Dynamic Chiropractic



# Dissecting Toxic Links to Sleep

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Sleep is a required need to sustain life, and quality sleep is critical to vital and abundant health. One of the most overlooked relationships in acquiring quality sleep is the role that the mattress plays. Most people, including healthcare professionals, have little understanding of what qualifies as a good sleeping surface, and even more concerning, they lack the knowledge of the materials that are used in making those surfaces. Shockingly, the evolution of the modern mattress has moved in a direction that is both less supportive of our physical structural needs and toward the use of more synthetic materials that on a physiological level can unknowingly expose the sleeper to potentially harmful toxicities.

Sleeping disorders in the U.S. are growing at an alarming rate and have been labeled as epidemic. But little has been done to look at the correlation between such disorders and the root cause of the dysfunction. Dissecting the toxic links to sleep can be both confusing and astounding, but necessary for the well-informed DC to arm their knowledge base and better help their patients.

Evolution of the Modern Mattress

In the first half of the 20th century, mattresses were primarily made using steel springs for support and cotton batting for cushioning. Polyurethane foam was created in Germany in 1937, and began to replace cotton in the 1950s. Polyurethane was much less expensive than cotton, even in that time, thus the trend to use such materials was embraced.

Polyurethane foam is made from petroleum-based products, which is known to emit volatile organic compounds, and exposure to such has been linked to respiratory irritation and other health problems, according to the Environmental Protection Agency. Over the past 30 years, the cotton used in mattress production has been completely replaced by the synthetic foams, as well as some of the springs. The first incarnation of synthetic foams was found in the pillow-top mattress, which fell out of favor because the foams often degraded, losing formation and becoming known for quickly forming body impressions.

The current state of mattress evolution uses combinations of synthetic foams (polyurethane, memory, latex, foamed gel) to create comfort and support alternatives. But as these new materials have grown in popularity, sleep problems have also increased. Most consumers are unaware that the same material pool, composed of synthetic, petrochemical-based foams, is used by nearly all of today's mattress manufacturers.

In 2007, the U.S. Federal Government mandated that every mattress manufacturer include a fire barrier in the mattress so that it would self-extinguish if it caught on fire. However, it did not mandate what type of materials should be used to accomplish the self-extinguishing, or require disclosure of said ingredients used to the consumer. The least expensive flame-retardants used by major retail mattress companies are liquid sprays containing chemicals such as PCDE's (polybrominated diphenyl ethers) and Boric Acid, both known to have carcinogen properties. Furthermore, in the last decade, the mattress industry has moved towards a softer mattress, providing less structural support to the sleeper, which inertly results in the increased incidence of

tossing and turning and thus robbing the sleeper of less time in the needed deep levels of non-REM III and IV. The support component of some mattresses used today has replaced the steel spring with a foam core, water and air. All three alternative forms of support are thought to be inferior to the good old-fashioned steel spring.

Toxic Mattress Materials

Most mattresses sold today contain some polyurethane foam and many contain specialty foams such as latex or memory foam, which consistently break down and release chemicals. The most common toxic materials used in making a mattress include petrochemicals, polyurethane, polyvinyl chloride (PVC), formaldehyde, antimony trioxide, phthalates and boric acid. These chemicals are used for the foam fillers, material adhesives and for water-resistance. Most are used to make the mattress flame retardant, per federal law, causing mattress toxicity to increase. All these chemicals individually give off their own noxious fumes, commonly referred to as off-gassing. Sleepers may report smelling the fumes when the mattress is first bought, which eventually ceases; however, although the off-gas smell no longer is detectable, toxins are still continuously being released and inhaled by the sleeper.

[pb]Studies show that when a person is sleeping on a mattress with such chemicals, the toxins can seep into the body through the skin. This is supported through scientific research that has shown PCDE's to be found in women's breast milk in the U.S., a fact that has led many to fear that children are more likely to suffer greater than adults from mattress toxicity. Further, infants and children spend more time sleeping, resulting in an increased amount of exposure time. Compounding the issue, mattresses made for children are not only made with additional chemicals to prevent wetness from destroying a mattress, but are manufactured to prevent the mattress from burning at high degrees. Researchers are questioning the origin of the increased incidences in pediatric respiratory issues, such as asthma, learning disabilities (specifically Attention Deficit Hyperactivity Disorder), and lower IQ levels. Some have speculated there is a strong correlation between these issues and the materials used in children's mattress and bedding items.

Additionally concerning is the chemical PVC, which is often used with phthalates to create a softer mattress. Phthalates are known to cause breathing disorders and have links to cancer. There is conflicting research linking PVC to the increase of infant crib deaths; however, research to the affirmative is not being recognized by the government and is understandably a controversial topic.

Another study, utilizing mice, was conducted to measure the effect of breathing the emission (off-gassing) of four types of mattresses on the respiratory system. This study revealed that all mattresses containing synthetic materials caused upper-airways irritation in up to 57% of the breaths measured, and saw decreased air flow by 17-23%. The worst violator was a combination of polyurethane foam and a vinyl cover – the type used in most crib mattresses. On the other hand, the old-fashioned mattress materials (organic cotton padding) actually caused increases in both respiratory rate and tidal volume as opposed to the decreased levels measured with the synthetic replacements. Unfortunately, organic cotton is not readily available for mattress use, thus most manufacturers opt for synthetic foams to provide comfort in their mattresses.

