

Digitizing Pathology Specimens

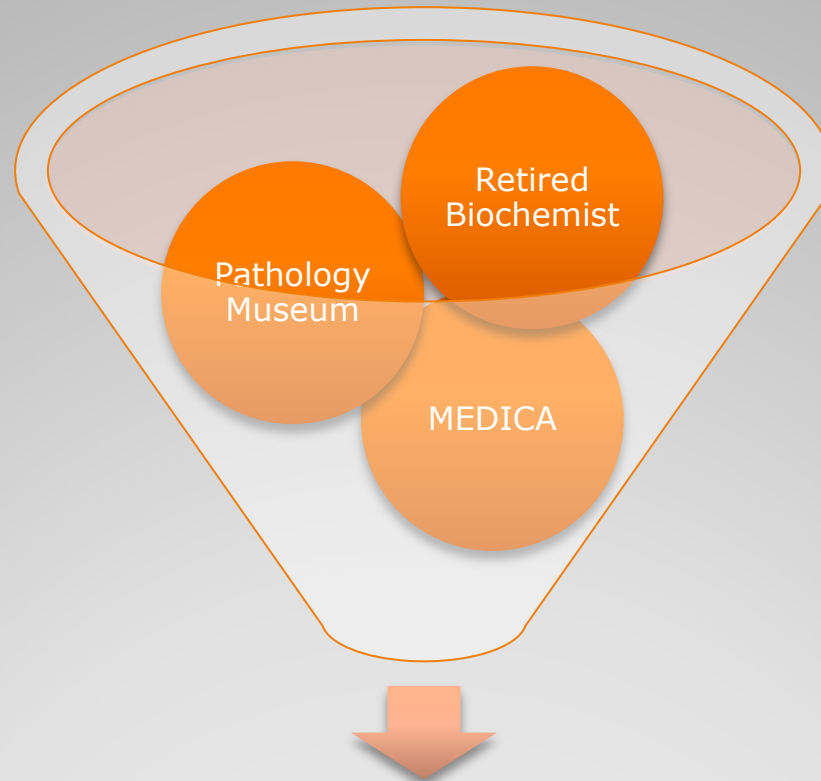
A collaborative project to preserve and make accessible
MUSC's wet specimen collection

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Waring.library.musc.edu



- Dr. Kenneth Lynch founded the collection and contributed some of these specimens, including the first examples in the country of asbestosis associated with lung cancer.
- Dr. Gordon B. Hennigar came to MUSC in 1965 and built upon collection. He died in 1998.
- Drs. Edward McKee and Jane Upshur kept up the collection and added to it

Gordon B. Hennigar Pathology Museum



PRESERVATION AND
DIGITIZATION PROJECT

Perfect Timing

- Department of Pathology and Laboratory Medicine
 - Sponsored Dr. Christine Papadea
 - Provided work space and departmental support
 - Purchased supplies
 - Provided services of Jim Nicholson for photography
- Waring Historical Library
 - Provided technical direction and production oversight
 - Pursued answers to ethical and legal questions
 - Uploaded collection to digital library ::SCDL ::DPLA

Partners

- Earliest documented specimen: 1968
- Primary collection: ~429 items
- Secondary collection: ~450 items
- Digital Images: ~1,700
- Cost of supplies: \$8,684.59
- Volunteer hours: ~thousands

By the numbers

- Bone
- Breast/Ovary/Endocrine
- Cardiovascular *
- Gastrointestine
- Kidney 1 1-36 *
- Kidney 2 37-73
- Liver *
- Oral Cavity/Soft Tissue/Testes/Ureteral
- Pancreas
- Pancreas and Gallbladder
- Respiratory 1 1-41 *
- Respiratory 2 42-81
- Reticuloendothelial
- Uterus/Cervix/Vulva

