain glutamate levels and major depression was discovered quite by accident, when researchers observed that the anesthetic drug ketamine could relieve depression for a prolonged period. Ketamine is a powerful blocking drug for a class of glutamate receptors (NMDA receptors).

For quite some time it was known that depression could cause a loss of neurons in the hippocampus of the brain—the area most important for recent memory (declarative memory or working memory), the form of memory most affected in Alzheimer's disease.

This shrinkage of the brain usually occurred with long-term depression, yet it was shown, using sophisticated testing, that even without brain shrinkage, memory could be adversely affected. Some antidepressants could not only reverse the memory loss but could reverse the shrinkage as well.

The implication was that the elevated brain glutamate, via excitotoxicity, was destroying brain connections and later killing brain cells in the hippocampus and that the antidepressants were lowering brain glutamate levels. Subsequent studies have confirmed that drugs that block excitotoxicity also reduce depression and that some antidepressants

reduce brain glutamate levels.

The Link Between Elevated Brain Glutamate and Inflammation

A tremendous amount of research has now demonstrated the link between chronic low-level brain inflammation, elevated brain glutamate levels and major depression. We know that as we age, the level of **inflammatory immune cytokines** increase (such as interleukin-1 β (IL-1), IL-6 and TNF-a). That is, the level of inflammation in our body increases, with high levels being seen at the extremes of life -- the 80s and 90s.

This progressive elevation in the body's inflammation increases our risk of a number of inflammation-linked diseases, such as cancer, arthritis, muscle weakness, fatigue, sleep disturbances, memory loss and confusion. People with Alzheimer's and Parkinson's disease have even higher levels of these inflammatory cytokines -- much higher.

When inflammatory chemicals are elevated in the brain it makes brain cells more vulnerable to a number of toxins, many of which are in the environment. One study demonstrated, using a series of sophisticated techniques, that if brain cells were exposed to low levels of a pesticide there was little toxicity seen and that if you exposed these same brain cells to an immune stimulant alone, little damage occurred.

But if you first exposed the brain cells to the immune stimulant, the same low dose of pesticide could destroy a great number of brain cells.

The importance of this observation was that the vaccine made the brain cells hypersensitive to the toxin so that even in concentrations that normally would do not cause harm, could wiped out most of the neurons. One of the strongest connections between an environmental toxin (pesticides) and a neurological disorder is with **Parkinson's disease**.

The reason it is more common in the elderly is that they have the highest levels of inflammatory cytokines. This also explains the high incidence of **Alzheimer's disease**, which reaches incidences of 50% after age 80.

The link to depression was also serendipitous

Doctors using immune cytokines to treat patients with cancer or hepatitis found that one third of the patients developed major depressive illness within days of the treatment and that it resolved only when the treatment was terminated. Other studies, in which inflammatory cytokine levels were measured in people with major depressive illness, also found most had high levels of these inflammatory chemicals.

To their surprise, they found that many of the antidepressant medications commonly used lowered inflammatory cytokines levels and that patients who failed to respond had the highest level of the cytokines.

So, how is this linked to excitotoxicity?

Neuroscientists have known for some time that inflammatory cytokines cause the brain to release higher levels of glutamate -- the more intense the inflammation, the higher the brain glutamate level. The highest levels are found in the **prefrontal lobes** and **limbic system**, the areas most related to mood control. MSG also increases brain inflammation.

Vaccination and Brain Inflammation

A great number of studies have shown that when you vaccinate an animal, the body's inflammatory cytokines not only increase dramatically, but so do the brain's inflammatory chemicals. The brain has its own immune system that is intimately connected to the body's immune system. The main immune cell in the brain is called a microglia. Normally, these brain cells are lying throughout the brain in a resting state (called ramified).

Once activated, they can move around, traveling between brain cells like amoeba (called amoeboid microglia).

In the resting state, they release chemicals that support the growth and protection of brain cells and their connections (dendrites and synapses). But when activated, they secrete a number of very harmful chemicals, including inflammatory cytokines, chemokines, complement, free radicals, lipid peroxidation products, and two excitotoxins -- **glutamate and quinolinic acid**.

In essence, these brain immune cells are out to kill invaders, since the body's immune system sent an emergency message that an invasion had occurred. With most infections, this phase of activation last no more than a few days to two weeks, during which time the immune system successfully kills off the invaders.

Once that is accomplished, the immune system shuts down to allow things to cool off and the brain to repair what damage was done by its own immune system.

