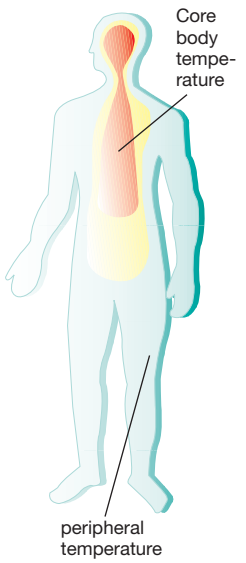
Where should body temperature be measured?

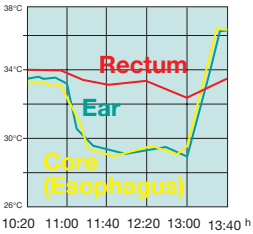


What is the ideal body temperature measurement?

The optimal thermometer would measure core body temperature, which is the temperature of the vital organs such as heart and brain.[1] Needless to say, these sites are not easily accessible for temperature measurement at home or in a doctor's office. This is why other, more accessible sites for temperature measurement have been identified. In a non-critical medical setting, or at home, temperatures are commonly taken at the following body sites: mouth, axilla (underarm), rectum, and ear.

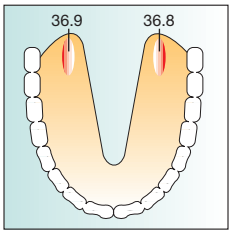
What is the best site to measure human body temperature?

Parents and medical professionals have a range of sites to choose from: axilla (underarm), mouth, rectum, temple/forehead and ear. Each site has a number of advantages and disadvantages. But regardless of the site, or the thermometer used, the right technique is crucial to obtain an accurate body temperature.



Rectum

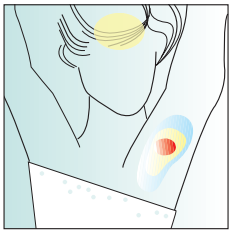
Measuring temperature in the rectum has been common practice both for doctors and parents for decades. However, rectal temperatures may lag behind changes in core body temperature, and therefore may be slow to reveal important temperature changes.[2] This is due to the distance between the heart/brain and the rectum and due to the heat producing activity of microorganisms in the rectum. Another disadvantage is that temperature measurement in the rectum can take several minutes and can cause discomfort. This method also bears potential risk for cross-contamination and bowel perforation.[3]



Mouth

Measuring temperature in the mouth can reflect core body temperature, if the proper technique is applied.[4] However, taking an oral temperature is not easy. The thermometer should be placed in one of the sublingual pockets underneath the tongue. Oral temperatures can be influenced by a variety of external factors, such as an open versus closed mouth, recent eating or drinking, or breathing.[4,5,6,7] It also takes several minutes and requires cooperation from the individual whose temperature is being taken. For that reason it is often not possible to use on small children.

Skin (e.g. axilla, forehead)



Although very convenient, skin temperatures measured under the arm or at the forehead are not reliable indicators of core body temperature.[8,18,19] This is because the body uses the skin to regulate internal body temperature. Especially the phases of temperature increase and decrease, which are so important medically, can only be judged with reservation by measuring skin temperature. For example, when core body temperature is decreasing, the body often reacts by perspiring or releasing heat via the skin to lower core body temperature. When fever is increasing the body often reacts by shivering or drawing in heat from the skin to increase core body temperature.[18,19] Skin temperature are further influenced by factors such as fever lowering medication and external temperature.[18,19]

Ear

Although a new technology, ear temperatures are clinically proven a reliable indicator of core body temperature.[2] The tympanic membrane, also called the eardrum, is located close to and shares blood supply with the hypothalamus, the body's temperature control center. Changes in core body temperature are reflected at the eardrum without a significant time lag.[9] The ear is an easily accessible site for measuring body temperature, and especially comfortable for "uncooperative" patients such as young children.

How do infrared thermometers work?

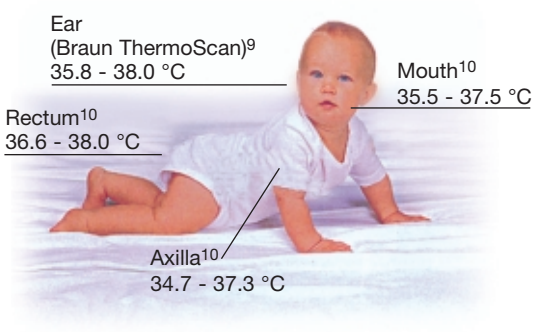
Infrared thermometers measure thermal heat generated by surfaces and cavities. Infrared sensors are not able to measure the heat or temperature below the surface. The most common type of infrared thermometers are ear thermometers. They measure the heat generated by the eardrum and surrounding tissue. Other types of infrared thermometers measure temperatures at other sites, such as the forehead or the axilla. They measure the infrared heat produced by the skin at these sites.

How should temperature readings be evaluated?

