International Journal of Applied Research 2017; 3(3): 229-232


**ISSN Print:** 2394-7500
**ISSN Online:** 2394-5869
**Impact Factor:** 5.2
IJAR 2017; 3(3): 229-232
www.allresearchjournal.com
Received: 18-01-2017
Accepted: 19-02-2017

**Dr. Mukesh Kumar**
PG student department of Anatomy, Dr. S. N. Medical College, Jodhpur, Rajasthan, India

**Dr. Sushma K Kataria**
Senior Professor and Head of Department Anatomy, Dr S.N Medical College, Jodhpur, Rajasthan, India

**Dr. Leena Raichandani**
Professor, Department of Anatomy, Dr. S. N. Medical College, Jodhpur, Rajasthan, India

**Dr. Eti mantri**
PG Student Department of Anatomy, Dr. S.N. Medical College, Jodhpur, Rajasthan, India

**Dr. Ritu Agarwal**
Assistant Professor, Department of Anatomy, Dr S.N. Medical College, Jodhpur, Rajasthan, India

**Dr. Anoop Gujar**
Assistant Professor, Department of Anatomy, Dr S.N. Medical College, Jodhpur, Rajasthan, India

**Correspondence**
**Dr. Mukesh Kumar**
PG student department of Anatomy, Dr. S. N. Medical College, Jodhpur, Rajasthan, India

# Study of Plastination to preserve biological specimen in western Rajasthan

**Dr. Mukesh Kumar, Dr. Sushma K Kataria, Dr. Leena Raichandani, Dr. Eti mantri, Dr. Ritu Agarwal and Dr. Anoop Gujar**

**Abstract**
**Aims and Objective**: - The aim is to study preserving biological specimen by plastination. Plastinated specimen is easy to handle, odorless, non hazardous stable procedure.
**Material and method**: - The present study has been conducted in department of Anatomy, Dr. S.N. Medical college, Jodhpur in which we used two methods of plastination i.e. Luminal plastination and Sheet plastination for preserving biological specimen.
**Result:** - Anatomists have always been looking for a technique to preserve the biological specimens retaining its original features and which can be stored in open place without the ill effects. In recent advances to preserve biological specimen plastination is the best method to preserve because it is easy to handle, minimal care require, flexible.
**Conclusion**:- Plastination is considered as one of the best technique for preservation of biological specimens for teaching and research in Biology, Medical Science and Veterinary Sciences.

**Keywords:** Sheet Plastination, Luminal Cast Plastination, Biological Specimen, Preservation

## 1. Introduction
A Biological Specimen (Also called a Biospecimen) is a biological laboratory specimen held by a biorepository for research. Biological specimens are stored ideally they remain eqvivalent to freshly collected specimens for the purpose of research. Anatomists have been looking for a technique to preserve biological specimen with least side effects and retaining its original features. Beginning in 17th century, researchers and museums have been able to preserve whole specimens by submersing and stored them in fluid chemicals.
Preservation techniques were taken from many years to preserve the specimens and cadaver.
Mummification is the one of the oldest preservative technique and popularly known as mummies were prepared and preserved in pyramids by Egyptians.
Disadvantage: - These method can be expensive, time consuming, toxic or applicable only to partially or completely unwrapped.
In 1896 Formalin was introduced for cadaver Preservation. Thereafter, scientists were developed color preserving embalming fluids/solutions to preserve life like color appearance and flexibility to aid in the study of the body.
Disadvantage: - Many health hazardous
Cryopreservation is process where cells or whole tissues are preserved by cooling to low sub-zero temperature, such as 77k 0r 196°C. At these low temperatures any biological activity, including the biochemical reactions that would leads to cell death, is effectively Stopped.
Disadvantage: - Damage to cells during cryopreservation mainly occur during the freezing stage, including solution effects, extracellular ice formation, dehydration and intracellular ice formation.
In 1960's the organs /human bodies were prepared by plastic polymers/or polyster resins.
In 21st century, the most challenging eco-friendly anatomical technique is Plastination and more than hundreds of laboratories in worldwide adapted for preparation and preservation of anatomical teaching aids or museum models.
Plastinated Specimen have serval advantages to preserved ones in that the former are clean, dry, odorless, durable, non-toxic, noninfectious, donot exude fumes fluid, have superior esthetics, can act as patient educative tool,

can be handled without gloves and do not require any special storage conditions or care. Unusual or Rare specimens can be made avaible for study no longer seen in clinical practice.

## 2. Material and Method

The present study has been conducted in Department of Anatomy, Dr S.N. Medical College, Jodhpur. Preservation of biological specimens was done by method of Plastination i.e Luminal and Sheet Plastination. It is expensive technique but we done without using vaccum chamber.