What researchers knew was that during this period of activation, people generally feel bad and that what they experience closely resembles depression -- a condition called "**sickness behavior**". Most of us have experience this when suffering from a viral illness -- such things as restlessness, irritability, a need to get away from people, trouble sleeping, fatigue and difficulty thinking.

Studies have shown that there are two phases to this "sickness behavior"; one in which we have the flu-like symptoms and a later onset of depression-like symptoms that can last awhile. They have also shown that all of these symptoms are due to high levels of inflammatory cytokines in the brain, which come from activated microglia.

A number of studies have also shown that after age 50, people have exaggerated and prolonged "sickness behavior", much more so than younger people. This is one of the reasons why many elderly hang onto flu symptoms for months after exposure.

There is also another immune phenomenon that plays a major role in vaccine-related brain injury. Researchers discovered that when you vaccinate an animal, the brain microglia immune cells turn on partially (called priming), that is, they are in a state of high readiness. If the immune system is activated again soon after (days, weeks to months), these microglia explode into action secreting levels of their destructive chemicals far higher than normal. This overreaction can be very destructive and make you feel very depressed.

Stimulating your immune system with a vaccine is far different than contracting an infectious illness naturally. Vaccines are made of two components -- the agent you wish to vaccinate against -- for example, the measles virus; and an immune system booster called an **immune adjuvant**.

These adjuvants are composed of such things as aluminum compounds, MSG, lipid

compounds and even mercury. Their job is to make the immune system react as intensely as possible and for as long as possible.

Studies have shown that these adjuvants, from a single vaccine, can cause immune overactivation for as long as two years. This means that the brain microglia remain active as well, continuously pouring out destructive chemicals. In fact, one study found that a single injection of an immune activating substance could cause brain immune overactivation for over a year. This is very destructive.

Flu Vaccines and an Expanding Vaccine Schedule for the Elderly

Public health authorities and physician societies are in an all out campaign to have every elderly person vaccinated every year with the flu vaccine as well as a growing number of newer vaccines. When I was practicing neurosurgery, the hospitals had an automatic written order on all older patients' charts mandating a flu vaccine, unless it was countermanded by the physician, which I always did.

Now, they are giving the shots in malls, tents and every available site they can muster. And worse still, using lies and scare tactics to frighten the elderly into getting the shots (such as the bold lie that 36,000 elderly die of the flu every year).

As you age, your immune system, including that special immune system in your brain, releases significantly more inflammatory immune cytokines than when you were younger. This serves to prime the microglia, as discussed. So, when you get your first flu shot your microglia overreact and does so for a very long period -- perhaps years.

Many elderly report that the flu shot gave them the flu. Proponents of vaccines, retort with a condescending laugh; that it is impossible because the flu vaccine contains killed flu viruses. In truth, what these people are reporting is a prolonged, intense "sickness behavior" response to the vaccine. To the body, it is worse than getting the flu.

Remember, **no one is recording the number of elderly who die after getting the flu shot**, especially if they die months later, which can happen with sickness behavior, especially if they have a preexisting chronic illness or are infirm.

The Shocking Truth

With the elderly already having increased inflammatory cytokine levels both systemically and in their brain, stimulating these primed microglia so that a chronic overstimulation of the brain's immune system is triggered, will not only increase their risk of developing one of the neurodegenerative diseases, but will also substantially increase their risk of developing major depression. Remember, this also increases their risk of suicide, and even homicide, dramatically.

Anxiety is a major problem with depression, and vaccinations will greatly worsen the condition. In fact, vaccination, especially multiple vaccinations, will maintain the brain in a state of inflammation that will be self-perpetuating, because the excess release of glutamate in the brain, as well as glutamate in the diet, will further enhance microglial activation and excitotoxicity.

Those who are prone to developing one of the neurodegenerative diseases, such as Alzheimer's disease or Parkinson's disease will be at a drastically increased risk as we have seen experimentally when even animals exposed to subtoxic concentrations of

environmental toxins and vaccinated develop neurologic worsening.

Most people use pesticides in their home, and studies have shown that the concentrations in homes are sufficient to trigger Parkinson's disease in susceptible people. Vaccinations, as these studies have shown, will greatly increase that risk. Most doctors are completely unaware of this important research.

You must keep in mind that "health authorities" urge the elderly to get the flu vaccine each and every year. This will keep the microglia in a **primed** and even **activated** state continuously. Recently, neurologists announced that the incidence of neurodegenerative disease had been grossly underestimated and that neurological diseases of aging were increasing at a frightening rate. They have no explanation.

Over the last three decades the number of elderly receiving yearly flu vaccines has risen from **20%** before 1980 to over **60%** today.