* More than 100 specimens

By the numbers: Groups

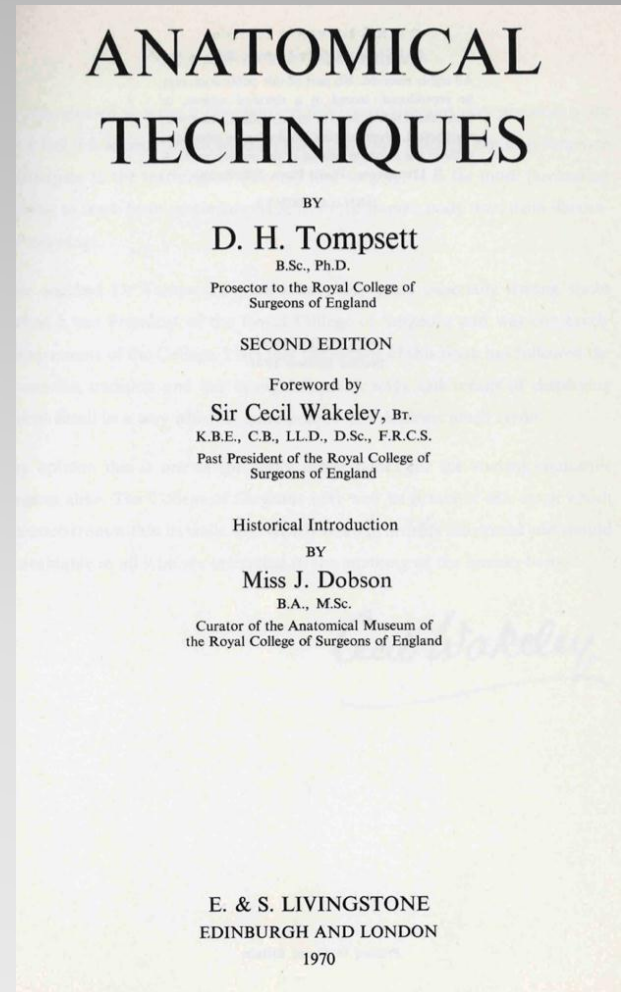
- Prepare specimens:
 - Drain cases, repair cases, refill cases
- Record Metadata:
 - Measure, record, and describe specimens
- Photography
- Photography editing; redact PHI
- Resolve ethical and legal issues
- Upload Digital files, set permissions
- Next steps/follow-up

Project Steps



Draining containers

- Apply acrylic glue to drained and dried containers
- If after three tries, doesn't bind, item is photographed and documented for disposal
- Label containers with date of repair and refill



Repairing containers



Refilling containers

- Source: original inventory. Primary collection descriptions were written by Dr. Jane Upshur in consultation with autopsy report; secondary collection, no reports therefore less clinical information.
- Metadata fields: Title, Alternative Title, Creator, Date, Description, Notes and Misc., and Clinical Description
- Photography metadata added later

Collecting Metadata

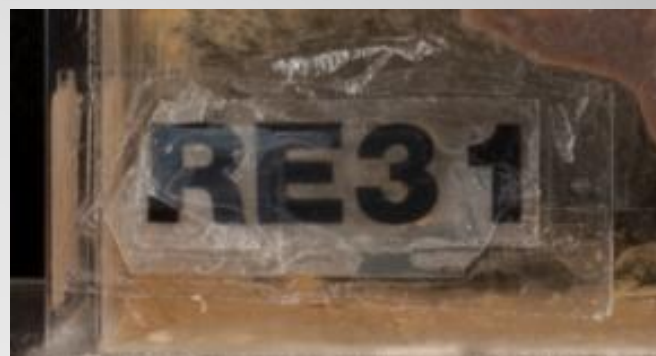
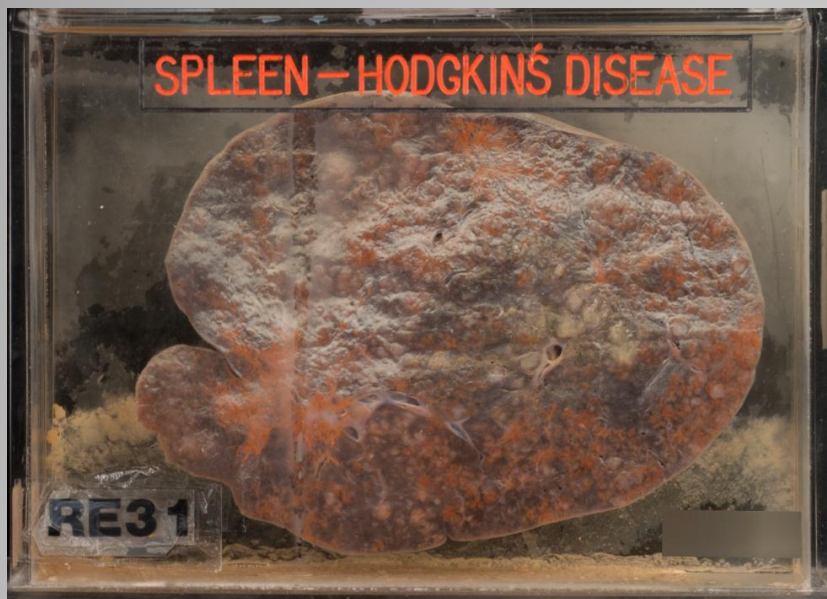