### Luminal Cast Plastination

- Fresh organ is preferred.
- Lumen is cleaned.
- Mucous, blood, secretions etc. will be cleared with repeatedly wash 10-13
- After clearing the excessive amount of water remove by tilting the organ and draining by gravity.
- Plastination material Silicone sealant inserted with help of silicone gun
- Kept for 24 hrs.
- Next day dissection of larger easily removable structures and boiling for half to one hour dissolves most of the tissues, leaving the beautiful luminal cast.
- Silicone produces an excellent, soft, flexible cast, showing 3- dimensional orientation of cavity.

### Sheet Plastination

This is a wonderful method of preparation of thin-transparent opaque body sections.

The sheet are totally portable, the whole body being convertible into slices and stored dry.

- A double – glass chamber required.
- A sheet of same sized OHP transperancy is kept on the glass sheet.
- A rubber tube with stiff metal wire inside (to give a shape) is placed on the OHP sheet clad glass sheet.
- Another glass sheet with OHP sheet covering is the next layer.
- Now clips are put to the bottom and sides.
- Clips hold the glass sheets together and make a leak proof chamber.
- The processed section is placed in the middle of the chamber.
- Resin and accelerator (0.01%) mixture is filled into the chamber.
- Kept in vertical position for a day.
- After 12 or 24 hrs Clips are removed; glass sheets are carefully separated from resin sheet; edges are trimmed and polished.

## 3. Result

The responses were recorded as Yes/No (Y/N) as regards to criteria which were under evaluation. A response of 'yes' was considered as satisfactory.

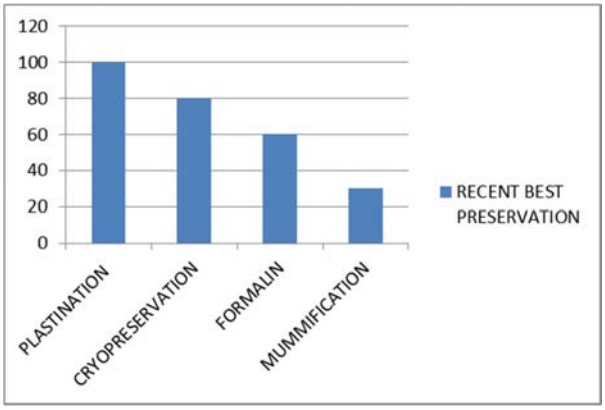
### Graph I: Recent Advance Best Method for Preservation of Biological Specimen

A) Mummification Y/N
B) Formalin Y/N
C) Cryopreservation Y/N
D) Plastination Y/N

### Graph II: Plastinated Specimens Are

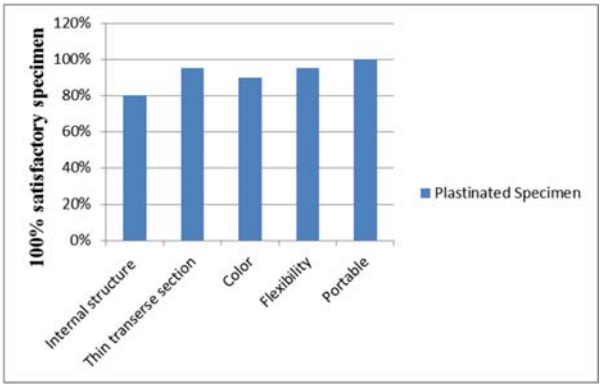
A) Internal structure: - Is the specimen shown internal structure?
B) Thin transverse section: - Is it easy to preserve thin transverse section?
C) Color: - Did the specimen maintain Color?
D) Flexibility: - Was the specimen Flexible?
E) Portable: - Is it easy to Portable?

### Graph and Explanation is given below




**Graph 1:** Recent Advance Best Method for Preservation Biological Specimen

Evaluation occurs on the basis of recent advance:- mummification was oldest method mainly done to wealthy people as poorer people could not afford the process. Formalin has so many health hazardous occur. In cryopreservation it is done at very low temperature, any enzymatic or chemical activity which might cause damage to biological material. Plastination is best method for preserve and is easy to handle, odorless, nonhazardous, stable procedure.




**Graph 2:** Plastinated Specimens Are

Internal structure: - Specimen was evaluated on the basis of internal structure in which we obtained best internal structures of the specimen, the principle involves filling up of the lumen with material and dissolving the surrounding tissue. A 3-dimensional structure was visualized.

Thin transverse specimen was evaluated on the basis of thin transverse section by forming a sheet plastination method, of preparation of thin –transparent or thick opaque body sections. The sheets are totally portable, the whole body being convertible into slices and stored dry.

Color: - The specimen with a life –like color were marked as satisfactory, while those any discoloration were marked as unsatisfactory. All the specimen of plastinated had good color preservation except one specimen.
Flexibility: - Most of the specimens are Flexible.

Portable: - Plastinated specimen can be easily carried to lecture halls/classroom and also can be easily passed to each student without gloves, appreciating features, which are impossible in jar specimens.

