

Muestra de patología con un sistema completamente digital

Curtis T. Thompson, M.D.

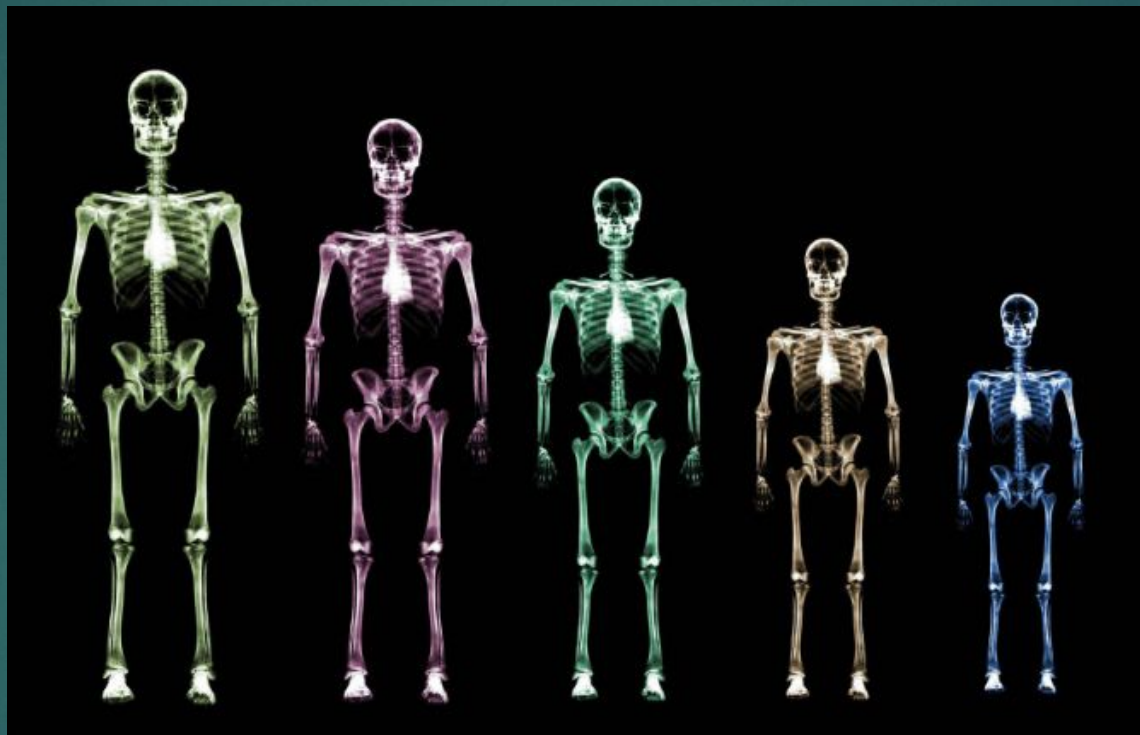
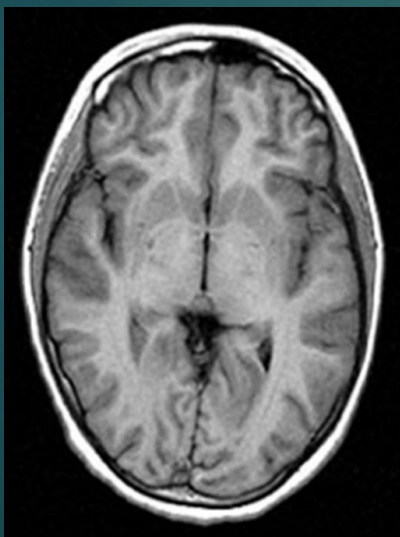
Medical Director, CTA Lab
and

Clinical (Affiliate) Professor of Dermatology, Pathology and Biomedical
Engineering

Oregon Health and Sciences University, Portland, Oregon

New Disruptive Technologies







Early Pathology Scanner

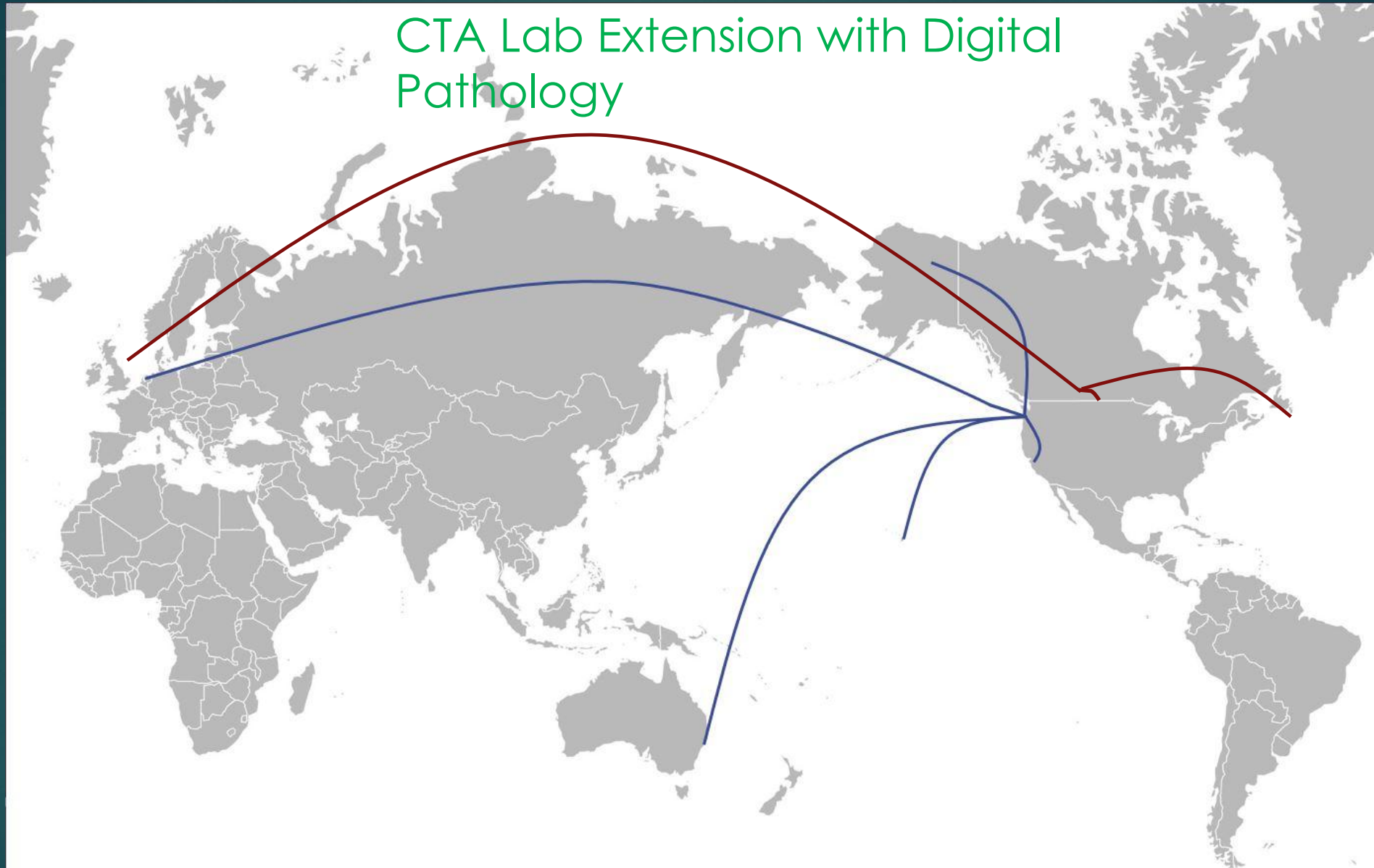








CTA Lab Extension with Digital Pathology



Consultation

The screenshot shows a Gmail interface with a search bar at the top containing "spies melanoma". The left sidebar lists folders: Compose, Inbox (5), Starred, Snoozed, Important, Sent, Drafts (1,062), and Categories (201903DermPathS..., CTA Financials). Below the folders are contacts: Curtis, Nathan Thompson, and Nathaniel Thompson.