Research Links Materials to Disease

As we begin to connect the dots with the rise in critical disease and the materials people are exposed to in the home, a closer look at some of the research specifically focusing on substances found in mattresses is needed. When evaluating toxic exposure while sleeping, it is important to keep in mind that at different stages of life the amount of sleep needed will vary. Humans have sleep cycles and sleep schedules, which are important and unique to each of the life stages.

There are four stages of non-REM sleep and REM (rapid eye movement) sleep, and sleep researchers prize levels III & IV non-REM sleep for its healing properties as that is when the brain repairs and nourishes the body. REM sleep is also important, as this is when the subconscious mind expresses itself through dreams. As people age, the amount and type of sleep needed changes and the exposure to the materials in mattresses will also change. Infants, children and pregnant women, for example, require more sleep per day in order to develop and function properly; non-pregnant females and male adults require less sleep, a requirement which decreases as age progresses. Let's take a look at the sleep needs of humans as they progress through their lives, as well as some of the relevant toxicity and materials research related to particular stages in life.

Pregnant Women

When females become pregnant they are encouraged to increase their time sleeping to greater than eight hours each day. A study released from the University of California, San Francisco reveals that an overwhelming percentage of pregnant women in the U.S. may have high levels of toxic environmental chemicals — some illegal — in their bodies. The trial found that out of the 268 pregnant women tested for toxins, 100 percent showed traces of several individual chemicals in their blood or urine. They include certain PCBs, organochlorine pesticides, PFCs, phenols, PBDEs, phthalates, polycyclic aromatic hydrocarbons (PAHs) and perchlorate. Two new studies have provided even more evidence that toxic chemicals used in everyday products contaminate the bodies of pregnant women, who then pass the chemicals on to their fetuses before birth. Scientists from both the Harvard School of Public Health and the Centers for Disease Control (CDC) found that certain chemicals like PCBs, toxic flame retardants, and Teflon chemicals move across the placenta to the fetus, with concentrated levels found in breast milk. Most women in the U.S. are sleeping on a modern mattress that is full of synthetic foams that contain these toxins.

[pb]Infants

According to the National Sleep Foundation, the average newborns requires up to 18 hours of sleep per day, and spends almost nine hours a day in REM sleep. Drs. Sprott and Richardson researched crib deaths in the U.K. and New Zealand for over ten years, correlating death with accidental poisoning; the poisons comprising one or more gases generated by microbiological activity of chemicals in the baby's crib. They also found that the gases, more dense than air, caused death by interfering with the baby's nerve function, thus causing breathing difficulties and ultimately heart failure. These gases were identified as the hydrides and/or lower alkyl derivates of phosphorus (P), arsenic (As) and antimony (Sb) and a common fungus, Scopulariopsis brevicaulis, as the most likely principal organism with the capability to cause the resultant death. These gases were found in the afflicted babies' mattresses and other bedding.

This data is very controversial amongst the organizations involved with SIDS (Sudden Infant Death Syndrome) in the U.S., but has led to intervention programs to prevent off-gassing in crib mattresses in the U.K. and New Zealand. In the UK, a voluntary program greatly reduced the level of infant deaths and in New Zealand a compulsory program virtually eliminated the problem over a 10-year period. Crib mattresses in the U.S. are primarily made with polyurethane foam, a chemical fire blocker and a PVC cover. This same research indicates these materials contain the chemical off-gasses. Some premium crib mattresses offer memory foam and other synthetic foam options, but these foams off-gas as well and have not been proven to be entirely non-toxic, hypoallergenic and anti-microbial. This research (and the causal test data in the UK and New Zealand) indicates that keeping the crib environment free from off-gassing foams, fungus, microbial growth and toxic materials is a prudent course of action when it comes to protecting infants.

A *New York Times* article published in 2009 stated, "Conventional mattresses for children are often

covered in vinyl, which begins life as a hard plastic and is softened using additional chemicals, frequently ones called phthalates. But small amounts of phthalates have been found in human tissue, and have also been linked to health problems. Last year California became the first state to ban the sale of mattresses with phthalates for use by children, in a law that became effective on Jan. 1. On Feb. 10, a federal law passed by Congress in August will forbid the use of three types of phthalates in products for young children, including mattresses." Positive evidence that, although in small steps-steps none the less-are beginning to be made to protect our young sleepers from potentially harmful materials.

Children

By the age of five, only slightly over two hours is spent in REM sleep. Studies say that school-age children need about 10 to 11 hours of sleep per day to continue to grow and mature into their teenage years. Children to adolescents from ages 10 – 17 begin to get into a more normal sleeping habit and most napping will be eliminated. According to the Mayo Clinic, children need better sleep at this stage of life because they are still growing. A study done at Children's Mercy Hospital in Kansas City, Mo., involving 11,000 children over a period of six years has uncovered stunning new results that indicate that problem sleeping may be linked to causing symptoms of ADHD and ADD. The study found that children who have sleeping disorders such as snoring and sleep apnea are as much as 90% more likely to suffer from ADHD symptoms.

