By Stefan A. Science Editor

What is the Heat?

And how does the human body react to it?

Temperature can have an unlimited increase but it cannot drop below -273.15o C (0 absolute). Every minute, each square cm of the Earth's surface receives about 2 calories from the Sun. The human body too produces heat, following the burning of organic chemicals. In 1620, Francis Bacon stated that movement is the origin of the heat. One century later, Ludwig Boltzmann discovered that heat is the effect of the movement of the molecules vibrating in all directions. That's why our skin is warmer than a piece of frozen meat: skin molecules are more active, transmitting this state to neighboring molecules. When we introduce an iron bar into a fire, its molecules start to agitate progressively, transmitting this movement from one to another, from those closer to the fire to the distal ones. Metals have a rigid structure, and movement space of the molecules is limited; vibrations are transmitted through conduction electrons, which move freely through the crystalline network. The more electrons are, the more rapid the energy transmission is, and the material will be a better heat conductor. Instead, human skin and wood are practically devoid of conduction electrons and the heat accumulates, causing oxidations and burning. If we keep heating the iron bar into the fire, the vibrations will turn so strong, that they will break atomic bounds, at the melting temperature of the metal. At 4,000o C, atoms separates from their electrons, and at 1 billion degrees Celsius, the atoms itself separates into neutrons and protons. Heat cannot be dissociated from matter because it determines its physical state. There are practically no upper limits of the heat, which can reach values of 100 billion degrees C, like in the case of the supernova explosions or 100 million degrees C inside the Sun. Nuclear fusion takes place at 140 million degrees C. At 0 absolute (-273.15o C), any molecular movement stops, fact confirmed by the quantum physics. When we make the minimum effort, we dissipate energy as heat. In the case of the engines, just 20 % of the energy is used for functioning, the rest being spread as heat. This continuous process of energy degradation will lead the Universe's energy to zero. The phenomenon is called entropy. Heat is not transmitted only through conduction. Sun is found at 150 million km (92 million mi) away, but it heats the Earth via electromagnetic waves, each one with a different frequency, interacting with the environment and with the human body. UV rays cause tanning, but the IR (infrared) waves produce heat similar to the way the microwave oven produces heat. Even the human body emits heat as IR waves. Earth's atmosphere acts like a protective shield, but also like a heat accumulator. Otherwise, Earth's average temperature would be of about -33o C. But the temperature does not decrease uniformly with the altitude. In the upper troposphere (10 km (6 mi)), temperature is about -60o C, but in the stratosphere (10-50 km or 6-30 mi), the temperature inversion due to the ozone raises its values to 0o C. The ozone layer absorbs part of the sun radiation, releasing it as heat. In the mesosphere (50-80 km or 30-50 mi), the presence of a secondary ozone layer raises temperature to 2,000o C. How does the human body react to various values of the heat?1o C The human blood freezes.14.2o C The minimal temperature required by the human body for survival.36.5-37.2o C The temperature the human body must maintain, no matter the value of the external temperature.42o C The proteins of the body start coagulating.49o C At this value, the human skin starts burning.101o C At this value, the human blood boils.205o C The maximum temperature stood by a naked body.260o C The maximum temperature stood by a dressed body.300o C Spontaneous combustion of the human body.