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DEATH BY CAR

by Ann Gerhardt, MD *July 2010*

Bottom line at the top: Drive less. Walk more. For a lot of reasons…

Motor deaths, business as usual: Since 1990, 44,450 people, on average, per year, die in motor vehicle accidents. That's 14.5 people for every 100,000 population, *each* year. Most likely you knew one of those people.

If influenza or mad cow disease had caused these deaths, a public outcry would vilify the government for not stopping it. **Instead we blithely accept the carnage as the cost of going about our lives. And demand lower gas prices so we can drive even more.**

Light trucks proportionately kill many more than cars, at 30% of the total. Bigger 'gun', more deaths. Over one-fifth of drivers in fatal crashes had blood alcohol levels exceeding the legal limit. More irresponsibility, more deaths.

Only one piece of good news emerges from the statistics. **Passenger miles driven increased between 1980 and 2000, but deaths fell from 3.3 to 1.5 per 100 million vehicle miles.** The rate has stabilized at that level since then, probably due to seat belt laws and airbags. My skeptical brain doubts there has been a sudden shift to more courteous and safe drivers.

Every Southern state, most Midwest states, Alaska, Washington DC, Idaho, Montana, Nevada, Arizona, New Mexico, Wyoming and West Virginia exceed the average national rate of motor vehicle deaths. Hmmm – interesting pattern. **By far, fewer people are crunched by cars and trucks in New England states.**

Yes, we need transportation to work and play. **But do we need to drive 5 blocks to a convenience store?** Can't Junior ride his bike to soccer practice? Do we need to live in the middle of nowhere, accessible only by vehicle? Does anyone see the hypocrisy of Walmart demanding environmentally responsible behavior by its suppliers when it plunks its stores in the middle of some distant field?

We live in the most technologically advanced country on earth, so why can't we fund and develop an accessible, convenient, public transportation system? The poor, dependent on it to get to work, would appreciate it. The rest of us could travel with less road rage and more time to read. And kill fewer people.

Motor vehicle exhaust kills: The term smog originated at the turn of the century to describe the filthy emanation from industrial smokestacks consisting primarily of particulates and sulfur dioxide. In 1952 the worst smog disaster in history blanketed London for 20 miles up the Thames, killing 12,000 people, most with pre-existing lung disease.

Analysis of Los Angeles haze in the 1950s found a different kind of "photochemical" smog generated primarily by automobiles. It contains less sulfur and more volatile organic compounds (VOC) and nitrogen oxides (NOX). This type of smog causes more cardiovascular than lung disease.

Each measurable pollution component has been associated with increased hospital readmissions of heart attack survivors. Sudden surges of ambient air pollution or exposure to heavy traffic raises the risk of heart attack within one hour. Men with coronary disease show signs of cardiac impairment after exercising for an hour in commonly experienced levels of diesel exhaust. **A direct link emerges between air pollution and angina, heart attack, irregular heartbeats, heart failure and stroke.**

Scientists propose that each component of pollution wreaks havoc on the body by inducing inflammation, promoting clotting and altering blood vessel reactivity. This all can happen within 2 hours of pollution exposure. Diesel exhaust particles actually trigger histamine release in hamsters, just like an allergic inflammatory response. It doesn't take years of exposure to add up to an acute illness.

Automotive exhaust contains hydrocarbons and carbon monoxide (CO), representing incompletely burned fuel. After mixing with water vapor and oxygen in the air,

they form VOCs. VOCs turn oxygen into ozone in the presence of heat and sunlight.

Ozone exacerbates chronic respiratory conditions like asthma and decreases lung function. The maximum 'safe' ozone concentration in an 8 hour period is 80ppb (parts per billion). California's regulation allows 70ppb. **For every 10ppb of daily increment of ozone in the air, an average of 0.6% more people die in U.S. cities. Not only do the elderly and people with health issues die, but healthy people do, too, at the same increased rate.** In rural communities ozone is generated by biogenic emissions (decaying plants, manure, etc) of volatile organic compounds and presumably cause the same health problems.

