An Eight Year Experience of a Fully-implemented Digital Pathology Laboratory. Curtis T. Thompson, M.D.

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and

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New Disruptive Technologies



Radiology led the way





What has held digital pathology back?



"Well, I've got your final grades ready, although I'm afraid not everyone here will be moving up."

2011 Early Pathology Scanner

"With just a 16-inch by 24-inch footprint, the ScanScope AT features a 400-slide capacity with sustained throughput of 30 slides per hour."



Early Pathology Scanner

"With just a 16-inch by 24-inch footprint, the ScanScope AT features a 400-slide capacity with sustained throughput of 30 slides per hour."



600 slides \div 30 slides/hour = 20 hours.



10 machines x \$287,657 = \$2,876,570

Pathology groups bought 1 machine (\$287,657)



• Slow

• Not streamlined for daily work

• Large files

• Expensive

• Unclear if legal

Pathology groups bought 1 machine (\$287,657)



Slow

- Not streamlined for daily work
- Large files
- Expensive
- Unclear if legal

2016 First functional system





2016 Regional need for connection



2016

- 3 options were available.
- Financing available for scanners.
- Definite occupational health issue
- Few examples of successful digital pathology implementation in existence

2016 First Two Scanners



Perfect posture



Benefit—Efficient Consultation

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- Compose		<
 Inbox 5 ★ Starred Snoozed Important Sent Desite 1000 	Second opinion for case CON191670 > Curtis Thompson <curtisinportland@gmail.com> to Jessica + Please review case CON191670: https://dps.cta-lab.com/pathologysuite/#/viewer?images=1.3.46.670589.45 596474194382786,12.20307374334818&bottomright=43.70847419438279,14.70107374</curtisinportland@gmail.com>	Fri, May 24, 10:12 AM (3 days ago) 5.1.1.254687382049802.1.9156.1558632919870.3&topleft=38. 43348179&server=
 Dratts 1,062 Categories 201903DermPathS CTA Financials Curtis - + 	55 y/o female left cheek. I think this is a benign nevusbut there is some pleomorphism. Don't think Ki or pHH3 w	vill help (lots of lymphocytes).
Nathan Thompson	Benign? p16? This will likely be left for you.	
Nathaniel Thompson	thx 	
	Jessica Spies to me - intradermal Spitzoid melanocytic tumorput arrows on large melanocytes with red nuclea I would do p16, BAP-1would preserve tissue for molecular. Why don't you order p16 a	Fri, May 24, 10:18 AM (3 days ago) oli at deep tissue edge. nd put my name on it?

Benefit—Efficient Consultation



Sharing cases—33 y/o female "Neoplasm vs dermatitis"

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*	Starred			Curtis Thompson <curtisinportland@gmail.com></curtisinportland@gmail.com>	Wed, May 15, 10:02 AM (12 days ago)	
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	Drafts	1,062			20152430Q3erver-https://ups.cla-lab.com	
	Categories			check out the CD123it really helped. This came as r/o glomus/melanoma/d	lermatitis. I called and they said she has LE elsewhere.	
	201903DermPat	thS				
	CTA Financials			enjoy!		
	Curtis 👻	+				

Sharing cases—33 y/o female "Neoplasm vs dermatitis"



