

# Move More, Eat Less: Addressing Deconditioning and Obesity in Your Practice

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In this sedentary society of ours, there has been a progressive decline in physical activity and a concomitant increase in weight gain despite multiple warnings from governmental agencies and a large and ever-increasing number of scientific publications recommending much greater amounts of physical activity and exercise, along with a reduction of caloric intake. An increase in obesity, deconditioning, cardiovascular disease, [type 2 diabetes mellitus](#) and overall increased morbidity are some of the consequences.

Deconditioning and excessive caloric intake have exploded to epidemic proportions and not only impact the general population, but also adversely affect chiropractic patients' ability to respond as well as possible to spinal adjustments and to comply with and perform effective exercise recommendations. Let's review some of the recent evidence on deconditioning, obesity, the metabolic syndrome, and the increased risk of cardiovascular disease and type 2 diabetes mellitus in the U.S.

## Our Obesogenic Society

Recently in several research papers, our society has been described as "obesogenic." Among adults, Wang, et al.,<sup>1</sup> explain that the prevalence of obesity increased from 13 percent to 32 percent between the 1960s and 2004. Currently, 66 percent of adults are overweight or obese; 16 percent of children and adolescents are overweight and 34 percent are at risk of becoming overweight. By 2015, the authors estimate that 75 percent of adults will be overweight or obese, and 41 percent will be obese. This systematic review concludes that obesity has increased at an alarming rate in the United States over the past three decades.



A 2009 review paper<sup>2</sup> calculates that from the 1970s to the 2000s, the average weight gain for

children and adolescents in the U.S. was 8.8 lbs; for adults, average weight gain was 18.92 lbs.

According to the National Health and Nutrition Examination Survey (NHANES),<sup>3</sup> a nationally representative sample of the U.S. population, comparing data obtained in 2007-2008 versus 1999 through 2006, the prevalence of obesity in 2007-2008 was 33.8 percent overall, 32.2 percent among men, and 35.5 percent among women. The corresponding prevalence estimates for overweight and obesity combined were 68.0 percent overall, 72.3 percent for men and 64.1 percent for women.

A major reason for this rapid growth in obesity is the increase in [caloric intake](#) in the typical American diet over the past several decades. Swinburn, et al.,<sup>4</sup> estimate that food energy intake for children was 1,690 kcal/day in the 1970s and 2,043 kcal/day in the 2000s. For adults, food energy intake was 2,398 kcal/day in the 1970s and 2,895 kcal/day in the 2000s. The authors calculate that this increase in energy intake appears to be more than sufficient to explain weight gain in the U.S. population. They conclude that in order to reverse the obesity epidemic, we need to focus on energy intake by addressing the obesogenic food environment "drivers" of current energy overconsumption. These drivers include the marked increase in consumption of universally available cheap calories found in soft drinks, fast foods, snack foods, fried foods, etc.

### The Epidemic of Type 2 Diabetes

According to another recent study,<sup>5</sup> the prevalence of type 2 diabetes mellitus increased from 5.08 percent of the U.S. adult population in 1976-80 to 8.83 percent in 1999-2004, a 74 percent increase. Of the 3.75 additional cases per hundred that existed in 1999-2004 as compared to 1976-1980, the authors estimate that 8 percent were among people of normal or below-normal weight (body mass index < 25); 27 percent were among those who were overweight (body mass index 25-30); and 32 percent, 23 percent and 26 percent among those with class I (body mass index 30-35), class II (body mass index 35-40) and class III obesity (body mass index > 40), respectively. Thus, the paper concludes that of the additional prevalent diabetes cases that existed in 1999-2004 as compared to 1976-1980, 81 percent were obese (i.e. body mass index > 30) and 49 percent had class II or III obesity (body mass index > 35), a group that increased in prevalence from 4 percent to 13 percent of the overall adult population.

### Physical Activity and the Deconditioning Syndrome

In addition to this well-documented and alarming increase in obesity, recent studies have also documented the startling lack of [physical activity](#) in our society. A 2008 paper<sup>6</sup> measured physical activity among children, adolescents and adults in the U.S. using objective data obtained with accelerometers from 6,329 participants (who provided at least one day of data) and from another 4,867 participants who provided four or more days of data.

Researchers found that physical activity declines dramatically across age groups between childhood and adolescence and continues to decline with age. Among children, 42 percent obtain the recommended 60 minutes per day of physical activity, but only 8 percent of adolescents achieve this goal. Among adults, adherence to the recommendation to obtain 30 minutes day of physical activity is less than 5 percent! This reduced physical activity results in a myriad of deleterious changes commonly referred to as the deconditioning syndrome.<sup>7</sup> Major changes included in this syndrome are:

- Decreased joint mobilization

- Wasting of trunk muscles
- Decreased muscular strength and endurance
- Reduced cardiovascular fitness
- Stiffness of ligaments and joints
- Reduced metabolic activity
- Increased susceptibility to sprains, strains and muscle spasms

These deleterious effects of muscle and joint disuse provoke symptoms, causing greater avoidance of activity, resulting in a cyclical pattern of pain and avoidance of activity / deconditioning / more pain, and is considered a defining characteristic of chronic low back pain patients.