Photography

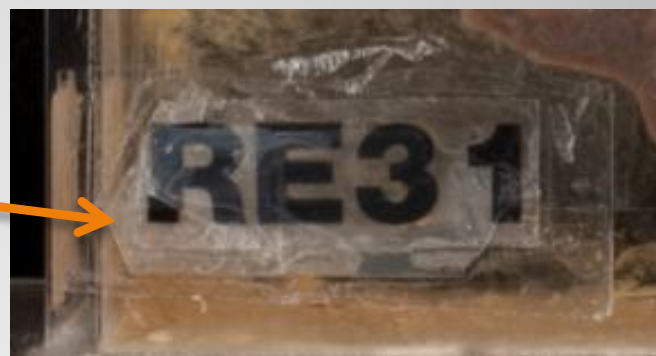
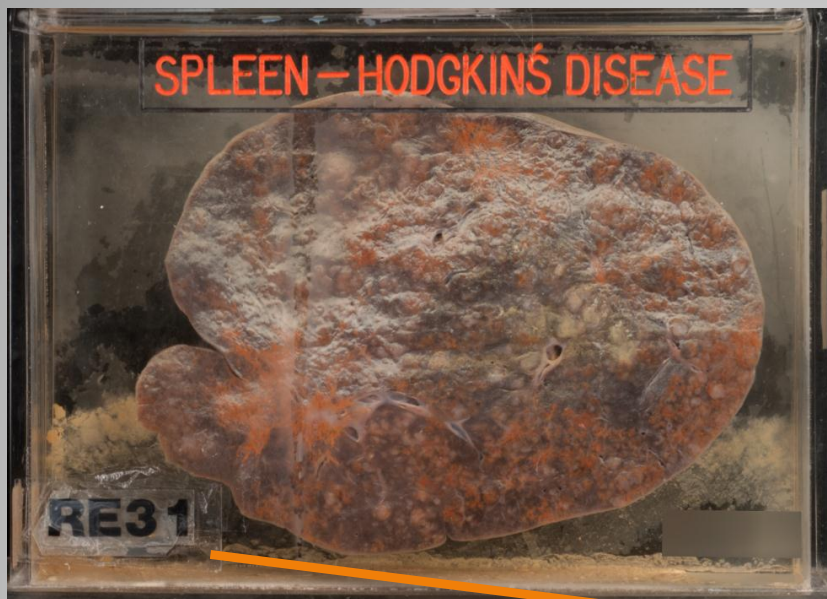
- Lighting was by standard tungsten 90W bulbs mounted in simple clamp-on reflectors. The background was black felt cloth in a seamless roll. A centimeter white ruler with blue lettering and a standard Kodak 18% gray card were set in line with the front surface of the specimen. Each specimen was imaged from front and back except in cases where an opaque back was used.
- All images were made originally as Nikon NEF 12bit Raw files which are stored on separate DVDs as a reference. Note: Raw files do contain identifiable autopsy and surgical numbers.
- The Raw files were processed in Adobe Photoshop CS5 and stored as TIF files at original resolution using Adobe RGB color space. The "levels" function was used to adjust color using the reference card. Density was adjusted to show the specimen detail.
- The only other processing was adjusting any unevenness in illumination using the lasso tool with a 100 feather, cropping, and removal of identifiable case numbers. Image enhancement was applied to labels in cases where they were difficult to read against the background. No enhancement was applied to the specimen.