The main email view displays a thread titled "Second opinion for case CON191670". The first email is from Curtis Thompson to Jessica, dated Fri, May 24, 10:12 AM (3 days ago). The email body contains the following text:

Please review case
CON191670: <https://dps.cta-lab.com/pathologysuite/#/viewer?images=1.3.46.670589.45.1.1.254687382049802.1.9156.1558632919870.3&topleft=38.596474194382786,12.20307374334818&bottomright=43.70847419438279,14.701073743348179&server=..>

55 y/o female left cheek.

I think this is a benign nevus--but there is some pleomorphism. Don't think Ki or pHH3 will help (lots of lymphocytes).

Benign? p16? This will likely be left for you.

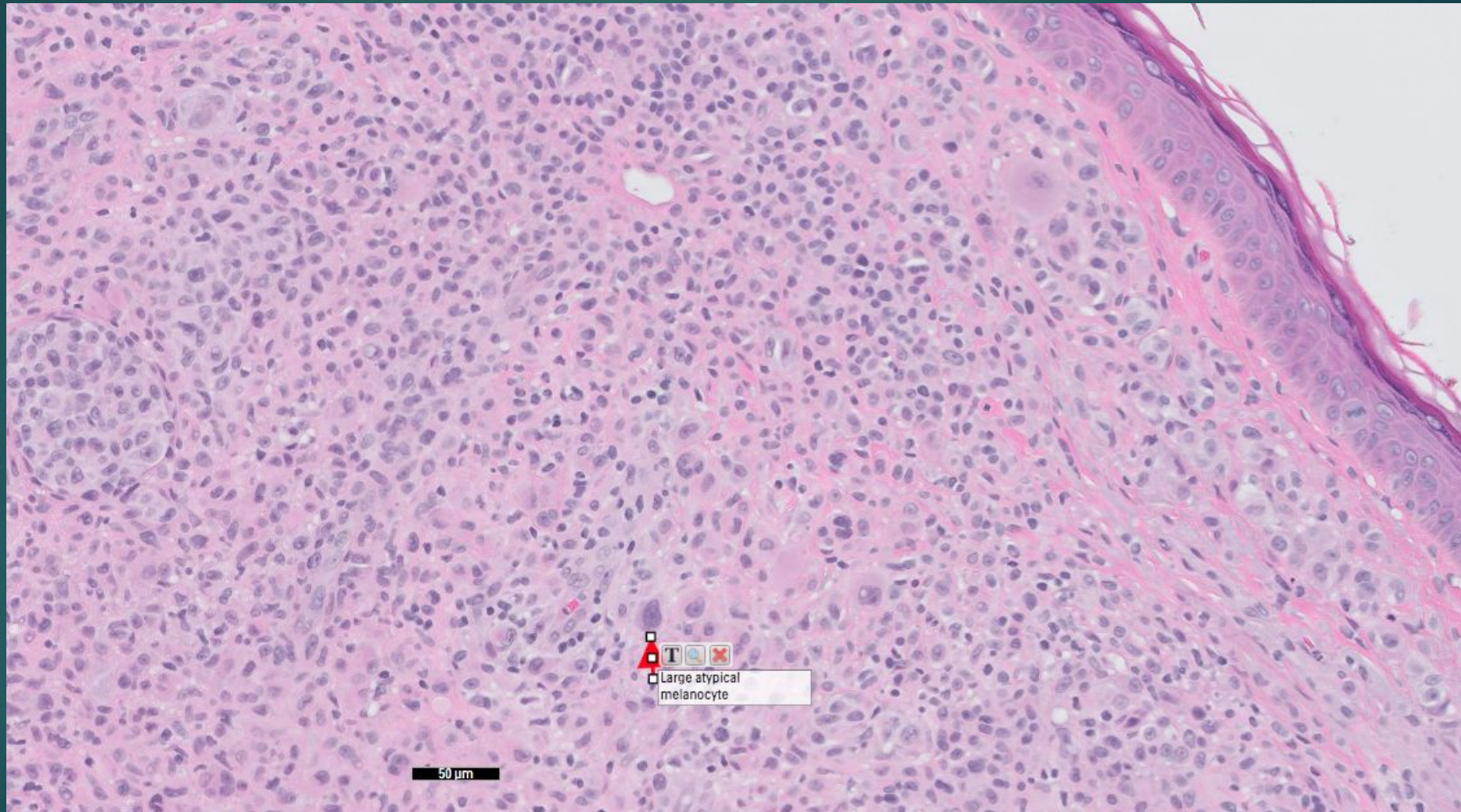
thx

The second email is from Jessica Spies to Curtis, dated Fri, May 24, 10:18 AM (3 days ago). The email body contains the following text:

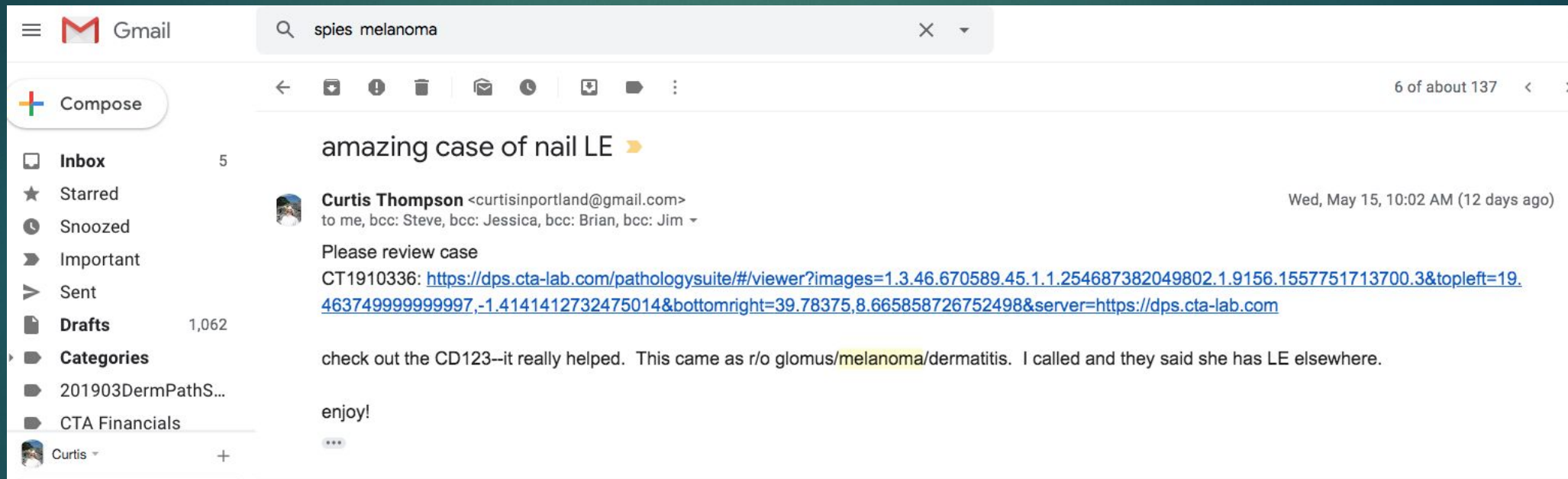
intradermal Spitzoid melanocytic tumor--put arrows on large melanocytes with red nucleoli at deep tissue edge.