If this were not depressing enough, now the public health authorities and medical specialty societies are adding a whole new set of vaccines for those above 50 years of age, including the pneumococcal and meningococcal vaccines. What is being completely ignored by the promoters of these vaccines is the effect of multiple doses of immune adjuvant that accompany each of these vaccines.

Let's say you see your doctor and he talks you into getting the flu vaccine, the pneumococcal and meningococcal vaccine all during the same office visit. That way, he can save you extra office visits. What your doctor ignores is that he is giving you three doses of **powerful immune adjuvant** all in one sitting, which means that your body and brain are assaulted by a massive dose of powerful immune activators, which have been proven to activate the brain's immune system to dangerous levels, even when given as a single dose.

Proof of this mechanism exists not only in animal studies, but in humans as well.

Mercury and Aluminum

There are other ways that vaccines can cause havoc in the brain. Most vaccines contain aluminum compounds. A multitude of studies have shown that aluminum, especially if combined with fluoride, is a powerful brain toxin and that it accumulates in the brain. With each vaccine injection, a dose of aluminum is given. These yearly aluminum inoculations accumulate not only at the site of the injection, but travel to the brain, where it enters neurons and glial cells (astrocytes and microglia).

A number of studies have shown that aluminum can activate microglia and do so for long periods. This means that the aluminum in your vaccination is priming your microglia to overreact. The next vaccine acts to trigger the enhanced inflammatory reaction and release of the excitotoxins, glutamate and quinolinic acid.

You must also appreciate that any infection, stroke, head injury or other toxin exposure will also magnify this inflammatory brain reaction initially triggered by your vaccines. Studies have now indicated that the more one's immune system is activated the more like he or she will suffer from one of the neurodegenerative diseases.

Mercury is also a powerful activator of brain microglia and can do so in extremely low concentrations -- in nanomolar amounts. Because of its numerous reactions with sulfhydryl compounds in the body (which are ubiquitous), mercury can poison a number of enzymes,

both systemically and in the brain. Of special concern is the ability of mercury, especially ethylmercury (the kind found in vaccines called **thimerosal**) to inhibit the regulation of brain glutamate levels. (It does this by inhibiting the glutamate transfer proteins that control the removal of glutamate from outside the neuron, where it does its harm.)

In essence, mercury, in the concentrations being injected with vaccines, triggers excitotoxicity, increases brain free radicals and lipid peroxidation products, inhibits critical brain enzymes, inhibits antioxidant enzymes and impairs DNA repair ability. The flu vaccine contains enough mercury to do all of these things. You must keep in mind that each flu vaccine adds to the mercury supplied by your last vaccine -- that is, it is progressively accumulating in your brain.

In addition, the aluminum in the vaccines also primes microglia, and when combined with mercury is infinitively more toxic to the brain. Now, if this is not enough, we also have to consider the contamination of vaccines with foreign viruses and viral components. Studies have shown that this is not a rare occurrence, with up to **60%** of vaccines being contaminated in one study of several major manufactured vaccines.

When confronted with this fact, vaccine proponents just shrug their shoulders and say -- "We don't think these things are harmful."

Yet, the studies say otherwise.

It has been found that insertion of **viral fragments**, not even the whole virus, is sufficient to trigger the brain's microglial system and subsequent excitotoxicity, leading to progressive brain degeneration. This is accepted to be the mechanism by which the HIV virus causes dementia in a great number of AIDS victims. Fragments of the virus (gp140 and Tat) are engulfed by the microglia and this triggers chronic brain inflammation and excitotoxicity. The herpes virus and measles virus can do the same thing.

Danger of Live Virus Vaccines

A number of studies have shown that live viruses used in vaccines can enter the brain and reside there for a lifetime. One such study, in which autopsied elderly were examined for the presence of the measles virus, found that 20% of the brains had live measles viruses and 45% of other organs were infected. These viruses were highly mutated, meaning that they could be just as potent as other measles viruses, but could be even more virulent.

Worse, is that in most cases they cause a smoldering destruction of tissues without the obvious symptoms of infection, which has been shown in a number of studies.

Live virus vaccines are made using a process to attenuate the pathogenic or disease-causing virus by passing it through a series of cultures. The problem is that the reverse can also happen within the body. A number of studies have shown that when we produce free radicals in our body (and we produce tons of such radicals over a lifetime), it mutates the viruses residing in our tissues. This is what was found in the autopsy study I referred to above.