High temperatures of combustion cause nitrogen to react with oxygen to form NOXs. In the presence of sunlight and heat they convert to ozone. Add VOCs and they become peroxyacetyl nitrates, which also harm health. Combustion exhaust also contains particulates like lead, alkaline earth compounds, iron oxide and tar, vaporized oil that escapes combustion completely, and traces of **aldehydes, esters, ethers, sulfur dioxide, peroxides, ketones, benzene, metal dust, asbestos fiber, dioxin, furon, ammonia, and chlorofluorocarbons (CFC). None of these are healthy to breathe.**

People with chronic lung disease, heart failure, diabetes and history of heart attack or angina risk hospitalization and death on bad air days. Air quality warnings are not purely academic data reports and we really should heed warnings to drive less and avoid going outside when the air is dangerous.

Particulates, also generated from soil, tire fragmentation and burning wood fires and cigarettes, come in a range of sizes, from ultra-fine ($PM_{2.5}$ or smaller), to fine ($PM_{2.5}$ - PM_{10}) to coarse (>PM_{10}). PM stands for particulate matter and the number refers to the size in microns. Particles smaller than PM_{10} penetrate deep into lungs. $PM_{2.5}$ particles are generated only by combustion.

High $PM_{2.5}$ - PM_{10} concentrations increase hospital admissions in the general population, elderly, people with lung disease, diabetics and cardiac patients. In a study of post-menopausal women, only ultra-fine particulates induced cardiac problems.

The greatest exposure of ultra-fine particles is in the middle of the road, where the vehicles are. Concentration decreases with distance from the road. **So, for more than one reason, don't stand in the middle of the road.** Living within an eighth of a mile of a major road augments coronary artery disease severity. Long-term exposure to fine particulates can even initiate atherosclerosis.

The California Air Resources Board has established very low maximum emission levels for PM_{10} and $PM_{2.5}$ for new vehicles. Now we all just need to buy new, ultra-low emission, high fuel efficiency cars.

Gasoline generates relatively more hydrocarbons and CO, therefore more VOCs and ozone. Diesel engines emanate more particulates, sulfur oxides, NOX and organic acids, contributing more to acid rain. By burning more completely, "clean" fuels like corn ethanol generate less hydrocarbon and less CO, and therefore less ozone and VOCs, but no fuel exhaust is healthy.

Motorized transportation contributes to climate change: See the Climate and Health article in DrG'sMediSense Volume 5 Number 1 in September 2010 for a discussion of diseases and deaths caused by climate change and global warming. Here I will just refute the common misperception that motorized transportation contributes little to total oil use.

In 2008 transportation accounted for 27.8% of all U.S. energy consumption. Petroleum products provided 95% of the energy for transportation. Almost half of the total oil consumed per day for all purposes, 9.286 million barrels, fuels cars, non-diesel trucks, RV's and motorcycles.

Ingenious humans have engineered petroleum into much more than transportation fuel. We use it in feedstock, synthetic clothing, toys, waxes, asphalt and lubricants. We use it to fuel industry. But of the 20.7 million barrels of oil used per day in 2008, all types of transportation accounted for 71%.

Travel by air is just as bad. Mile for mile, the carbon footprint per passenger on a full airplane equals that of an individual driving in a car that gets about 20 mpg. Everyone addicted to motorized movement shares culpability for oil spills, rising obesity rates, mosquito borne diseases, heat deaths, weather disasters and famines.

Our insatiable appetite for oil allows us to OK 27,000 oil rigs in the Gulf of Mexico and tolerate oil spills that devastate wildlife and human lives. Just say No?

What to do: Reduce your chance of killing or being killed by **driving less, never drinking and driving, using seat belts and not using the phone while driving**.

Remember that you share the road with human cyclists and pedestrians. They are not bowling pins. Follow the rules of the road and actually stop at lights and stop signs.

Reduce your pollution and global warming impact AND save at the pump by being the first on your block to **have a car that gets 60 miles per gallon. Then leave it in the garage and take the bus… or bicycle… or carpool… or (gasp!) walk. Move close to your work and play, so you don't need to drive.** Think of walking and using public transportation as being very European, which seems to sell when related to food or clothing.

Drive smarter, by keeping the car in tune, the tires pumped up, the oil clean and the load light. **Save even more by not driving like a maniac – Slow down and avoid repetitive breaking and acceleration when you know you're not going anywhere fast.**

Buy local food to reduce produce transportation. Forget shopping at big box retailers in the middle of nowhere. Read more at www.beyondoil.nrdc.org/cars/seven-ways.php.