I would do p16, BAP-1--would preserve tissue for molecular. Why don't you order p16 and put my name on it?

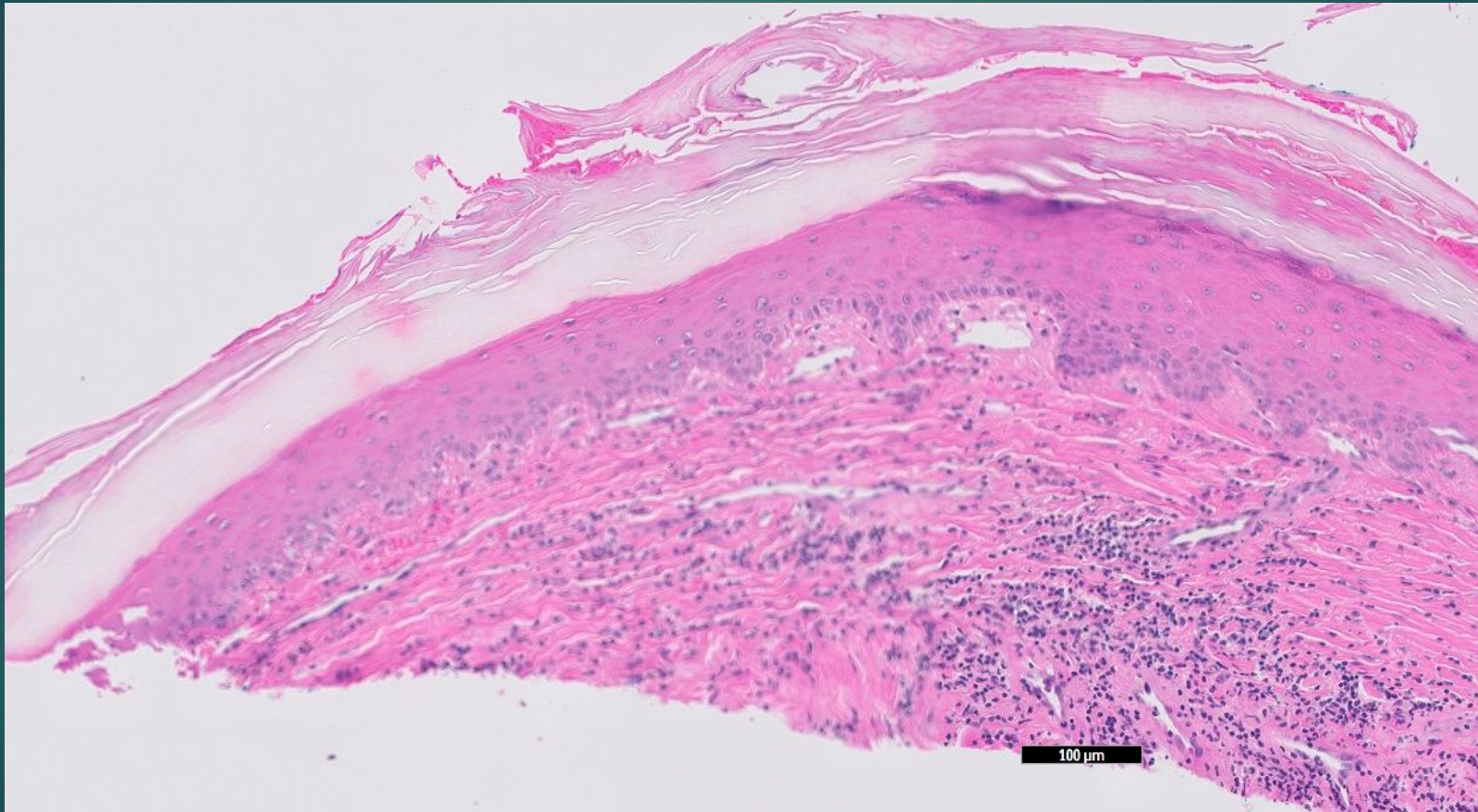
Consultation



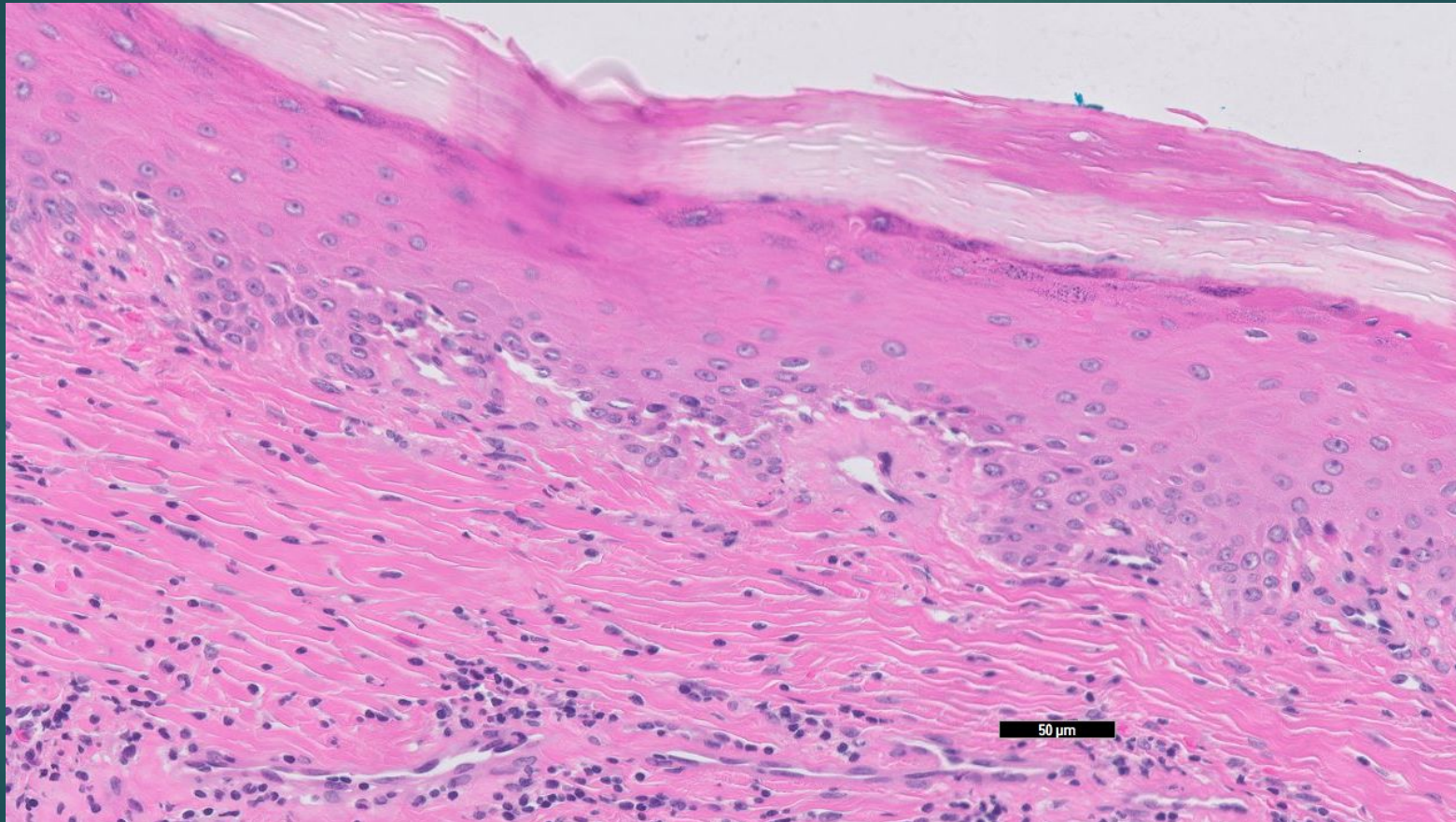
Sharing cases



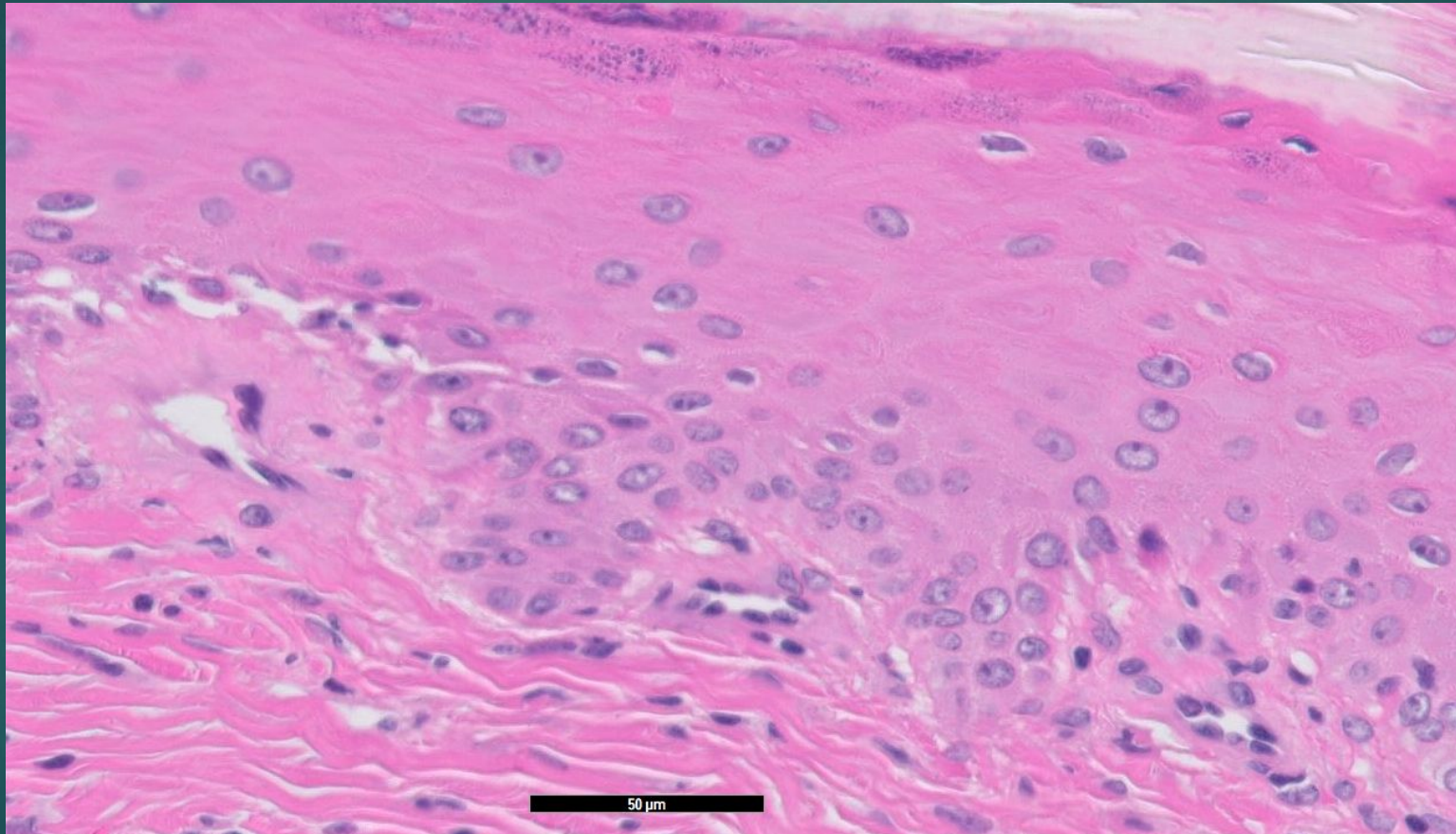
Sharing cases—Nail lupus erythematosus



Sharing cases—Nail lupus erythematosus



Sharing cases—Nail lupus erythematosus



Education—put in lecture, residents, lab all connected



<http://hackededucation.com/2015/04/25/factory-model>

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-Oct-18 14:15	ABOMP201807 ABOMP201807	01-Jan-00 (-) Other	1	<Unassigned> Finished
Finished	30465	ABOMP201808 - 01-Oct-18 14:15	ABOMP201808 ABOMP201808	01-Jan-00 (-) Other	1	<Unassigned> Finished
All cases	45858	ABOMP201809 - 01-Oct-18 14:29	ABOMP201809 ABOMP201809	01-Jan-00 (-) Other	1	<Unassigned> Finished
▼ Other		ABOMP201810 - 01-Oct-18 14:29	ABOMP201810 ABOMP201810	01-Jan-00 (-) Other	1	<Unassigned> Finished
Action Required	0	ABOMP201811 - 01-Oct-18 14:30	ABOMP201811 ABOMP201811	01-Jan-00 (-) Other	1	<Unassigned> Finished
Deleted Items	0	ABOMP201812 - 01-Oct-18 14:30	ABOMP201812 ABOMP201812	01-Jan-00 (-) Other	1	<Unassigned> Finished
▼ Tags						
<input type="checkbox"/> (122) Keep online						
<input checked="" type="checkbox"/> (26) Demo Cases						
<input type="checkbox"/> (7) Research Cases						
		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
		NW1810 - 08-Jul-18 14:15	NW1810 NW1810	01-Jan-00 (-) Other	1	Kratochvil, Jim Finished

Residency Program



- ▶ 200K per machine or
- ▶ \$1306/month/machine
- ▶ \$3540/month/machine X72 months
- ▶ 0.69aus per us \$





<https://mimeographrevolution.tumblr.com/post/167611522517/fullerton-college-library-part-of-the-general>



Tissue identification decrease scan size



Issue: Data Storage

- Streaming of data superior to static storage
 - 870 terabyte server at CTA Lab and files must be deleted every 3 weeks
 - Slides can be rescanned easily
 - Can keep consult slides longer
 - Onsite servers becoming much less expensive (1 petabyte server is \$5,000)

- **HOW BIG IS A PETABYTE?**

One quadrillion bytes!!

