Medical Research

# **Heart Rate**

## **Normal**

Heart Rate – Resting [1]

· Newborns 0 to 1 month old: 70 to 190 beats per minute

· Infants 1 to 11 months old: 80 to 160 beats per minute

· Children 1 to 2 years old: 80 to 130 beats per minute

· Children 3 to 4 years old: 80 to 120 beats per minute

· Children 5 to 6 years old: 75 to 115 beats per minute

· Children 7 to 9 years old: 70 to 110 beats per minute

· Children 10 years and older, and adults (including seniors): 60 to 100 beats per minute

· Well-trained athletes: 40 to 60 beats per minute

Heart Rate – Exercise [1]

|  |  |  |
| --- | --- | --- |
| **Age (years)** | **Target heart rate zone at 50 to 85 percent exertion (bpm)** | **Average maximum heart rate at 100 percent exertion (bpm)** |
| 20 | 100 to 170 | 200 |
| 30 | 95 to 162 | 190 |
| 35 | 93 to 157 | 185 |
| 40 | 90 to 153 | 180 |
| 45 | 88 to 149 | 175 |
| 50 | 85 to 145 | 170 |
| 55 | 83 to 140 | 165 |
| 60 | 80 to 136 | 160 |
| 65 | 78 to 132 | 155 |
| 70 | 75 to 128 | 150 |

## **Abnormalities**

· Tachycardia – Heart beats too fast

· Bradycardia – Heart beats too slow

· Ectopic Beats – These are extra beats, and these are usually common and harmless. If these are a concern, get an electrocardiogram (ECG) done to assess the heart rate and the rhythm. [1]

· Arrhythmia – All the 3 above essentially. Prolonged arrhythmia means the person should visit a doctor

· Weak or absent pulse – Emergency

## **Predictions**

· Bradycardia (slow heart rate) can be a sign of disease, such as: [4]

* + heart attack or other heart disease (such as "sick sinus syndrome")
  + certain infections (including Lyme disease or typhoid fever)
  + high levels of potassium in the blood (hyperkalemia)
  + an underactive thyroid gland.

· Tachycardia (a fast heart rate) can be a sign of: [4]

· most infections or just about any cause of fever

· heart problems, for example cardiomyopathy (in which the pumping function of the heart is reduced), atrial fibrillation, or ventricular tachycardia

· certain medications (such as an EpiPen)

· low levels of potassium in the blood (hypokalemia)

· an overactive thyroid gland or too much thyroid medication

· anemia

· asthma or other breathing trouble.

· A slow increase in heart rate (< 70BPM to > 85BPM of resting rate over 10 years) are twice as likely to die from heart disease. A decrease in heart rate over time leads to less risk of heart disease.

AI:

<https://nevonexpress.com/Heart-Attack-Prediction-Using-Artificial-Intelligence.php>

<https://www.researchgate.net/publication/306523633_Predicting_Heart_Attacks_in_Patients_Using_Artificial_Intelligence_Methods>

# **Oxygen Saturation**

· Oxygen saturation (SaO2 is the fraction of [oxygen]-saturated hemoglobin relative to total hemoglobin (unsaturated + saturated) in the blood. Measured with a pulse oximeter

· Partial pressure of Oxygen (PaO2) is a measurement of how well oxygen moves from the lungs to the blood.

## **Normal**

· SaO2 of between 94% and 100% [6]

o However, it isn’t uncommon for people with severe COPD to maintain their pulse ox levels between 88 to 92 percent

· PaO2 of between 75-100 mmHg [6]

o Both of the above measured at sea level. If > 3000 feet then oxygen drops

## **Abnormalities**

· Hypoxemia is oxygen below the normal levels

## **Predictions**

· A low oxygen level is a result of the following issues: [7]

o COPD (including chronic bronchitis and emphysema)

o acute respiratory distress syndrome

o asthma

o collapsed lung

o anemia

o congenital heart defects

o heart disease

o pulmonary embolism

# **Temperature**

## **Normal**

· Orally, a normal body temperature is 37o +- 0.6o. [8]

· Ear temperature will be slightly higher, armpit temperature is lower [8]

· Menstruation can affect temperature as well [8]

## **Abnormalities**

· Fever occurs when temperature is >= 37.6 in mouth, or 38.1 in ear

<https://www.quora.com/Why-isn%E2%80%99t-continuous-body-temperature-measurement-a-feature-on-current-fitness-bracelets-or-smart-watches-as-far-as-I-can-tell>

Citations

[1]<https://www.medicalnewstoday.com/articles/235710.php>

[2]<http://healthland.time.com/2011/12/21/how-your-pulse-can-predict-your-risk-of-death/>

[3]<https://medlineplus.gov/ency/article/001101.htm>

[4]<https://www.health.harvard.edu/heart-health/hows-your-heart-rate-and-why-it-matters>

[5]<https://www.americannursetoday.com/wp-content/uploads/2014/12/ant1-CE-Oxyhemogglobin-1219.pdf>

[6]<https://medlineplus.gov/ency/article/003855.htm>

[7]<https://www.healthline.com/health/normal-blood-oxygen-level#oxygen-levels>

[8]<https://www.healthlinkbc.ca/medical-tests/hw198785>