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The Gravity of Weight

Smoking and Weight: Those "Burnt-out Ends of Smoky Days"

The burden of weight gain after smoking cessation

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T.S. photo by Ottoline Morrell, 1934.
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"A custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs," and with its "stinking fumes," it resembles the bottomless pit of the underworld's River Styx. So wrote King James 1st of England (*aka* King James VI of Scotland and after whom the King James version of the Bible was named) in his 1604 treatise *A Counterblast to Tobacco*. Ironically, though, King James noted that

the "unsavory" and "filthy custom" of smoking "refreshes a weary man," but also "makes a man hungry." Many people, though, (and particularly women) have used smoking to control their appetite and report that one major reason to continue smoking, despite serious medical morbidity and mortality, is the fear of gaining considerable weight when they stop.

My title phrase "burnt-out ends of smoky days" comes from T.S. Eliot's poem *Preludes*, written just about 100 years ago. Though Eliot, according to some critics, evokes the gritty alienation of urban life, he furnishes us with a poetic image for smoking cessation.

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Despite dire warnings by the Surgeon General, over 18% or more than 42 million U.S. adults continue to smoke, according to statistics from the Centers for Disease Control (CDC). Cigarette smoking and exposure to second-hand smoke kill more than 480,000 Americans a year.

Researchers have found that not only

does smoking impact cardiac and pulmonary functioning specifically, but it also has multiple effects on endocrine and metabolic functioning and has been associated with impaired adrenocortical functioning (e.g. decreased cortisol levels), thyroid disease (e.g. Graves disease), reduced fertility, insulin resistance, osteoporosis in post menopausal women, and even type 2 diabetes. (Berlin, 2009, *Current Medical Research and Opinions*.)

For years, researchers have known that smokers typically weigh less than nonsmokers and the majority who are able to quit do indeed gain weight when they stop. Back in 1982, for example, Judith Rodin and her colleague Jeffery Wack, writing in the *American Journal of Clinical Nutrition*, found that some smokers can actually consume several hundred more calories daily than nonsmokers. They speculated that nicotine resulted in less efficient storage of calories by changing the physiology of the gut (e.g. altering gastric motility or increasing the propulsive activity of the colon) or even by altering metabolism (e.g. increasing sympathetic activity and creating a thermogenic effect of increasing resting metabolic rate and burning more calories.)

Research on weight gain and smoking cessation, though, is often complicated. For one thing, tobacco contains thousands of other compounds and non-nicotine factors may contribute. Further, measures of smoking cessation and weight gain often come from self-report, rather than validated biochemically by either carbon monoxide in exhaled breath or by cotidine, a metabolite of nicotine and a biological marker of smoking, excreted in the urine. And data collected may be measuring what is called “point prevalence”—a “yes or no” response to smoking at a particular follow-up point—rather than measuring continued

abstinence. Studies, as well, may be so heterogeneous in design and follow-up periods that a true meta-analysis becomes impossible.

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Most researchers acknowledge there is great variability in the amount of weight gain after cessation, but younger ages, lower socioeconomic status, and heavier smoking are predictors of higher weight gain. (Filozof et al, *Obesity Reviews* 2004.) Weight gain seems also influenced by underlying genetic factors, as evidenced by twin studies where concordance for weight change is higher in monozygotic twins. The speculated mechanisms for weight gain post cessation include increased energy intake, decreased resting metabolic rate, decreased physical activity, and increased lipoprotein lipase activity, but the underlying increase in weight (and specifically fat accumulation) is not well understood. Another theory is that nicotine may facilitate the reinforcing properties of food, and this effect may persist long after the individual stops taking it (Donny et al, 2011, *Physiology and Behavior*.) The effect of nicotine on food reinforcement may be related to an interaction between cholinergic and dopaminergic systems that have a genetic contribution as well (e.g. reduced availability of D2 dopamine receptors in some people). In other words, there may be individual differences at both the neurobiological and behavioral levels.

How much weight do people gain? Aubin et al, writing in the *British Medical Journal* (2012) performed a meta-analysis of 62 randomized controlled studies that addressed weight gain in those who quit smoking and remained abstinent at one year. They found those who quit experience a mean weight gain of 4 to 5 kilograms (8.8 to 11 pounds) twelve months after quitting, with most weight gain occurring within the first three months of quitting—about 1 kilogram (2.2 pounds) a month— though the researchers found considerable variation: over the year, 16% actually lost weight; 37% gained less than 5 kilograms, 34% gained from 5 to 10 kilograms, but 13% gained more than 10 kilograms (22 pounds.) Interestingly, they noted that no study detailed how weight was measured (e.g. clothing worn; scales used.)

Many studies, often financed by pharmaceutical companies, have systematically reviewed interventions specifically targeting weight gain after quitting as well as those that were designed to help people quit. For example, varenicline (Chantrix), a partial agonist at nicotinic acetylcholine receptors that may block the

reinforcing action of nicotine, has been used. A study just published in *JAMA* (Ebbert et al, 2015) notes the effectiveness of varenicline in some of those who are not quite ready to quit but want to reduce their usage —a "reduce to quit approach." Farley et al (2012, *Cochrane Data Base of Systematic Reviews*) found that interventions like bupriopion (Wellbutrin), nicotine replacement therapy (e.g. nicotine patch, gum, spray), and varenicline do reduce post cessation weight gain in the short term while subjects take the medication, but this is not necessarily maintained at 12 months after smoking cessation.

Yang et al (2013, *Addictive Behaviors*) did a systematic review of pharmacological interventions for smoking cessation to prevent weight gain. In general, about 80% of those who quit gain weight in the U.S. They noted that use of approved smoking cessation medications double the likelihood of quitting smoking, and combinations are particularly effective. Bupropion in combination with nicotine replacement therapy was effective in reducing weight gain post cessation; naltrexone, an opiate antagonist, (used for both drug and alcohol cravings) in combination with buproprion has been found to decrease weight gain compared to mono therapy with buproprion alone.

More recently, Stadler et al, in the *European Journal of Endocrinology* (2014) examined the metabolic changes, including insulin resistance and increase in the orexigenic hormone neuropeptide Y (NPY) in a group of long-term smokers after three months of smoking cessation.These researchers suggest that treating insulin resistance with a medication used to treat type 2 diabetes, metformin, could be beneficial in avoiding weight gain after quitting smoking. Other methods, including exercise programs, cognitive behavioral therapy, and very low calorie diets have all had varying degrees of effectiveness in preventing or reducing post cessation weight gain.

Bottom line: The relationship between weight and smoking is a complex one, and weight gain after smoking cessation is not completely understood. For the majority of those predisposed, it may be an inevitable occurrence, though there is considerable variation in how much weight gain occurs; there are some pharmacological combined treatments that may lessen the amount. Concerns about potential weight gain should never be an excuse to continue those "smoky days." The benefits of smoking cessation far outweigh any risks from subsequent weight gain.

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About the Author

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In Print: *The Gravity of Weight: A Clinical Guide to Weight Loss and Maintenance*

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