Not getting enough sleep at night can leave children hyperactive, aggressive, depressed and anxious. In a controlled situation, children who snore perform significantly worse in both language abilities and overall intelligence. While this does not mean that every child with ADHD developed it due to poor sleep, it certainly supports the need for children to get quality sleep-especially for those that suffer from such disorders. It's clear that the importance of creating a positive sleep environment for children is equal to feeding them nutritious food. This includes providing a sleeping surface that supports the body structurally, and one that does not expose the child to potentially interfering toxic substances that can have a negative physiological.

Adults

As adults age, the amount of sleep needed is actually reduced. After the age of 18, most adults need 7-9 hours of sleep per night. Unfortunately, as the body ages, it becomes more difficult to achieve level III & IV deep-healing sleep and REM- a result of changes to the musculoskeletal system. As humans age, their bodies require better cushioning and support while they sleep, without which there will be an increase in sleep related pain. This leads to frequent tossing and turning, which sleep research proves, robs the sleeper of deep, healing-level sleep. Many people think poor sleep is a normal part of the aging progression. However, it is not normal to toss and turn in an interruptive way, and is in fact an indicator that the sleeping surface may be failing. Nor is it normal not to have quality sleep on a regular basis. There is also evidence that the use of synthetic foams contributes to the adult population's sleep problems as well.

[pb]Some question the smell that often accompanies memory foam in a new mattress: It is the off-gassing of toxic chemicals, which can be noticeably strong for weeks to months. Off-gassing fumes have reportedly caused headaches and other severe health reactions to people exposed to them while sleeping. More information on the health effects of memory foam and the materials used in mattresses is available at www.chem-tox.com, where people have reported severe reactions to their new synthetic foam mattresses.

Millions Suffer from Sleep Related Disorders

Almost everyone nods their head when it comes to acknowledging the importance of sleep. But most people aren't sleeping well and research shows that 95% will go undiagnosed, and 70 million people in the U.S. report that they suffer from sleep-related pain (*Time* Magazine). Last year alone, 60 million prescriptions for sleeping medications were written. And recent studies have linked poor sleep with the growth of many disease states, specifically: diabetes, obesity, stroke, heart disease, allergies, and fibromyalgia. According to the Center of Disease Control and Prevention, an estimated one-in-five people suffer from a sleep disorder, with sleep deprivation being the most prevalent sleep disorder of them all. Sleep is vitally important to physiological and psychological health. If the sleeper is not achieving a healthy 8 hours of sleep each night, they may experience a host of disadvantageous symptoms such as: drowsiness, irritability, waking up tired, stress, anxiety, depression, memory, concentration problems, and/or appetite fluctuations. It's critical that, when seeing these symptoms in patients, doctors consider poor sleep as being a possible cause.

How Can DC's Help?

Sleep is vitally important, but is a largely overlooked part of wellness. The doctor of chiropractic can take action in becoming better equipped and more informed to assist their patients in achieving quality sleep ... safe sleep. As previously stated, sleeping disorders are epidemic, largely undiagnosed, and often thought to be normal by those suffering. Millions have sleep-related pain, and the degraded quality of sleep substantially impacts the overall health and well-being of the patient. DC's are seeing this in their practices each and every day! The need for addressing these issues cannot be overstated. Quite simply, the body needs to be structurally supported properly while sleeping and this should be accomplished using safe materials.

Adequate government regulations on monitoring mattress materials are not in place, an issue that is compounded as consumers fail to make the connection between what they're sleeping on, their sleep quality, and the connections to possible exposure to harmful toxins that can lead to other health issues down the road. There's a growing body of research, some that we've reviewed in this article, that indicates lower quality foams and fire-retardant chemicals used in the home, may be a contributor to the growing rates of disease. Simply put, patients need assistance in helping them make an educated decision about what they are sleeping on, the possible risks, and how to choose a healthy alternative. Toxicity links can be found in both the structural integrity of the mattress, as well as in the materials that are used.

The DC is in an ideal position to discuss the importance of quality sleep with patients. Patient in-take forms can be used to evaluate sleep quality and potential toxic exposures. And if total patient wellness is the doctor's goal, then sleep can no longer be overlooked. Sleep researchers agree that the mattress and pillow are likely the most important elements of sleep quality for the average person. A mattress that fails structurally will affect the skeletal integrity of that sleeper each night. One that fails to provide adequate pressure relief will cause pain and rob the patient of deep, healing level sleep. And one that is made of poor quality materials can off-gas toxic fumes that adversely affect the respiratory system and other vital functions of the body.

Mattress and pillow vendors can be sought out that are willing to reveal the total material list used in their products. Ask them to provide support, cushioning and toxicity data as well. If they can't or won't, then don't recommend them. This is an area worthy of further consideration for the DC as it has profound implications on the patient's health and well-being. It is also an area of significant opportunity for the field of chiropractic because no other healthcare professional is effectively addressing or treating patients in the area of Sleep Wellness.