Photography specifications

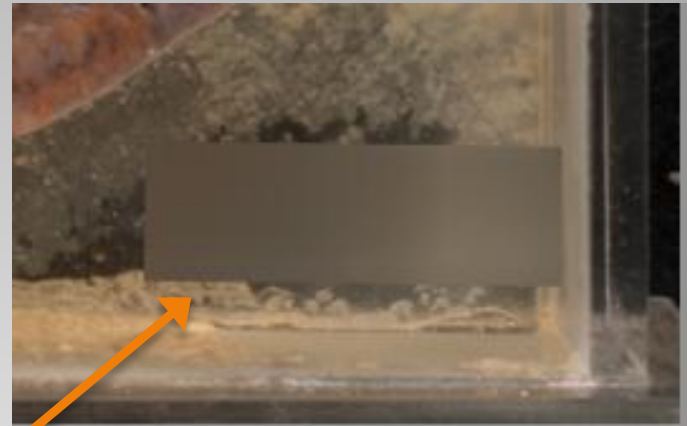
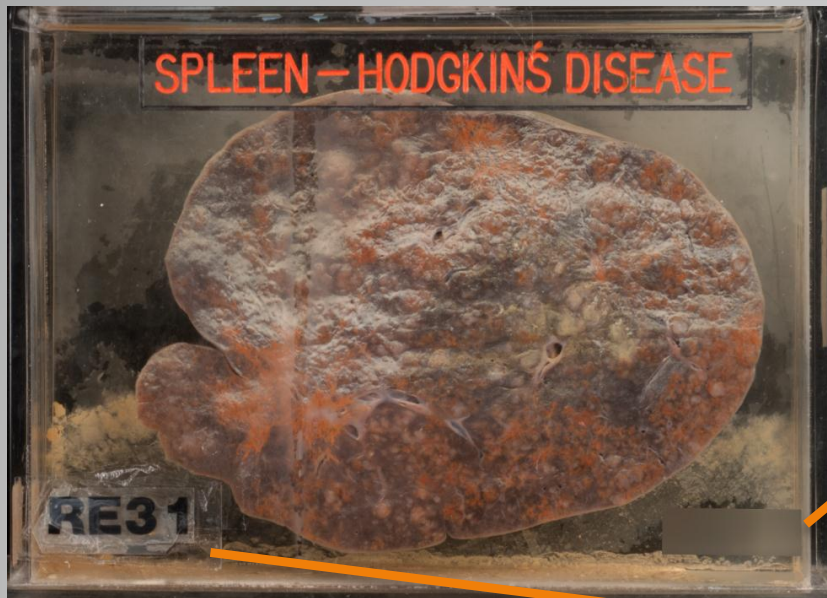




**Photography editing/
Redacting PHI**



**Photography editing/
Redacting PHI**



**Photography editing/
Redacting PHI**

The Gordon R. Hennigar Pathology Museum Collection

[select all items](#) • [clear all items](#) •

results 1- 20 of 63

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Sort by:	▲ Title	Description
☐ 1. no preview available	 Liver: Acute Fulminant Hepatitis	Acute fulminant hepatitis . COMMENT ON SPECIMENS (#25-29): These illustrate the range of changes seen in autopsy livers from patients dying from viral hepatitis (liver disease or complications therefrom): #25=a liver that is bile stained and shows dark areas of necrosis but is not as massively necrotic as #26 and #27 (these two livers probably less than 800-900 gms) and although these two do not now show the usual maroon appearance, there has been a marked loss of hepatocytes. #28 and #29 show pale nodular areas interspersed in liver parenchyma which histologically demonstrates, besides necrosis, scarring or cirrhosis (#28 less, #29 more scarring). The nodular areas actually represent attempts at regeneration of hepatocytes.
☐ 2. no preview available	 Liver: Acute Hepatic Necrosis	Acute hepatic necrosis secondary to occlusion of hepatic veins by renal cell carcinoma and thrombus). COMMENT: Note thrombosed veins (arrows) and adjacent necrosis (dark areas). Remember tendency of renal cell carcinoma to invade vascular structures (i.e., renal veins to IVC and out hepatic veins).
☐ 3. no preview available	 Liver: Acute Infectious Hepatitis	Acute infectious hepatitis-massive necrosis. COMMENT ON SPECIMENS (#25-29): These illustrate the range of changes seen in autopsy livers from patients dying from viral hepatitis (liver disease or complications therefrom): #25=a liver that is bile stained and shows dark areas of necrosis but is not as massively necrotic as #26 and #27 (these two livers probably less than 800-900 gms) and although these two do not now show the usual maroon appearance, there has been a marked loss of hepatocytes. #28 and #29 show pale nodular areas interspersed in liver parenchyma which histologically demonstrates, besides necrosis, scarring or cirrhosis (#28 less, #29 more scarring). The nodular areas actually represent attempts at regeneration of hepatocytes.
☐ 4. no preview available	 Liver: Acute Passive Congestion	Acute passive congestion of liver. Comment: Darker red areas particularly show a nutmeg pattern
☐ 5. no preview available	 Liver: Adenocarcinoma of Bile Duct	Adenocarcinoma of bile duct. COMMENT: Tumor involves central portion of specimen--obviously in this and above five specimens, the histologic appearance is crucial to the diagnosis

