Glossary

Arthroplasty: The term for the surgical procedure of replacing joints.

Embolism: A blockage of an artery in the lungs by fat, air, tumour tissue or blood.

Fracture mechanics: An approach to the understanding of strength and mechanical failure in materials that is based on a consideration of the influence of cracks (size, geometry and rate of growth) in the material, including at the surface.

Fracture toughness: When a material breaks, due to the extension of pre-existing cracks, two factors influence the amount of energy absorbed. These are (i) the energy needed to create the new surfaces and (ii) the energy absorbed, for example in polymeric materials, by viscous flow of the molecules at the crack tip. The latter causes the material to be tough.

For a crack of original length $2c$, the breaking stress, σ_b is given by the expression:

$$\sigma_b = \left(\frac{K_1}{\pi c}\right)^{\frac{1}{2}}$$

The term K_1 is known as the *fracture toughness* and is a measure of the resistance to growth of pre-existing cracks.

Hank's Balanced salt solution: A solution with the following composition (mmol dm^{-3}):

NaCl	130
KH_2PO_4	0.44
$MgSO_4.7H_2O$	0.811
$CaCl_2$	1.26

$NaHCO_3$	4.1
$NaHPO_4$	0.33
KCl	5.3
Glucose	5.5

pH = 7.4

Ringer's solution: A solution with the following composition (mmol dm^{-3}):

NaCl	137
KCl	5.64
$CaCl_2$	2.16
$NaHCO_3$	2.38

pH = 7.2

It is isotonic with cells and is used for studies on mammalian tissues. The term is sometimes loosely applied to any salt solution that approximates to physiological saline.

Stem cells: Cells that have the ability to divide for indefinite periods in culture and to give specialised cells.

Strength: The maximum load a material or structure can bear before failing. Depending on the orientation of the load, strength can be classified as:

(i) tensile (the loads are applied in tension, *i.e.* pulling the structure apart);
(ii) compressive (load is applied to crush the specimen);
(iii) flexure (load is applied in such a way that the specimen breaks by bending).

Other specialised types of strength are often determined for biomedical materials, notably (a) biaxial flexure, where a disc of material is supported on a ring and broken by loading in the centre; and (b) diametral tensile strength, where a cylindrical specimen is loaded along its axis, resulting in forces along that axis that are essentially tensile in nature.

Wear: The loss of material that comes as a result of rubbing at the surface. It is usually classified as two-body (two surfaces rubbing against each other causing material loss) or three-body (two surfaces, plus an abrasive powder, rubbing together).