

## Introduction

This pamphlet is designed to explain and define brain damage and brain death

## Brain Damage

In the brain damaged patient the brain has been partially injured but some of it is at least initially still alive. Some areas are still supplied with blood and can function. A person with brain damage may be in a coma or have some degree of disability. They may be able to breathe on their own or need help.

## Brain Death

Brain death occurs when all functions of the brain stop irreversibly.

Brain death happens when the vital control centres of the brain have died due to loss of blood flow to the brain.

When there is a very bad brain injury, stroke or bleeding into the brain there is swelling that causes raised pressure inside the skull. There are only limited ways to try to control this pressure. The increasing pressure reduces the flow blood to the brain, and eventually the oxygen supply to the brain is inadequate. After a few minutes the brain cells die and cannot regenerate or recover.

The brain stem is the part of the brain that controls consciousness, breathing, heart rate, blood pressure and temperature. When this dies a person cannot breath, will never be

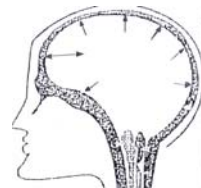
File: Brain Damage and Brain Death

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aware of surroundings, feels no pain, cannot see, hear, talk, smell, cough or swallow, and will never recover. In reality the person has died.



Blood flow to the brain  
Normal Brain



No blood flow to the brain  
Swollen Brain

The brain becomes so swollen that the blood supply cannot continue.

How can it be shown that a person's brain has died?

### Brain death test

Brain death is diagnosed by a series of tests that examine the function of the brain stem.

The patient is assessed for:

- Unconsciousness, meaning that there is no movement response of any type to speech or to pain.
- Ability to breathe. The patient is taken off the ventilator (breathing machine) but still given oxygen for 10 to 20 minutes, and observed for any signs of breathing.
- Reaction of pupils. A light is shone into the patient's eyes to see if the pupils shrink in response to light.

- Cranial (head) nerve responses, the patient is assessed for the absence of
  - A cough or gag reflex,
  - Eye movement on injection of cold water into the ears (in a non-braindead person this makes the eyes flick from side to side very quickly).
  - Blink reflex when the eyeball is touched.

These tests are undertaken after a period of observation; the tests are completed by two doctors at different times. If both tests confirm that the brain is dead the time of the second test is documented as the legal time of death.

The ventilator (breathing machine) is used initially to keep the person breathing until the extent of their brain injury is assessed. If a brain dead person is not ventilated, because they would not breathe, their heart would stop. Although the brain is dead, as long as the heart receives oxygenated blood it keeps beating.

The spinal cord may still allow some reflex movements like a "knee jerk." This type of movement occurs from nerves in the body interacting with the spinal cord without any of the messages being processed through the brain. It is not related to pain. The pain is not sensed when a person's brain is dead.

The nurses and doctors realise how difficult it can be to understand brain death. Usually

Understanding Brain Damage and Brain Death  
death is recognised by the absence of a heart  
beat or breathing.

In the case of the brain dead patient he or she  
looks no different, appears to be breathing  
and there is a heart beat on the monitor. It is  
important to understand that the ventilator is  
breathing for the patient and when it is taken  
away, there will be no breathing and shortly  
afterward there will be no heart beat.

If long-acting sedative medicine have been  
given or of there is extensive face or skull  
injury making parts of the brain death test  
impossible to perform, a cerebral angiogram  
(a type of xray) may be used to look at  
whether there is blood flow to the brain. If  
there is no blood flow, the brain has died.

If you have any questions do not hesitate to  
ask the nurse or the doctor. You may wish to  
see the brain scan or observe the second  
brain death test.

### **Please ask questions**

**It is important for you to  
understand very clearly  
what has occurred.**

References: DCCM Brain Death Protocol.

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and caregivers’ *D.Gronwall, P.Wrightson, P.  
Waddell, Oxford University Press 1992 p17-  
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# **UNDERSTANDING BRAIN DAMAGE AND BRAIN DEATH**

Information pamphlet for  
families and whanau