

Fever: Suppress it or Let it Ride?

By Steve Paulus, DO, MS

There has always been a debate among doctors when fever—in the presence of an infection—should be reduced; if at all. There is no medically agreed upon definition of what is a normal body temperature or fever in human beings or how to best measure temperature. Body temperature measurements vary with the time of day, the anatomical location of measure, and with the type of thermometer.

Body temperature is finely controlled by a part of the brain called the hypothalamus, which acts as the master thermostat, keeping the core temperature of the vital organs constant within a narrow range. The sense of being cold or hot comes from temperature sensors in nerve endings scattered throughout the body. The hypothalamus receives all of this data and initiates adjustments by making physiologic changes like shivering to warm up, or sweating to cool down. Also initiated are behavioral changes like putting on a sweater or turning up the air conditioning depending upon the ambient temperature. At any given time, your skin temperature may be 10 degrees cooler or warmer than your vital core temperature. The ultimate goal is to keep the core temperature about the same all the time.

But what about fever? A fever is a common sign of most infectious diseases, but a fever is not necessarily a bad thing. Fevers play a key role in fighting infections.

For centuries doctors have recognized the benefit of fevers in fighting infections. The 17th-century English physician, Thomas Sydenham, often called “the English Hippocrates,” stated, “Fever itself is Nature's instrument.” Sydenham is credited with the aphorism, *Primum non nocere* or *First do no harm*. He recognized that within the ecology of human physiology, fever is a powerful instrument in the fight against infectious diseases.

Before we dive into the depths of fever management, we need to discuss, what is a normal body temperature? Normal human body temperature varies depending upon sex, age, race, body mass index, time of day, season of the year, exertion level, presence or absence of menstruation, health status, waking vs. sleeping, hunger, and emotions. No person always has exactly the same temperature at every moment of the day. Temperatures cycle regularly up and down through the day, based upon circadian rhythms. Our lowest temperature occurs between 3-6 AM and in general, our highest daily temperature occurs between 3-6 PM. The difference between the low (in the early morning) and the high (in the late afternoon) can be up to 1° Fahrenheit. The term, *basal body temperature* refers to the lowest body temperature attained during rest (usually during sleep). It is usually estimated by a temperature measurement immediately after awakening and before any physical activity has been undertaken.

Temperature is recorded in five dominant anatomic regions: oral, rectal, axillary (arm pit), ear drum, or cutaneous (skin) surface temperature commonly measured at the forehead. The most accurate measurement is a rectal temperature and the least accurate is a skin surface temperature. The old average temperature of 98.6° Fahrenheit is based upon the standard of an oral temperature reading. A normal rectal temperature is 1° higher—99.6°. A normal axillary temperature is 1° lower—97.6°. Ear drum temperatures are calibrated to adjust the device to an oral equivalent, so an adjustment is not needed. Skin surface temperatures recorded with an infrared “temperature gun” are NOT reliable and have a high proportion of false-positive results. (*Emerging Infectious Diseases*, 2008, 14(8), 1255-1258).

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Our antiquated assumption that 98.6° is the average “normal” temperature for all humans for all ages, for men vs. women is wrong. Several large studies over the past 20 years have questioned the 98.6° average. The British Medical Journal in 2017 found that a more modern and accurate “average” should be 97.8°. (*British Medical Journal*. 2017 December 13; 359: j5468).

The typical span of a “normal” temperature (plus or minus 1°) could then range between 96.8° to 98.8°.

Let’s go back to fever. What is the definition of a fever? Believe it or not, there is not a single agreed upon upper limit for normal temperature, demarcated as a fever. Varied sources have ranging values for the start of a fever between 99.0° and 100.9° in humans!

Then there is the question of a what is a low-grade fever or a high-grade fever? Low-grade fevers tend to range from about 99.0° to 101.0°. A temperature between 101° to 102° is commonly considered an intermediate-grade for adults. High-grade fevers range from about 103° to 104°. Dangerous fevers are >104°. These are generally accepted fever ranges. They are not rigidly defined in medicine.

Of course, these fever ranges differ depending upon the time of day (to use just one obvious variable). If we trust the British Medical Journal (and I do) then what if our average body temperature is 97.8°? Then, in the presence of an infection, an early morning temperature of 98.8° could very well be a low-grade fever. But an early afternoon temperature of 99.8° may very well be defined as not being a fever.