MEDICA



MEDICA

MUSC Electronic Documents Initiative and Collected Archives

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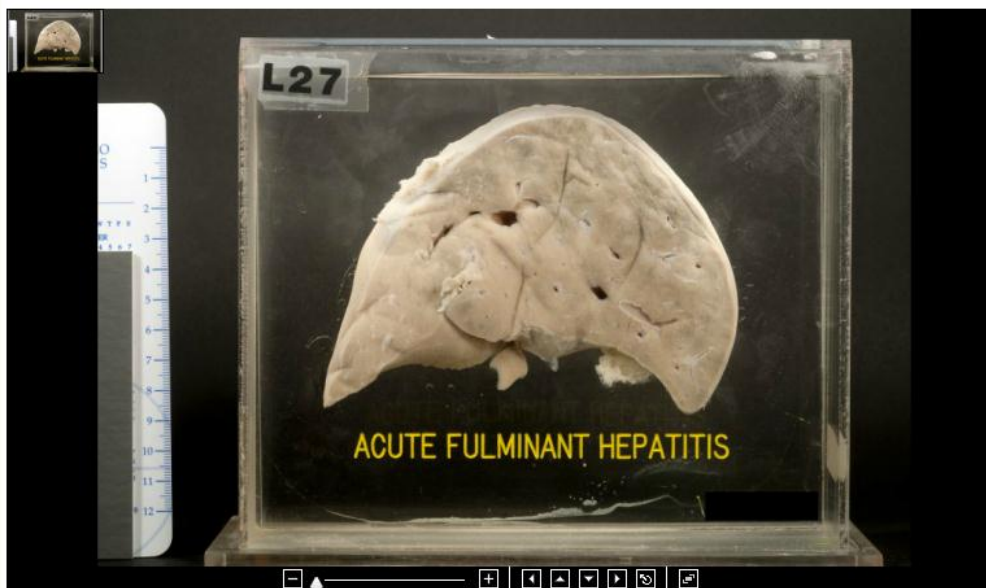
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Liver: Acute Fulminant Hepatitis

- ▣ Liver: Acute Fulminant Hepatitis
- ▣ Liver: Acute Fulminant Hepatitis

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MEDICA

Web Site <http://www.musc.edu/pathology/>

Holding Institution MUSC

SC County [Charleston County \(S.C.\)](#)

SC Region [Lowcountry](#)

Digitization Specifications [Nikon D200](#)

Date Digital 2011-06-21

Type still image

Format image/jpeg

Media Type [Still Image](#)

Resource Identifier [L27](#)

Title [Liver: Acute Fulminant Hepatitis](#)

Alternate Title [Liver Gross Specimens](#)

Creator MUSC Department of Pathology and Laboratory Medicine

Date 1900-1999

Subject [Liver Pathology](#)
[Liver Diseases -- pathology](#)

Description [Acute fulminant hepatitis . COMMENT ON SPECIMENS \(#25-29\): These illustrate the range of changes seen in autopsy livers from patients dying from viral hepatitis \(liver disease or complications therefrom\): #25=a liver that is bile stained and shows dark areas of necrosis but is not as massively necrotic as #26 and #27 \(these two livers probably less than 800-900 gms\) and although these two do not now show the usual maroon appearance, there has been a marked loss of hepatocytes. #28 and #29 show pale nodular areas interspersed in liver parenchyma which histologically demonstrates, besides necrosis, scarring or cirrhosis \(#28 less, #29 more scarring\). The nodular areas actually represent attempts at regeneration of hepatocytes.](#)

Digital [The Gordon R. Hennigar Pathology Museum Collection](#)

MEDICA: Metadata

- Set permissions for accessing sensitive specimens
- Manage Digital files for long-term preservation
- Related project with early 20th-century autopsy records

Moving Forward



Dr. Christine Papadea

- Dr. Christine Papadea
- Ms. Jennifer Welch
- Mr. James Nicholson
- Dr. Erin Presnell
- Dr. Janice Lage
- Dr. Sally Self
- Dr. Nicholas Batalis
- Dr. Michael Caplan
- Dr. Cynthia Welsh
- Ms. Beth Hansell
- Dr. Robert Sade
- Mr. Joseph Good

Acknowledgments

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Questions