Likewise, these viruses can trigger brain inflammation and degeneration, which has been shown in a number of studies -- that is, there exist a chronic degeneration of the brain over years or decades. Because it is so far separated from the time of the original vaccine, physicians just attribute it to old age or heredity. Anything but the vaccines.

Virologists are also concerned that such mutated live viruses can also infect other people, leading to outbreaks of disease totally unsuspected by health authorities.

Conclusion

Current recommendations by the CDC for adult vaccinations include a total of 14 separate inoculations with infectious agents and powerful immune adjuvants. To be fair, some of these are for special medical risks and conditions, such as high-risk behaviors, illegal drug use and HIV infected individuals.

If we eliminate these, women will be exposed to 10 inoculations and men 7, should they follow CDC guidelines, which doctors follow.

According to CDC recommendations, multiple vaccinations for a single disease are separated by no more than 4 weeks, which is close enough together to produce priming and subsequent hyperactivation of brain microglia. We have seen that this can trigger a smoldering process of brain inflammation and excitotoxicity that can not only result in depression, anxiety and high suicide rates, but can increase one's risk of developing one of the neurodegenerative diseases as well.

We have also seen that in many cases a person will be injected with several vaccines during a single office visit and that this means their body is exposed to a very large dose of immune adjuvant. Compelling studies, using many animal species as well as humans, have shown that this overactivates brain inflammatory mechanism that can last for years.

In addition, several additives to vaccines, such as mercury and aluminum, are powerful brain toxins that are known to accumulate in the brain over years and can trigger brain inflammatory/excitotoxic mechanisms. Vaccine contaminants, such as bacteria, mycoplasma and viral fragments can also produce prolonged brain inflammation and neurodegeneration.

Because the elderly already have high levels of inflammatory cytokines, they are at a special risk. The very young (babies and small children) are at a high risk because their brains are undergoing the most rapid development at the very time they receive the greatest number of vaccinations -- the first two years of life. In fact, they receive **22 vaccines during the first year of life**, one of which contains a full pediatric dose of mercury.

Like adults, they receive many inoculations (up to 9 inoculations) in one office visit. This is insane and in my estimation, criminal.

Nasal flu vaccines are even worse, because they introduce a live virus into the nasal passages, which can then travel along the olfactory nerves, which leads to the very part of the brain first and most severely affected by Alzheimer's disease. A number of studies have shown that viruses and bacteria can pass along this route to the brain.

In fact, in one study scientists sprayed a bacterium into the nose of mice and observed a rapid development of Alzheimer's type plaques in the mouse's brain.

So What Should Older People Do?

First, studies have shown that the primary cause of immune deficiency in the elderly is purely dietary. The carotenoids, such as beta-carotene, alpha-carotene, canthaxanthin, lutein and lycopene significantly enhance the immunity of the elderly. Zinc, magnesium and selenium are also essential. One should also avoid omega-6 oils (the vegetable oils: corn,

safflower, sunflower, canola, soybean and peanut oils), since they greatly enhance inflammation and depress immunity. The EPA component of fish oils (omega-3 oils) is also a powerful immune suppressant. DHA is not.

A healthy immune system means that you can fight infections efficiently and rapidly.

Regular exercise, such as brisk walking or weight exercises three to five times a week also boost immunity, while extreme exercise suppresses immunity. Sugar and refined carbohydrates also suppress immunity and inflame the brain. Exercise protects the brain from aging effects and from degeneration.

Adequate sleep is also vital to both brain health and good immune function.

Public health officials and spokesmen for the major medical societies are lying to the public concerning vaccine safety. We now possess sufficient information from a great number of studies to halt this disastrous vaccine policy. We are facing a medial disaster in this country, which is already well on its way.