What if you are elderly? There is an expression in medicine, “older is colder.” In one study, people over the age of 70 years old in nursing homes had a 6 AM temperature average of 97.3° and at 4 PM only increased 0.1° to 97.4° and at 10 PM to 97.8°. (*Journal of the American Geriatrics Society*, 2005 December; 53(12): 2170-2) These findings make fever determination in the elderly even more confusing. Thus a morning temperature in an 80 year old of 100.3° might be an intermediate-grade fever demanding an aggressive approach.

What about menstruating women? Body temperature is sensitive to many hormones, so women have a temperature rhythm that varies with their menstrual cycle and is called a circamensal rhythm. A woman’s basal body temperature rises by about 0.5° upon ovulation. A woman with a normally high average body temperature of 98.8° who is now ovulating, may then have a normal non-infection temperature of 99.3°. Her definition of a low-grade fever may not start until a temperature of 101.3°.

Hormonal contraceptives suppress the circamensal rhythm and raise the typical body temperature by about 1.1°. I will let you do the math regarding this pharmacologic variable.

Now, let’s go back to the subtitle of this article, ***Fever, suppress it or let it ride?*** There are two basic schools of thought:

#1 **Maladaptive Model of Fever Management:** Fever should ALWAYS be suppressed because the negative costs outweigh its potential physiologic benefit in an already stressed patient.

#2 **Adaptive Model of Fever Management:** Fever is a protective adaptive response that should be allowed to run its course under selected circumstances. This approach is often referred to as the “let it ride” medical philosophy. The scientific literature is increasingly pushing the pendulum away from the knee-jerk automatic medical treatment response of treating every fever no matter what the temperature. (*New England Journal of Medicine* 2015; 373: 2215-24). Of course that also depends on how we define fever and how we define an average temperature and how we incorporate temperature variables.

Many studies have found that if people are infected with a viruses or bacteria bringing their fevers down—with ibuprofen, aspirin, or with acetaminophen—their symptoms commonly are extended and they continue to shed virus for a longer time, remaining contagious for longer periods. (*JAMA*, 1975 March 24; 231(12):1248-1251). Other studies show that automatic use of aspirin or acetaminophen in treating fevers associated with the common cold to cause suppression of immune response, increased viral shedding (more contagious and for a longer time), increased overall symptoms. (*Journal of Infectious Diseases*, 1990 December: 162(6): 1277-82 and *Journal of Thoracic Diseases*. 2015 December; 7(12): E633-E636).

Basically, patients may be more comfortable by lowering fever range temperatures, but this maladaptive approach can short-circuit the body’s main defense against infection. **There is strong theoretical scientific evidence that ALL FEVER-REDUCERS—including acetaminophen—may suppress an immune response, increase viral shedding, and extend symptoms in patients ill with the coronavirus.**

Fever creates a beneficial thermal stress reaction upon the body causing an elaborate cascade of immunologic benefits. Fever has a protective role. It confers a survival benefit upon a patient that outweighs the metabolic costs of elevating the core temperature. (*Nature Review Immunology*. 2015 June; 15(6): 335-349).

Now let’s set some limits. For adults, if your temperature is up to 102° then DO NOT take a fever reducer of any kind. The treatment is, rest and drink plenty of fluids. Call your doctor if the fever is accompanied by a severe headache, stiff neck, shortness of breath, or other unusual signs or symptoms.

BEWARE of hidden forms of fever reducers. Most over-the-counter (OTC) cough and cold medications also contain acetaminophen or ibuprofen. You must read labels before you take any OTC drug. And by the way, OTC cough and cold remedies DO NOT shorten the duration of an infection, decrease how contagious you are, or offer any real medical benefit. They only treat the symptoms. They do not treat the disease. I do not recommend taking OTC cough and cold remedies for colds, influenza, or for coronavirus.

If your fever is greater than 102° and you are unusually uncomfortable then take a *maximum* of 650 mg of acetaminophen up to four times per day. Please do not exceed this dose. If a little is good more is not better. In the case of coronavirus DO NOT use ibuprofen or similar medications. Call your doctor if the fever doesn't respond to the medication, is consistently >103 F, or lasts longer than three days.

People who have become patients mistakenly think that taking a fever reducer or OTC cough and cold drug means that they are taking care of themselves. That is an erroneous assumption. I would suggest that taking these drugs in the presence of an infection is actually causing harm.

It is my professional gut feeling, that for a person infected with the coronavirus who has a low-grade or intermediate-grade fever that it is best to use an Adaptive Model of Fever Management and AVOID reducing a fever with ANY form of medication.

Let us use reason not fear to let the body holistically and naturally fight off infections. In summary, let the fever do its job and embrace the “Let it Ride” medical philosophy.