Lupus erythematosus involving the nail unit



Benefit—Efficient Teaching



Residency Program



Benefit—Efficient Teaching

 Active Priority 	Showing case 1-122 of 122	cases in 'Keep online'			1 case(s) select
High Priority 51	Cases	Slides			
• Cases In preparation 123	ABOMP - = 14-Jul-17 10:30	ABOMP ABOMP	01-Jan-00 (-) Other	1	Kratochvil, Jim Finished
For Review 15270	ABOMP201807 - 01-0ct-18 14:15	ABOMP201807 ABOMP201807	01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
Finished 30465 All cases 45858	ABOMP201808 - = 01-0ct-18 14:15	ABOMP201808 ABOMP201808	_ 01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
Other Action Required	ABOMP201809	ABOMP201809 ABOMP201809	01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
Deleted Items 0	ABOMP201810 - = 01-Oct-18 14:29	ABOMP201810 ABOMP201810	01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
 Tags (122) Keep online 	ABOMP201811 - = 01-Oct-18 14:30	ABOMP201811 ABOMP201811	_ 01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
 (26) Demo Cases (7) Research Cases 	ABOMP201812 - = 01-Oct-18 14:30	ABOMP201812 ABOMP201812	01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
	MK19141 - = 01-Mar-19 16:34	MK19141 MK19141	01-Jan-00 (-) Other	1	Klein, Marla Finished
	MK19145 - = 01-Mar-19 11:41	MK19145 MK19145	01-Jan-00 (-) Other	1	Klein, Marla Finished
	MK19168 - = 12-Mar-19 10:05	MK19168 MK19168	_ 01-Jan-00 (-) Other	1	Klein, Marla Finished
	NW17-155 - = 16-Apr-18 15:02	NW17-155 NW17-155	01-Jan-00 (-) Other	1	<unassigned> Finished</unassigned>
	NW1810	NW1810	01-Jan-00 (-)	1	Kratochvil, Jim Finished





Challenges



Challenge: Need 3 machines



Challenge: Need at least 3 machines





Challenge: Cost



plus

\$2,500 month/machine (ongoing service contract)

Challenge: Implementation



Challenge: Implementation

- Slide prep flow of work
- Paper vs paperless
- Digital and laboratory information system (LIS) marriage
- Data storage
- Laboratory regulation
- Pathologist training



Challenge: Case Flow



Inserting a new step into slide prep



Challenge: Case delay?

- Only for onsite pathologists
- Options
 - Change laboratory staff shifts—night shift
 - Delay cases



Challenge: Paper vs Paperless



Challenge: IT Support

- LIS and Scanning software relationship
- Data storage
- Internet speed/access
- Preventing downtime

Challenge Digital and Laboratory Info-System "A Relationship"



Challenge: Data Storage

- Cloud versus onsite servers:
 - Server replacement (q4 years)
 - Disc storage/Cold storage
- Slides can be rescanned

ONE TERABYE PER DAY

Why store images?

- Access of old cases
- Use by outside clients
- Sell data
 - Research
 - Artificial intelligence development

Internet

As fast as possible (works in wifi)
 Streaming—like Netflix



Challenge: Pathologist Training





Young vs Old



- Not yet confident at pathology and comfortable only at a microscope
- In a hurry
- Not yet worried about chronic use injury
- Independent

- Not computer literate
- Typing ability
- Heading toward retirement
- Independent

Challenge: Must remove the microscope from the office



Challenge: Train and retrain



Compliance: Quality Assurance

- College of American Pathologists (CAP) recommends
 - 60 cases for H&E comparison glass to computer read
 - 20 cases for special stains
 - 20 cases for immunohistochemistry
- Glass and computer read separated by two weeks
- Remote clients must comply

Compliance: CLIA

- No CLIA needed at sites that are digital reading only
 - Home
 - Hotel
 - Works in WiFi
 - Hotel—Usually
 - Starbucks--No
 - Mobile Hotspot--most of the time
 - Gogo Inflight--barely

Challenge: Need onsite pathologist for occasional reading of glass slides



Gram stain—no Z axis focus (spirochete)



Challenge: Blurry—small tissue; hypekeratotic, bone



Blurry tracts



Blurry with writing on slide



Challenge: A low quality H&E is still low quality scanned



Challenge: Slide Labels



Summary

- Pathologist
 - Health
 - Lifestyle
 - Education
 - Retention of pathologists
- Innovative business growth
- Implementation is complex (\$\$s must be planned)
- At least 3 machines needed
- Useful for vast majority but not all cases

CURTIS THOMPSON, MD & ASSOCIATES Skin, Hair and Nail Pathology Experts



Cheers! curtisinportland@gmail.com