Is fever present at 37°C and above?
Not necessarily. Just as there is no single normal value that applies to everyone for pulse rate or blood pressure, there is no universally applicable normal body temperature.
Body temperature varies from person to person, fluctuates throughout the day and changes with age. Practice taking temperatures on healthy family members at different times of the day to determine their normal ”baseline” temperature. When consulting a doctor, inform him/her of the individual’s baseline temperature as an additional reference point.

Why do temperature readings obtained at different body sites vary from one another?
Temperature is not the same throughout the body. Readings taken under the arm are often lower and those taken in the rectum are often higher than ear temperatures.

Studies have identified the following normal ranges of body temperature for traditional sites for temperature taking:



The normal ranges of temperature readings taken in the ear with the Braun ThermoScan by age are:

Age	Braun ThermoScan Normal Range
0-2	36.4 - 38.0 °C
3-10	36.1 - 37.8 °C
11-65	35,9 - 37,6 °C
>65	35,8 - 37,5 °C

Important: If you communicate a Braun ThemoScan temperature reading to a doctor, indicate that this is an ear temperature.

Is taking the temperature in the ear accurate?

How reliable are ear temperature readings with Braun ThermoScan?

Very reliable. Over 30 clinical tests, with more than 4,600 patients of all ages have demonstrated the accuracy, efficacy and safety of Braun ThermoScan ear thermometers.
Ear temperature measurement using infrared technology has changed the habits of thousands of medical professionals and millions of parents. Last year, over 250 million temperatures were taken in doctor's offices and hospitals with Braun ThermoScan professional ear thermometers.
However, as with any temperature taking method, proper technique is necessary to obtain accurate results.

Why does one sometimes obtain different readings when taking several temperature within a short period of time?

With any type of thermometer, slight temperature variations (+/- 0.2/0.3°C) can occur between readings. These variations are usually not apparent with traditional methods, as the temperature is only measured once and not repeated.
If experiencing variations of more than 0.3°C between readings please check to make sure that:
1. lens of thermometer is clean and not damaged
2. a new, clean lens filter is attached
3. that proper measuring technique is being used, specifically that you are performing an ear tug, and that the probe is inserted snugly into ear canal.

A correct ear tug allows a clear view of the eardrum, helping ensure an accurate reading

Note: When using a Braun ThermoScan in the following situations, it is recommended to take three temperatures in the same ear, and use the highest reading.
1. Infants in the first 90 days of life.
2. Children under three years of age who have a condition such as a compromised immune system and for whom the presence or absence of fever is critical.
3. When you are first learning to use the ear thermometer until you are comfortable with the technique and are obtaining consistent readings.

Can the temperature in the right ear vary from the temperature in the left ear?

Yes, the temperature can vary slightly as the body is not completely symmetrical. Generally, the difference is not greater than 0.3°C.[11] But each body site has variables unique to that site, which influence the body temperature measured. For that reason, it is advised that temperature readings should always be taken in the same ear.

Is taking the temperature in the ear accurate?

Is ThermoScan accurate when used on children under 12 months?

Yes. Braun ThermoScan is clinically proven accurate, safe and effective for all ages.[10,12] While the probe tip may not fit into the ear canal of newborns, clinical studies have shown that with careful technique, an accurate temperature can be obtained even on this age group, by covering the entry of the ear canal with the probe.[10] The probe tip has been designed to eliminate the risk of damage to the eardrum, regardless of the age of the patient.

Is the Braun ThermoScan accurate when used on a child with an ear infection (otitis media)?

Yes. It has been demonstrated that the presence of otitis media has only a small, clinically insignificant effect on the temperature measured.[13]

Does ear-wax influence the accuracy of Braun ThermoScan?

No, it does not. Clinical tests have proven that normal levels of ear-wax have no significant impact on temperature readings with the Braun ThermoScan.[10,14]

Can parents use the Braun ThermoScan as accurately as a pediatrician or a nurse?

The Braun ThermoScan is clinically proven so easy-to-use that parents can handle it as accurately as medical professionals.[15,16,17]