1 billion bytes!

storage

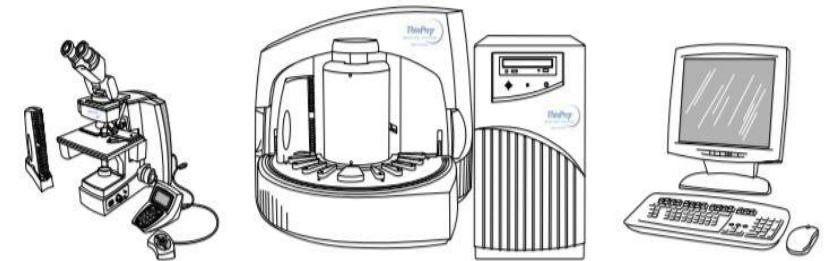
- ▶ Slide #11--Data storage
- ▶ USE PETABYTE--THEN SHOW 3 USES WITH WEIRD AI TERMINATOR/SKYNET
- ▶ 1. access of old cases
- ▶ 2. use by outside clients
- ▶ 3. selling data--research and AI development

Digital Pathology Future

- ❖ Deep learning/Artificial intelligence diagnostics
 - ❖ Cytology screening/aid
 - ❖ Not yet for primary diagnostics
- ❖ Addresses worldwide shortage of pathologists
 - ❖ Rural connections

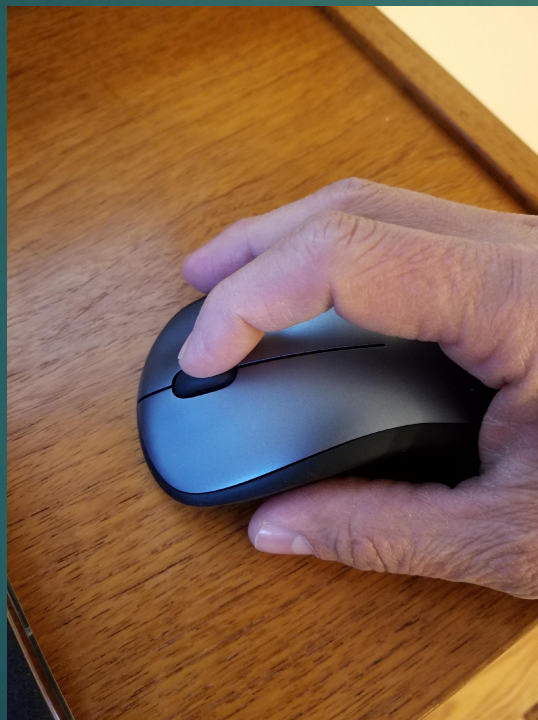


Operation Summary and Clinical Information



The ThinPrep® Imaging System

- ▶ Slide #12--Pathologist training--need to train and retrain--take slides away
- ▶ PHOTO--MICROSCOPE IN CHAINS? YOUNG VS OLD?
- ▶ 1. Acceptance of new technology--Not all pathologists are created equal
- ▶ 1. Young don't have experience so not willing to learn new technology in addition to pathology
- ▶ 2. Older not tech forward--don't type well



Issue: CLIA Approval

- CAP Recommendations for Quality Assurance
 - 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
- All clients who read remotely and have a CLIA license will be aided by CTA Lab in this QA

Issue: Lab Certification

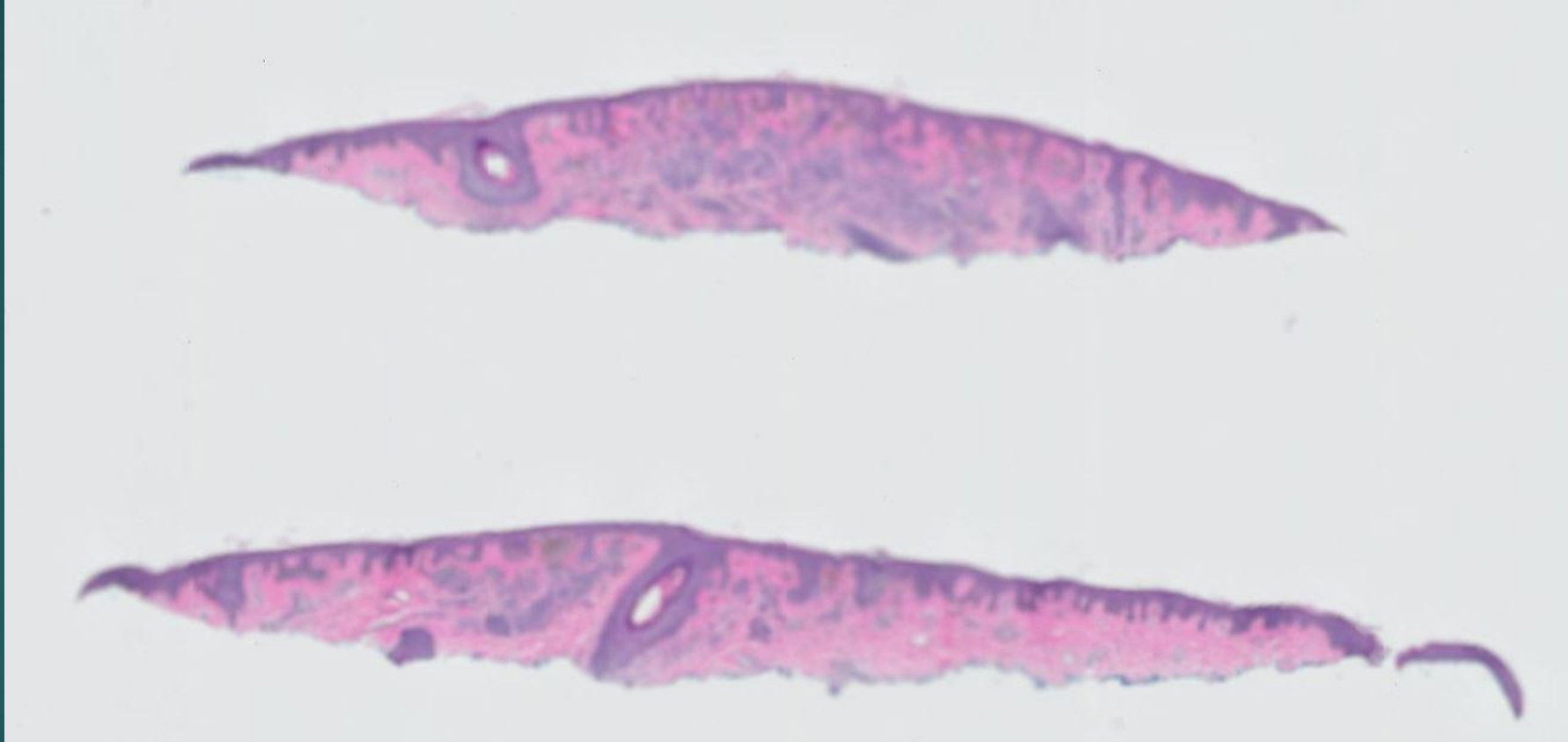
- Laboratory primarily regulated by CLIA not by FDA
 - Can use machines without FDA approval if QA is performed appropriately in house
 - CAP supportive
 - *i.e.* Immunohistochemistry not FDA approved
- Use of machine with FDA approval requires use exactly in the same manner that FDA study was performed.
 - 4k monitor--\$3500 vs \$500
 - Speed of internet, *etc.*

