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Effects of temperature on blood circulation measured with the laser Doppler method.

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Abstract

The effects of local heating or cooling on skin microcirculation in volar aspect of human forearms was studied using laser Doppler flowmetry. When the skin was heated to 40 degrees C from a normal temperature of 32 degrees C, red cell flow (laser Doppler flow, blood flow) momentarily increased several fold and then temporarily decreased. The flow subsequently resumed a gradual increase reaching 10-15 times that of control in 30-40 min. When the skin temperature was returned to 32 degrees C after 60 min of heating, the blood flow momentarily declined but soon increased for several minutes before it began its major descent. When cooled from 32 degrees C to 5 degrees C, the flow momentarily decreased, but soon increased, surpassing the pre-cooling level. The flow began to decline when the cooling was prolonged for more than 15-20 min. The changes in flow corresponded well with the changes in number (volume) and speed of red cells. Laser Doppler flowmetry was found to be very useful for continuously monitoring microcirculatory blood flow in human skin.

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