1. Shinozaki T, Deane R, Perkins F; "Infrared Tympanic Thermometer: Evaluation of a New Clinical Thermometer"; Critical Care Medicine; 1988; 16:148-150
2. Terndrup T; "An Appraisal of Temperature Assessment by Infrared Emission Detection Tympanic Thermometry"; Annals of Emergency Medicine; 1992; 21: 92-100
3. Schuman A; "The Accuracy of Infrared Auditory Canal Thermometry in Infants and Children"; Clinical Pediatrics; 1993; 347-354
4. Erickson R, Meyer L; "Accuracy of Infrared Ear Thermometry and Other Temperature Methods in Adults"; American Journal of Critical Care; 1994; 3:40-54
5. Beck W, Campbell R.; "Clinical Thermometry"; The Guthrie Bulletin; 1975; 44:175-194
6. Tandberg D, Sklar D; "Effect of Tachypnea on the Estimation of Body Temperature by an Oral Thermometer"; The New England Journal of Medicine; 1983; 308:945-946
7. Terndrup T, Allegra J, Kealy J; "A Comparison of Oral, Rectal, and Tympanic Membrane-Derived Temperature Changes After Ingestion of Liquids and Smoking"; American Journal of Emergency Medicine; 1989; 7:150-154
8. Kresch M; "Axillary Temperature as a Screening Text for Fever in Children"; The Journal of Pediatrics; 1984; 104: 596-599
9. Chamberlain J, Terndrup T, Alexander D, Silverstone F, Wolf-Klein G, O'Donnell R, Grandner J; "Determination of Normal Ear Temperature Using an Infrared Emission Detection Thermometer"; Annals of Emergency Medicine; 1995; 25: 15-2010.
10. Chamberlain J, Terndrup T, "New Light on Ear Thermometer Readings"; Contemporary Pediatrics; 1994; 14:66-73
11. Leithäuser D; "Erfahrungen zur Seitendifferenz bei der Temperaturmessung mit dem Braun ThermoScan"; published in Internet http://www.zieleit.de; 1999
12. Silverstone F, Wolf G; "Ear Temperature - A Clinical Modality in the Elderly." Abstract presented 1992
13. Kelly B, Alexander D; "Effects of Otitis Media on Infrared Tympanic Thermometry"; Clinical Pediatrics; 1991; 30: 46-48
14. Castle S, Toledo S, Daskal L, Norman D; "The Equivalency of Infrared Tympanic Membrane Thermometry with Standard Thermometry in Nursing Home Residents"; Journal of the American Geriatrics Society; 1992; 40:1212-1216.
15. Alexander D, Kelly B; "Consumer Use of Tympanic Thermometry: Is It Reliable?"; Presented at the 32nd Meeting of the Ambulatory Pediatric Association;,1992.
16. Trygstad C; "Parents First Time Use of an Ear Thermometer"; Unpublished data; 1995
17. Rulf W; "Evaluation Study in the Pediatric Office"; Der Kinderarzt, 1998; 12:1382-1386
18. Gagge AP Gonzalez RR. Mechanisms of heat exchange: biophysics and physiology, 1996. Handbook of Physiology Section 4: Environmental Physiology Volume 1. Oxford University Press, 157-185.
19. Greger R Windhorst U. 1996. Comprehensive Human Physiology: From Cellular Mechanisms to Intergration, Berlin: Springer, 2199-2206.

What is the correct technique for using a Braun ThermoScan ear thermometer?

Four easy steps for using your Braun ThermoScan

1. Make sure a new clean lens filter is attached. A dirty lens filter can result in low, inaccurate temperature readings.

2. Press „on" button.

3. Perform an ear tug to ensure the thermometer has a clear view of the eardrum.
The ear canal has a natural bend in it. As light, and that is exactly what infrared heat is, cannot travel around corners, the "ear tug" is necessary to straighten the ear canal.
This helps ensure that the probe tip has a clear view of the eardrum and that an accurate reading is obtained.

Children under 1 year: pull gently straight back.
Children 1 year to adult: pull gently up and back.

4. Fit probe snugly into the ear canal as far as possible. Aim towards opposite eye (children under 1 year) or slightly in front of opposite ear (1 year to adult). When correctly positioned, fully depress the activation button and hold for one full second.

Section 4

What is the correct technique for using a Braun ThermoScan

An obstructed view of the eardrum causes incorrect readings

Why does the ”ear tug” have to be performed?
The ear canal has a natural bend in it. As light, and that is exactly what infrared heat is, cannot travel around corners, the ”ear tug” is necessary to straighten the ear canal. This helps ensure that the probe tip has a clear view of the eardrum and that an accurate reading is obtained.

What is the correct way to perform the ear tug?
- In children over the age of 1 year and adults: pull the outer ear up and back. In babies and children under 1 year: pull the outer ear straight back.
- Maintain the ear tug until after you have released the activation button.

A correct ear tug allows a clear view of the eardrum, helping ensure an accurate reading

How does one know when the thermometer is correctly positioned in the ear?
The probe tip should be:
1. carefully inserted as far as possible into the ear canal (the probe tip is designed so that it cannot touch or damage the eardrum)
2. consistently positioned for each reading to help ensure consistent readings.
If initially one is unsure of the technique, we recommend that to practice, one takes three separate measurements in the same ear and use the highest reading.

Why must a new, clean lens filter be used for each measurement?
- Use of a new, clean lens filter helps ensure an accurate reading. A dirty lens filter can result in low, inaccurate temperature readings.
- Protects the delicate lens of the thermometer from damage. A damaged lens can result in inaccurate readings.
- Helps ensure hygiene.

Section 5

Other questions

Is the Braun ThermoScan IRT 3000 also suitable for hospitals and medical practices?
No. For medical care facilities a special Braun ThermoScan product range is available which has been designed to meet the special requirements of medical professionals in terms of accessories and durability.

Where can I obtain answers to any queries I have about Braun ThermoScan?
Please call the local Braun Infoline: 000-000000 (to be inserted by each country)

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Key facts about body temperature and ear thermometers.