

SensorTouch™ Temporal Artery Thermometry

Illustrating Measurement Principles with High Resolution Infrared Imaging

In an investigation of the validity of the temporal artery area as a temperature measurement site, several hundred subjects were thermographed for observation of perfusion patterns, using a high resolution infrared camera. Examples are presented here in support of the method, as they graphically depict the various perfusion patterns encountered using the temporal artery method of temperature assessment. An acronym, *Roy G. Biv*, designates the colors in descending order of

Hot **R** **O** **Y** **G** **B** **I** **V** Cold
 Red, orange, yellow, Green, Blue, indigo, violet

VASODILATION

Figures 1 and 2 illustrate vasodilation, as evidenced by the red areas. Note the domination of the temporal artery. Vasodilation is the condition under which the neck and the area behind the ear receive perfusion necessary for the measurement as well as the



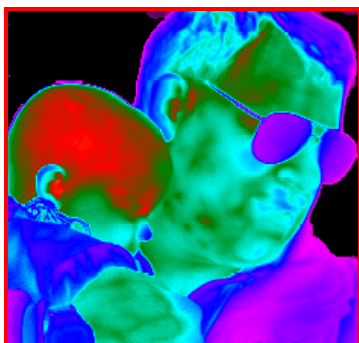
1. Vasodilation in an adult



2. Vasodilation in a child

of perfusion in the neck area is of interest as it allows the area to be used as an alternative measurement site when the temporal artery area is not easily accessible, in the presence of head trauma, dressings, or excoriations on the head, conditions normally sustaining a high rate of perfusion.

In infants, the normal rate of perfusion is high, evidenced by the large red area on the infant's head in Figure 3. Both the father and infant had just entered from the cold outdoors, accounting for the blue color of the infant's nose and ears, the father's ear and hair. Only a short time inside, it is of interest that the TA area has already equilibrated, showing no effect from the cold, and in a substantially shorter



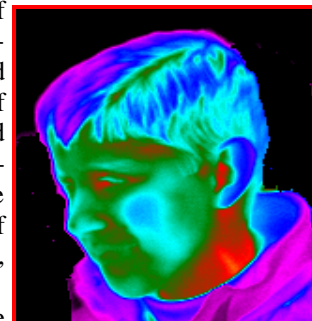
3. Vasodilation in the infant, vasoconstriction in the father.

time than would be possible with other temperature measurement sites. This is a significant benefit for emergency medicine and

frequently taken immediately, as a cold environment can easily mask a fever with other the

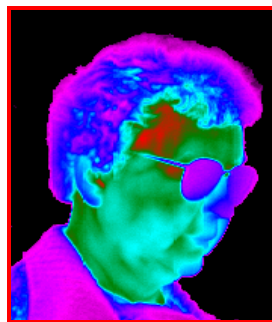
The father in Figure 3 is vasoconstricted, however, there is sufficient perfusion at the temporal artery area to make the measurement, as evidenced by the red area. Note the absence of any visible heat in the neck area. When vasodilation is not present, the perfusion rate behind the ear is too low and variable to give an accurate measurement.

Figure 4 is a good example of the effect of evaporative cooling of diaphoresis, evidenced by the green and blue color of the forehead and head. The red neck area, extending up to behind the ear lobe, illustrates the perfusion present as a result of vasodilation. Vasodilation, which always precedes diaphoresis, provides this area the high rate of perfusion required for accurate measurement.

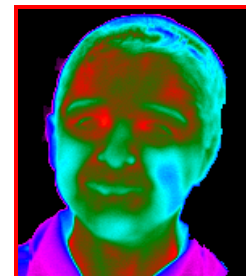


4. Diaphoresis

Figures 5 and 6 illustrate normothermia. The expected pattern, and variable perfusion in the neck area are visible on the boy.



6. Normothermia in an adult



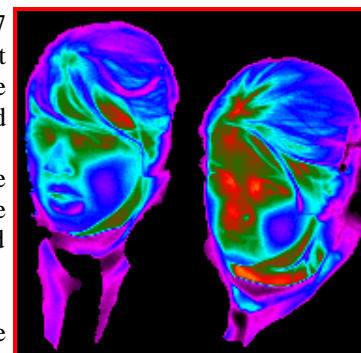
5. Normothermia in a child

lateral view of the woman. Note the heat at the ears of both subjects and on the neck area of the

The twin girls in Figure 7 illustrate totally different thermal patterns. The twin on the left presented

normal body temperature and feeling fine, but the twin on the right presented

a headache and a very sore



7. Twins: afebrile (left), febrile (right).