1. McGeer PL and McGeer EG. Local neuroinflammation and progression of Alzheimer's disease. *J Neurovirology* 2002; 8: 529-538.
2. Tavares RG, et al. Quinolinic acid stimulates synaptosomal glutamate release and inhibits glutamate uptake into astrocytes. *Neurochem Int* 2002; 40: 621-627.
3. Eastman CL, et al. Increased brain quinolinic acid production in mice infected with a neurotropic measles virus. *Exp Neurol* 1994; 125: 119-124.
4. Glass JD and Wesselingh SL. Microglia in HIV-associated neurological diseases. *Microsc Res Tech* 2001; 54: 95-105.
5. Turowski RC and Troozzi PL. Central Nervous System toxicities of cytokine therapy: In: Plotnikoff NP, et al, Eds. *Cytokines, Stress and Immunity*. Boca Raton, CRC Pres, 1998, pp 93-114.
6. Mrak RE, et al. Glial cytokines and Alzheimer's disease: Review and pathogenic implications. *Human Pathol* 1995; 26: 816-823.
7. Klatschmidt C, et al. Stimulation of ionotropic glutamate receptors activates transcription factor NFkB in primary neurons. *Proc Nat Acad Sci USA* 1995; 92: 9618-9622.
8. Gao HM, et al. Distinct role for microglia in rotenone-induced degeneration of dopaminergic neurons. *J Neurosci* 2002; 22: 782-790.
9. Dyatlov VA et al. neonatal lead exposure potentiates sickness behavior by *Listeria monocytogenes* infection in mice. *Brain Behav Immun* 2002; 16: 477-492.
10. Nakai Y, et al. Apoptosis and microglial activation in influenza encephalopathy. *Acta Neuropath (Berl)* 2003; 105: 233-239.
11. Anderson T et al. NMDA-receptor antagonist prevents measles virus-induced neurodegeneration. *Eur J Neurosci* 1991; 3: 66-71.
12. Conner TJ, et al. Depression stress immunological activation: the role of cytokines in depressive disorders. *Life Sciences* 1998; 62: 583-606.
13. Renault PF, et al. Psychiatric complications of long-term interferon-alpha therapy. *Arch Internal Medicine* 1987; 147: 1577-1580.
14. Adams F et al. Neuropsychiatric manifestations of human leukocyte interferon therapy in patients with cancer. *JAMA* 1984; 252: 938-941.
15. Broderick PA, et al. Interleukin-1a alters hippocampal and norepinephrine release during open field behavior in Sprague-Dawley animals: differences from the Fawn-Hooded animal model of depression. *Prog Neuropsychopharmacol Biology* 2002; 26: 1355-1372.
16. Katayama Y, et al. Detection of measles virus nucleoprotein mRNA in autopsied brain tissues. *J General Virology* 1995; 76: 3201-3204.

17. Nicolson GL et al. High frequency of systemic mycoplasma infections in Gulf War Veterans and civilians with amyotrophic lateral sclerosis. *J Clin Sci* 2002; 9: 525-529.
18. Blaylock RL. Interaction of cytokines, excitotoxins, and reactive nitrogen and oxygen species in autism spectrum disorders. *JANA* 2003; 6: 21-35.
19. Blaylock RL. Central role of excitotoxicity in autism. *JANA* 2003; 6: 7-19.
20. Blaylock RL. Food additive excitotoxins and degenerative brain disorders. *Medical Sentinel* 1999; 4: 212-215.
21. Blaylock RL. Chronic microglial activation and excitotoxicity secondary to excessive immune stimulation: Possible factors in Gulf War Syndrome and Autism. *J Amer Phys Surg* 2004; 9: 46-51.
22. Pilc A, et al. Mood disorders: regulation by metabotropic glutamate receptors. *Biochem Pharmacol* 2007; (Epub ahead of print)
23. Palucha A, Pilc A. The involvement of glutamate in the pathophysiology of depression. 2005; 18: 262-268.
24. Paul IA, Skolnick P. Glutamate and depression: clinical and preclinical studies. *Ann NY Acad Sci* 2003; 1003: 250-272.
25. Pittenger C, et al. The NMDA receptor as a therapeutic target in major depressive disorder. *CNS Neurol Disorders Drug Targets* 2007; 6: 101-115.
26. Magaki S et al. Increased production of inflammatory cytokines in mild cognitive impairment. *Exp Gerontol* 2007; 42: 233-240.
27. Gao H-M et al. Synergistic dopaminergic neurotoxicity if the pesticide rotenone and inflammogen lipopolysacchride: relevance to the etiology of Parkinson's disease. *J Neurosciences* 2003; 23: 1228-1236.
28. Holmes C et al. Systemic infection, interleukin 1 β , and cognitive decline. *J Neurol Neurosurgery Psychiatry* 2003; 74: 788-789.
29. Godbout JP et al. Exaggerated neuroinflammation and sickness behavior in aged mice after activation of the peripheral innate immune system. *The FASEB J* 2005; 19: 1329-1331.
30. Perry VH et al. The impact of infection on the progression of neurodegenerative disease. *Nature Rev Neuroscience* 2003;4: 103-112.
31. Feiring B et al. Persisting responses indicating long-term protection after booster dose with meningococcal group B outer membrane vesicle vaccine. *Clin Vaccine Immunology* 2006; 13: 790-796.
32. Vaccine Excipients and Media Summery Center for Disease Control and Prevention. (also the source for recommended vaccines for adults and children).