Issue: Lab Certification

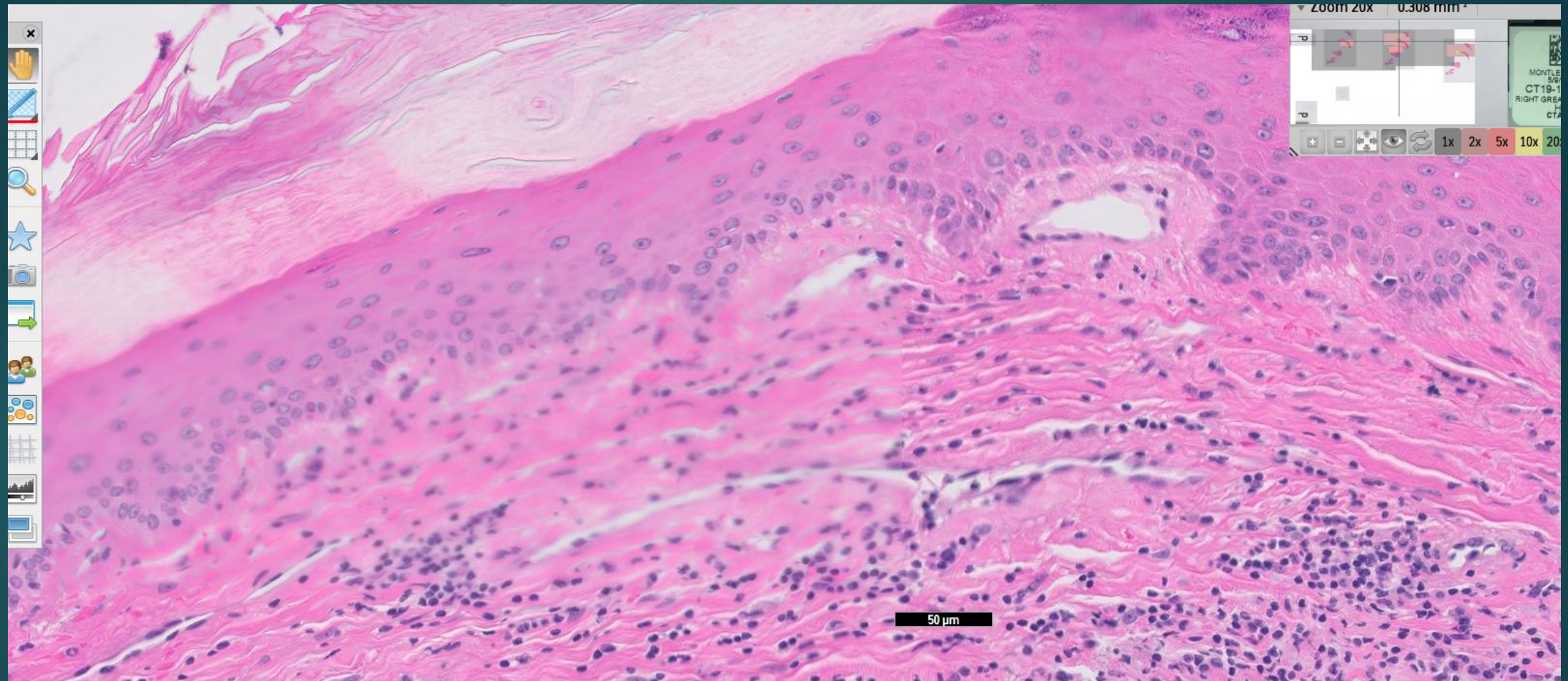
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 - CAP supportive
 - *i.e.* Immunohistochemistry not FDA approved
- Use of machine with FDA approval requires use exactly in the same manner that FDA study was performed.
 - 4k monitor--\$3500 vs \$500
 - Speed of internet, etc.

No need for added cost

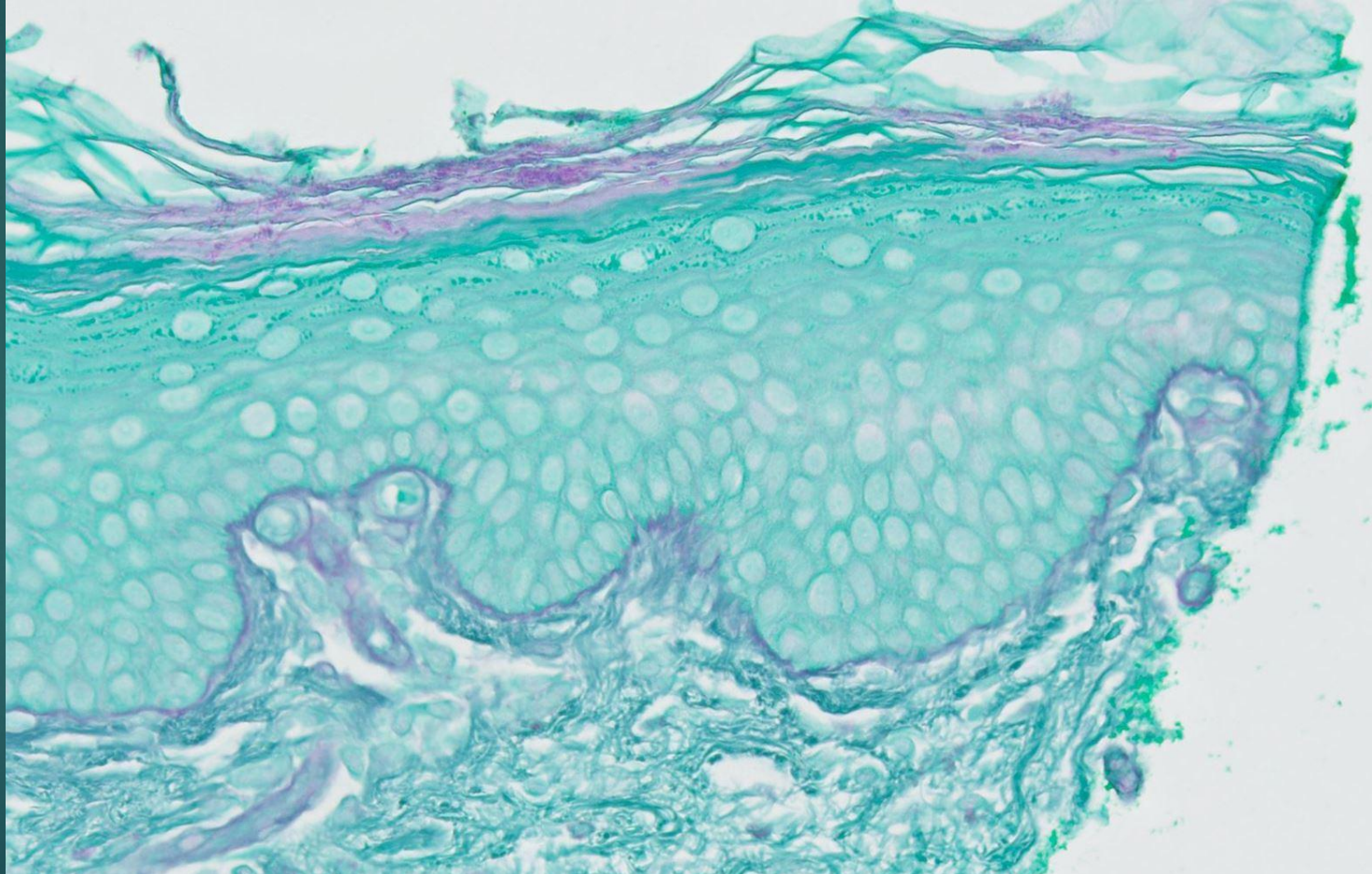
Cases to read the old way



blurry sections



Cases to read the old way



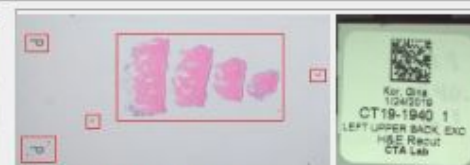
Cases to read the old way—many

Showing case 1-111 of 111 cases matching 'ct1919' in 'All cases' 1 case(s) selected