### The Dangers of Inactivity

In an excellent 2011 review paper<sup>8</sup> on the dangers of inactivity, the authors describe deconditioning as the physiologic response of the body when there is a reduction in energy use or exercise levels; that is, with bed rest, prolonged sitting or in living a very sedentary lifestyle. Deconditioning is associated with a host of physiological changes including:

- Decrease in muscle mass
- Loss of muscle strength
- Decline in muscle capillary density
- Decline of mitochondrial enzyme activity and ATP production
- Loss of muscle oxidative potential
- Increased fatigability of muscle
- Reduced cardiac output
- Decrease in [aerobic capacity](#) (VO2 max)
- Decrease in bone strength as a result of increased bone resorption and decreased bone formation in response to unloading. Bone loss occurs most at weight-bearing skeletal sites
- Disuse decreases the collagen turnover in tendons and muscles, weakens attachments of ligaments to bone and causes a disorganization of collagenous fibers
- Proprioceptive mechanisms within muscle and muscle-tendon junctions degenerate and become less responsive, increasing risk of injury
- Metabolic changes lead to increased risk of cardiovascular disease and type 2 diabetes
- Decline in sensitivity to insulin-mediated glucose uptake
- Shift toward increased reliance on carbohydrate for energy at submaximal and maximal exercise intensities in muscle, and a decrease in the contribution from lipid metabolism
- Blood lactate concentration with exercise increases at submaximal intensities and the lactate threshold is apparent at a lower percentage of VO2 max, so exercise performed at the same intensity after disuse results in a higher heart rate, higher blood lactate accumulation, an increase in muscle glycogen utilization and carbohydrate oxidation
- Reduction in exercise time to fatigue
- Increased dyspnea: activities demand a higher relative percentage of VO2 max and may cause shortness of breath and [fatigue](#)
- Activities may be reduced or avoided, resulting in a vicious cycle wherein activity is reduced, walking speed is lowered, and fitness levels decline

### Physiological Considerations

Wittink, et al.,<sup>9</sup> reviewed what they describe as "inactivity physiology," a result of the extended amount of sedentary time in people's daily routine, such as in prolonged sitting. Studies published from several

different countries show that the majority of adult waking hours (>90 percent) are spent either in sedentary or in light-intensity activity.<sup>10</sup> A number of studies, using both subjective and objective measures of physical activity, suggest that prolonged bouts of sitting time are strongly associated with chronic disease including: obesity, abnormal glucose metabolism, diabetes, metabolic syndrome, cardiovascular disease risk and cancer, *independent of whether adults meet physical activity guidelines*.<sup>11</sup>

This discouraging piece of news indicates that the metabolic changes due to prolonged inactivity cannot be fully reversed or compensated for by one hour of vigorous physical activity. Each one-hour increase in sitting time (watching television) increased the prevalence of the metabolic syndrome in women by 26 percent, independent of the amount of moderate to vigorous physical exercise performed. This is approximately the same decreased risk (28 percent) of the metabolic syndrome caused by 30 minutes of extra physical exercise.

Even activities as minimal as standing, rather than sitting, which is associated with muscle inactivity, a lack of muscular contraction, and minimal metabolic demand, were shown to result in substantial increases in total daily energy expenditure and resistance to fat gain. In people who do not exercise, it is important to reduce their sitting time and attempt to maintain a high level of daily low-intensity activity (such as standing, walking and walking stairs) to reduce their metabolic risk.

### The Metabolic Syndrome

The [metabolic syndrome](#) or insulin resistance syndrome is characterized by at least three of the five following metabolic derangements: 1) high serum levels of triglycerides, 2) low high-density lipoprotein (HDL) or "good" cholesterol, 3) hypertension, 4) elevated fasting blood glucose, and 5) increased waist circumference (>102 cm for men and >88 cm for women). These insulin-resistant individuals commonly have an abnormal fat distribution characterized by predominantly upper-body fat.

Waist circumference, a measure of visceral fat, actively contributes to an adverse inflammatory response and to disordered insulin signalling and endothelial dysfunction. Endothelial dysfunction contributes to the initiation and progression of atherosclerotic disease and is an independent vascular risk factor. The metabolic syndrome is associated with a marked risk of CVD and type 2 diabetes mellitus, myocardial infarction and stroke. Mortality from any cause is increased 2.26-fold in men and 2.78-fold in women with metabolic syndrome, independent of age, body mass index, cholesterol levels and smoking status.

A 2009 retrospective study<sup>12</sup> performed a 40-year follow-up of five men who, at the age of 20, voluntarily consented to three weeks of strict bed rest in 1966 to measure the impact of deconditioning. The men then went through eight weeks of heavy endurance training to help them recover from bed rest's deconditioning effect. In 2009, the now-60-year-old subjects were re-evaluated to compare the decline from 40 years of aging with that as a result of the three weeks of strict [bed rest](#). Over those 40 years, the subjects had a major decline in cardiovascular fitness and endurance: about 27 percent reduction in aerobic capacity attributed to a loss of fitness due to aging and comorbid conditions. The net loss of fitness with 40 years of aging among the men was, amazingly, roughly the same loss of fitness - 27 percent vs. 26 percent - they suffered with just three weeks of bed rest at age 20!

## Move More, Eat Less

So, the take-home message can be concisely expressed as, "Move more, eat less." This is clearly the basic formula for a healthy, long and functional life. This essential advice can also be integrated into our patient care, education and management as a primary directive for our patients. It is important for patients to understand that they cannot simply be passive and compliant, but must learn to accept responsibility for their health and function. They need to understand that many of their symptoms and much of their dysfunction are within *their* control, not the doctor's.<sup>13</sup> As chiropractors, we can adjust our patients, educate them and prescribe exercises for them, but they need to be active partners in the recovery and maintenance of their health.

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