**Fig 1:** Shown Luminal Cast Plastination

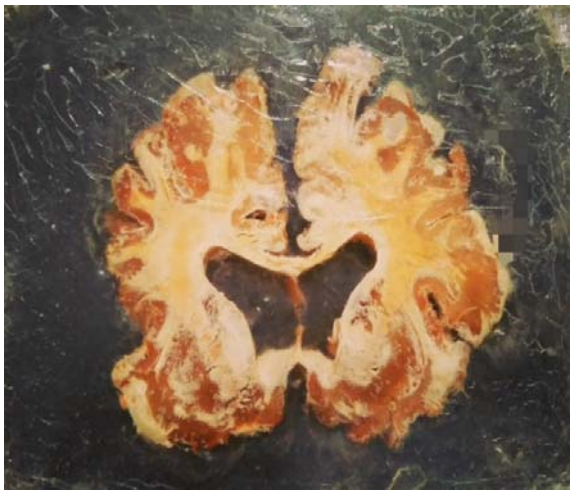


**Fig 2:** Shown Sheet Plastination

## Discussion

The evolution of science, the prevention of tissue, organ or cadaver decay has become a necessity for numerous domains of research in biology and medicine but also for the teaching institution to them.
In present work suggested that plastinated specimen can be used to study and teach gross specimens by using silicone polymers. The process is simple inexpensive and can be carried out in any laboratory to produce dry, odorless, durable, life-like, maintenance-free and non-hazardous specimens. In this study we used formalin preserved specimen and fresh organ for plastination.
Meeusen *et al* 2009 studied on branching pattern similarity between the two species makes the sheep lung an ideal experimental model to study human airway diseases and effect of medication on diseases like asthma [3].
H. Steinke *et al* 2006 investigated a new method for tissue dying in sheet plastination to prevent from color change in dyed samples in plastination steps. The prepare sections had better contrast and distinction for educational purpose. In study, it was observed that for sections of mature rat which was plastinated by $UP_{87}$, plastination had no effect on double staining of bone and cartilage [8].
Musumeci *et al* 2003 states that a comparison of the S10 and P40 techniques clearly shows that plastination is complementary teaching technique to demonstrate the different aspects of the human anatomy, the type of plastination being governed by the structure to be demonstrated. The S10 method is ideal for well dissected specimens and larger body slices. Fine structures become more resistant to damage but also become more rigid. This may influence exploratory anatomy using endoscopic procedures [4].
Rieder *et al* studied a comparison between the two methods, S10 and P40, clearly shows that the S10 method id ideal for dissected specimens, independent of their size, whereas P40 slices are mor difficult to handle, as they are larger, but they become transparent and even show microscopic structures [5].
Weiglein *et al* 1997 stated that plastinated brain tissue is an essential tool for teaching neuroanatomy [7].
Thompett, 1955 Visualization of gray and white matter can be enhanced by using staining or impregnation methods, such as Prussian blue method [8].
Venkatesh G Kamath *et al* was observed that the tracheobronchial division pattern showed significant similarities and single variation. Therefore the sheep lung is an ideal experimental model and luminal plastination can be applied to comparative anatomical study to identify more such models [2].
Conclusion: - Biological specimens are ideally retaining its orginal features and which can be stored in open place without the ill effect for purpose of research. Plastination is considered as one of the best techniques for the preservation of biological specimens for teaching and research in Biology, Medical Science and Veterinary Sciences. It is good replacement for formalin as a preservative and there are no health hazards. Plastinated specimens can serve as an excellent educational tool for undergraduate and postgraduate students of anatomy, radiology and orthopedics.

## Reference


1. Hagen's Von G, Tiedemann K, Kriz W. The current potential of Plastination Anat Embryol (Berl) 1987; 175:411-21.
2. Kamath Venkatesh G, Shetty Radhakrishna K, Asif Muhammed. A Ramakrishna A comparative study of tracheobronchial Pattern using Luminal Plastination. Int J Anat Res. 2013; 03:161-164.
3. Meeusen N, Els Snibson Kenneth J, Hirst Stuart J, Bischof Robert J. Sheep as a model species for study and treatment of human asthma and other respiratory diseases. Drug discovery Today: Disease Models. 2009; 6(4):101-106.
4. Musumeci E, Lang FJW, Duvoisin B. Plastinated ethmoidal region: I preparation and application in clinical teaching J Int Soc Plastination. 2003; 18:23-28.

5. Riederer BM. Plastination and its importance in teaching anatomy.
6. Thompett DH. Differential staining and mounting of human brain slices Med Biol Illustr. 1955; 5:29-34.
7. Weiglein AH. Plastination in Neurosciences, Acta Anat! 1997; 58:6-9.
8. Steinke H, Spanel Borowski K.coloured Plastinates. Ann Anat. 2006; 188:177-82.