CT191976 25-Jan-19 10:42	CT191976 CT191976	01-Jan-00 (-) Other	4	<Unassigned> Finished
CT191986 29-Jan-19 06:17	CT191986 CT191986	01-Jan-00 (-) Other	4	<Unassigned> Finished
CT191998 28-Jan-19 09:27	CT191998 CT191998	01-Jan-00 (-) Other	4	<Unassigned> Finished
CT191961 28-Jan-19 08:58	CT191961 CT191961	01-Jan-00 (-) Other	5	<Unassigned> Finished
CT19197 04-Jan-19 11:35	CT19197 CT19197	01-Jan-00 (-) Other	5	<Unassigned> Finished
CT191974 28-Jan-19 08:33	CT191974 CT191974	01-Jan-00 (-) Other	5	<Unassigned> Finished
CT191902 28-Jan-19 12:23	CT191902 CT191902	01-Jan-00 (-) Other	6	<Unassigned> Finished
CT191908 28-Jan-19 06:34	CT191908 CT191908	01-Jan-00 (-) Other	6	<Unassigned> Finished
CT191928 25-Jan-19 13:14	CT191928 CT191928	01-Jan-00 (-) Other	6	<Unassigned> Finished
CT191913 28-Jan-19 06:41	CT191913 CT191913	01-Jan-00 (-) Other	7	<Unassigned> Finished
CT191922 30-Jan-19 06:22	CT191922 CT191922	01-Jan-00 (-) Other	7	<Unassigned> Finished
CT191936 28-Jan-19 10:32	CT191936 CT191936	01-Jan-00 (-) Other	7	<Unassigned> Finished
CT191956 28-Jan-19 07:46	CT191956 CT191956	01-Jan-00 (-) Other	8	<Unassigned> Finished
CT191965 28-Jan-19 08:49	CT191965 CT191965	01-Jan-00 (-) Other	8	<Unassigned> Finished
CT191912 25-Jan-19 13:39	CT191912 CT191912	01-Jan-00 (-) Other	10	<Unassigned> Finished
CT191949 25-Jan-19 13:07	CT191949 CT191949	01-Jan-00 (-) Other	10	<Unassigned> Finished
CT191958	CT191958	01-Jan-00 (-)		<Unassigned>



Slide Id: 730872 Stain info: ☆



Slide Id: 730873 Stain info:



Slide Id: 730880 Stain info:



Slide Id: 730874 Stain info:



Slide Id: 730881 Stain info:



Slide Id: 730875 Stain info:



Slide Id: 730882 Stain info:



Slide Id: 730876 Stain info:



Slide Id: 730883 Stain info:



Slide Id: 730877 Stain info:



Slide Id: 730884 Stain info:



Slide Id: 730885 Stain info:

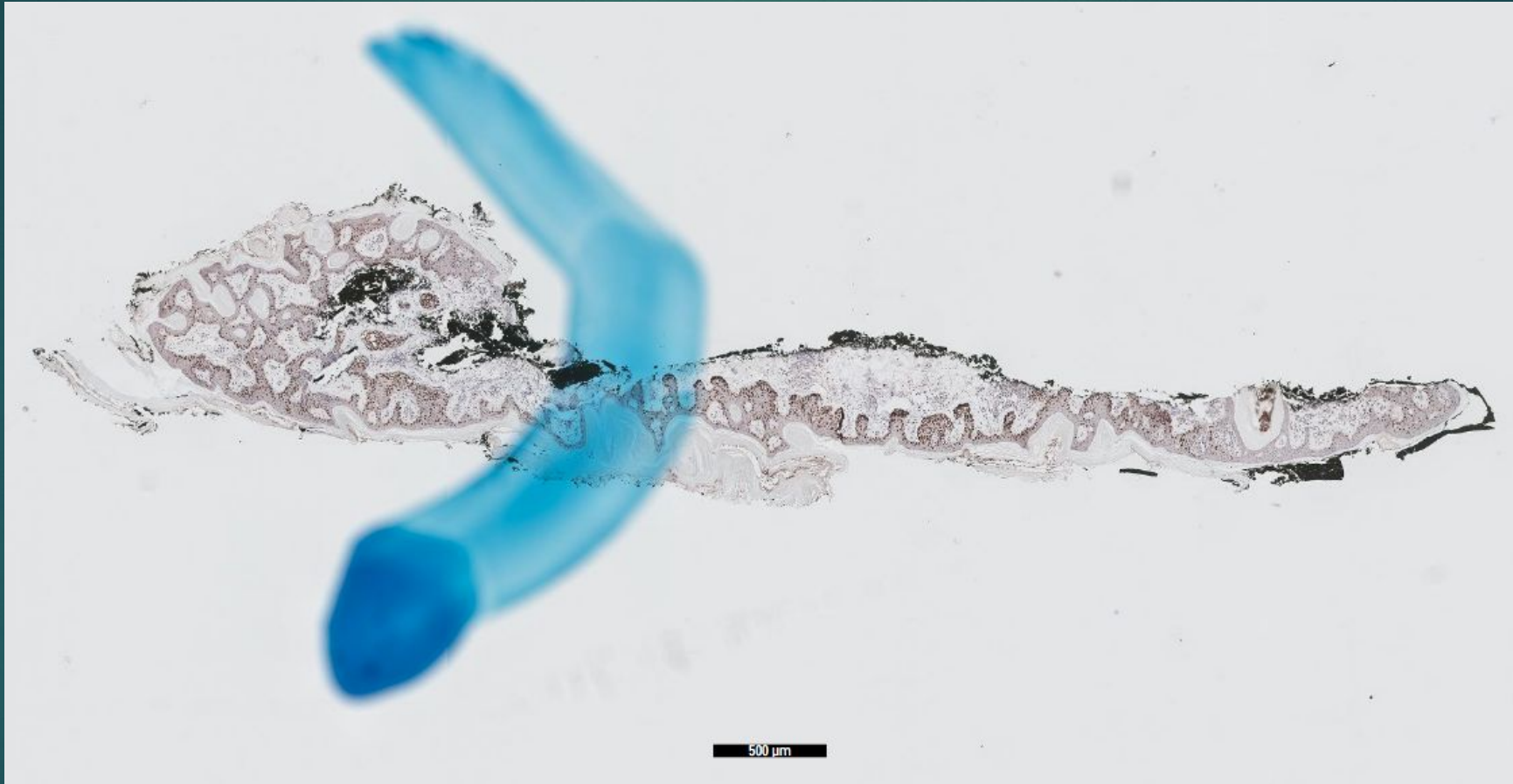


Slide Id: 730878 Stain info:

