

# ANATOMY

- Structural organization of living organisms  
(Greek word – Anatome (to cut up))
- Functional approach
- Clinical applications

# Sub divisions

1. Gross (macroscopic, Cadaveric)  
Regional  
Systemic
2. Microscopic (Histology)
3. Surface Anatomy visualization
4. Comparative
5. Physical Anthropology
6. Living Anatomy
7. Clinical Anatomy

## 8. Radiological Anatomy

X-rays

Computerized axial tomography

Magnetic resonance imaging

Ultrasound

## 9. Embryology

## 10. Genetics

## 11. Experimental Anatomy

# History

1. Gracian Period  
Hippocrates (460-377 BC)  
Aristotle (384-322 BC)  
Herophilus (About 325 BC)
2. Roman Period  
Cladius Galen (AD 130-201)
3. Renaissance Period  
Leonaro Da Vinci (1452-1519)
4. Sixteenth Century  
Vesalius (1514-1654)

- Seventeenth and Eighteenth Century

William Harvey (1578-1657)

Antonie Van Leeuwenhoek (1632-1732)

Malpighii (1628-1634)

John Hunter (1728-1793)

Wilhelm Konrad Von Roentgen (1845-1923)

Gregory Johann Mendel (1822-1844)

Robert Hooke

Embalming, at least in a lay person's mind, is firmly associated with the Egyptian mummies.

But mummification is not really embalming in the sense we, as anatomists, understand today.



The basis of the process of mummification was essentially the same as occurs in extreme hot conditions i.e., rapid dehydration which prevents growth of microorganisms and the resulting putrefaction.

[The word mummy is derived from Arabic word *mumiyah* = asphalt < Greek *asphaltos* = to make firm.]

Embalming began to come back into practice in parallel with the anatomists of the Renaissance (14th through 17th centuries) who needed to be able to preserve their specimens.

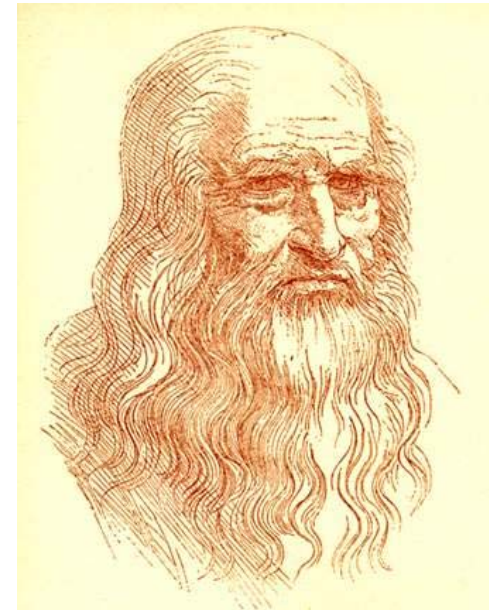


Leonardo da Vinci (1452-1519), an artist as well as a scientist, used dissection to make the appearance of the subjects of his painting realistic.

He also devised methods of preparation for anatomical studies.

He has written " In the anatomy of the eye, in order to be able to see the inside well, you should place the whole eye in white of an egg and make it boil and become solid; and then cut the egg and the eye transversely so that no part of the middle portion be poured out".

He also made wax casts of the ventricles of brain.





Michelangelo too is known to have dissected a body or two before making his famous statue of David and the fresco of Sistine Chapel.



Arterial embalming is believed to have been first practiced in the Netherlands in the 17th century by Frederik Ruysch but his *liquor balsamicum* preservative was kept a secret to the grave and his methods were not widely copied.

Contemporary embalming methods advanced markedly during the American Civil War.

The passage of Abraham Lincoln's (1809-65) body home for burial was made possible by embalming and it brought the possibilities and potential of embalming to a wider public notice.

After the discovery of its bactericidal and preserving qualities several concentrations were tried till Blum (1893) recommended 10% concentration as the best solution.

So now there were two widely used fluids – alcohol and formalin.

Melinkow-Raswedenkow (1896) from Moscow was the first to introduce the third solution by addition of salts and Glycerine. His work was on preservation of tissues and the same principles were later applied to embalming.

He recommended three stages:

- i) Formalin 'which discolours the preparation....but fixes its histological constituents'
- ii) 95% alcohol 'in which the original shades of colour partially reappear' and
- iii) ' a solution of 30 parts potassium acetate, 60 parts glycerine and 100 parts distilled water' which restores 'its colour characteristics'.

Embalming is done for preservation of bodies for

Anatomical dissections.

Transport.

Predominantly in the west, in the interval between death and interment.

The process and the fluids used would vary slightly according to the purpose of embalming and the condition of the body e.g. an autopsied body.

In the funeral homes, while the fluid is being injected, blood is drained through a cut in the jugular vein.



Anatomically embalmed cadavers have a typically uniform grey colouration, due mainly to the high formaldehyde concentration.

Typically, embalming fluid contains a mixture of formaldehyde, methanol or ethanol and other solvents.

Red colouration is added normally to standard, non-medical, embalming fluid for example those used in the funeral homes.

The formaldehyde content generally ranges from 5 to 29 percent and the ethanol content may range from 9 to 56 percent.

A body needing to be repatriated overseas needs a higher index (percentage of diluted preservative chemical) than one simply for viewing (known in the United States and Canada as a funeral visitation) at a funeral home before cremation. The end result is improved by application of cosmetics and colouration.

Based on these observations, several fluids are devised and used by various laboratories. The following are some of the more popular mixtures:

For dissection hall:

Formalin                    10-20%

Methanol                    55%

Glycerine                    15%

Water                        10-20%

A few crystals of thymol.

Up to 5% phenol may be added and so can 15 G each of potassium acetate and nitrate.

Eosin may be added to make the smaller vessels more prominent.

The bodies are then stored in a refrigerated chamber or immersed in a tank with 5-10% formalin with some phenol.

Glycerine may be added if one can afford it.

As a rough guide 8 litres of the fluid are enough but it can be more or less depending on the size and weight of the body and weather conditions. It is always safer to err on the higher side.



Embalming methods:

Gravity

Injecting pump

Supplemented by local injections.

Autopsied bodies are preserved by injections into the intact areas like the limbs and by cotton soaked in embalming fluid for the body cavities from where organs have been removed.

Arterial injection is done through femoral or carotid arteries.