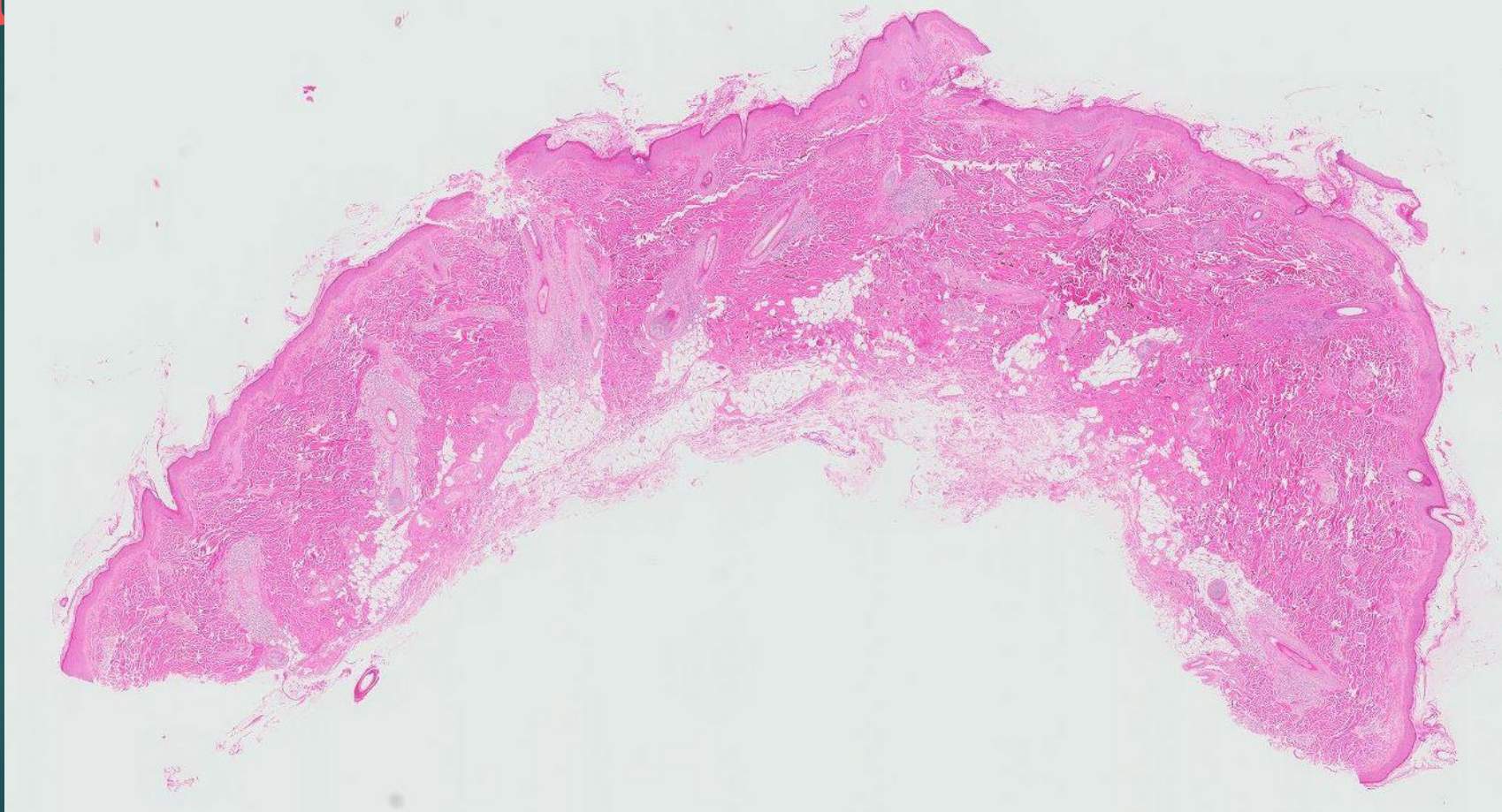


Slide Id: 730879 Stain info:

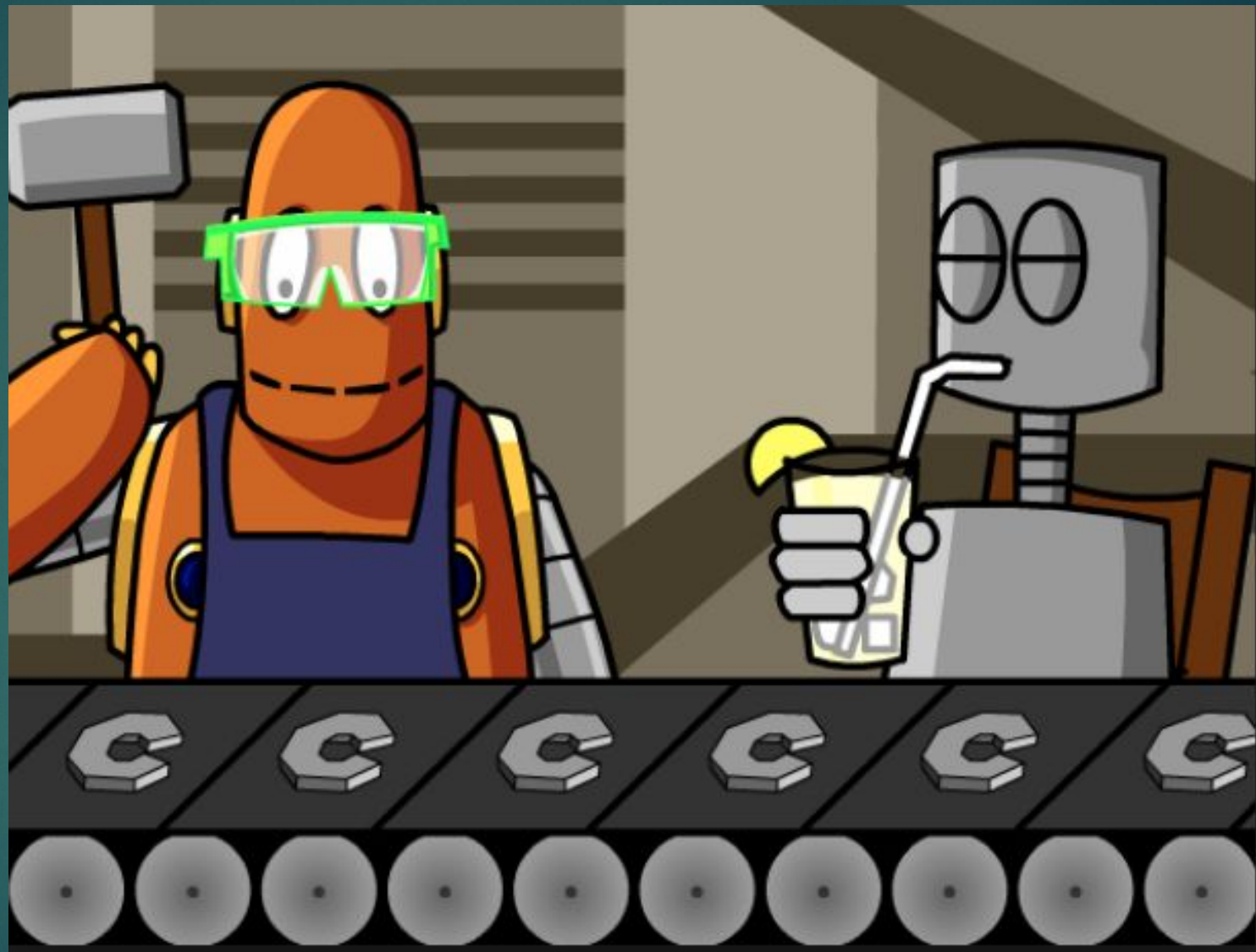
WRITING ON SLIDE--BLURRY



Issue: Low quality H&E is
still low quality on a scan







<https://www.brainpop.com/technology/scienceandindustry/assemblyline/>

Slide labels





RIS	A30	12:40	DELAYED
NKFURT	B01	12:40	DELAYED
YORK	A19	12:45	DELAYED
SELS	B13	12:45	DELAYED
N	A26	12:50	DELAYED
V	A37	13:00	DELAYED
JANEIRO	A40	13:00	DELAYED
M	A28	13:10	DELAYED
	A34	13:15	DELAYED
	A22	13:20	DELAYED
	B09	13:30	DELAYED
	A27	13:30	DELAYED

COST OF SCREENS



Summary—important points

- Timing of case delivery to pathologist
 - Number of machines needed—generally at least 3
 - 1 slide per 2 minutes—so 40 seconds with 3 machines
 - Time saved because of no need for delivery of slides to off site pathologists
- Paperless or not
 - May end up with 2 systems (on and off site)
 - Cases easier to misplace
 - Communication with offsite—Email? Texting? Phone?



Go Timbers and Thorns!

Thank you!



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