

Implementation of Virtual Microscopy in Education of a large Medical Center



Peter Riegman

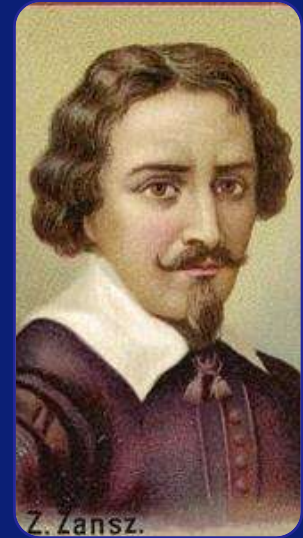


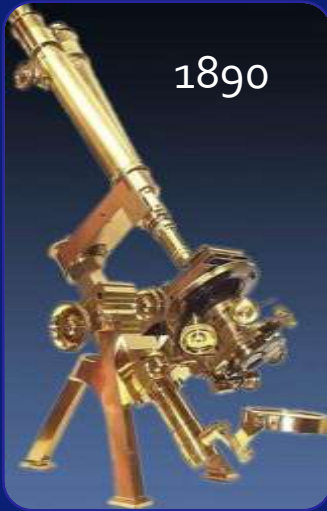
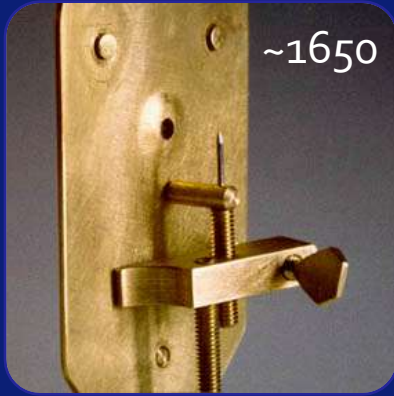
Heidelberg
12-2-2009

Microscopy

Optical microscope ~1590

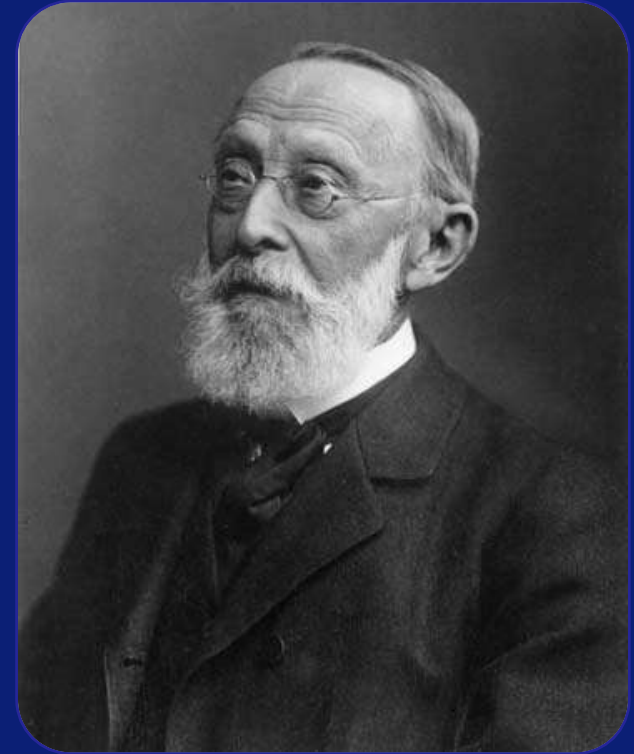
- Zaccharias Janssen
- Antonie van Leeuwenhoek
- Robert Hooke





Microscopy in Pathology

- Rudolph Virchow 1821-1902





Multiheader

But what if your colleague is in.....?

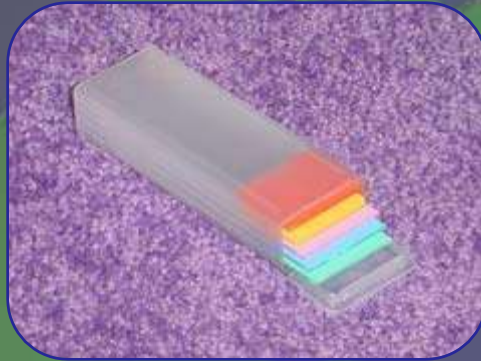


(Dynamic) Telepathology ?

- Remote control of motorized microscope
- Minimally requires an operator / technician at microscope station
- Pathologist has to be “booked”



Send slide?



Consultation by mail

- Slides get lost
- Slides get broken
- Delay in mail



2004



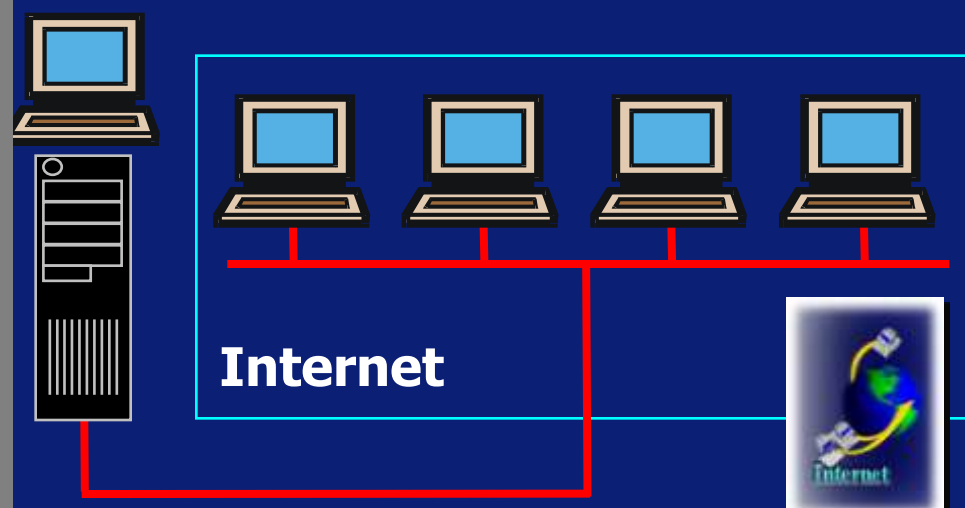
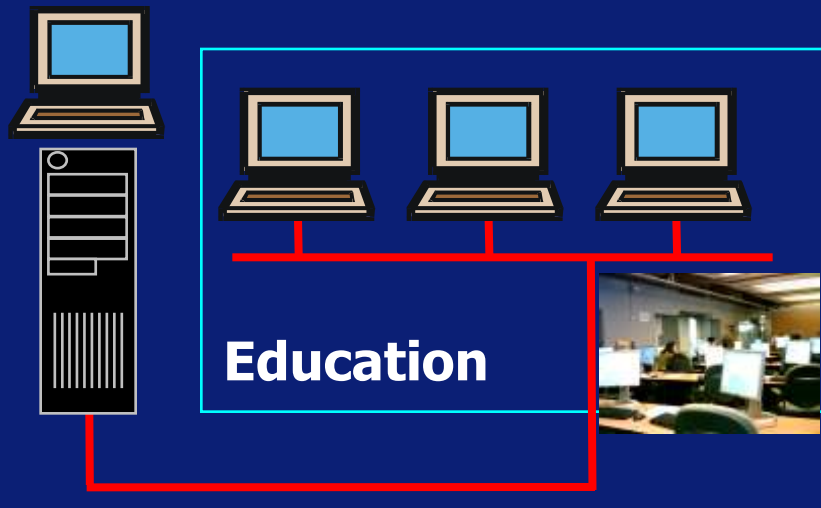
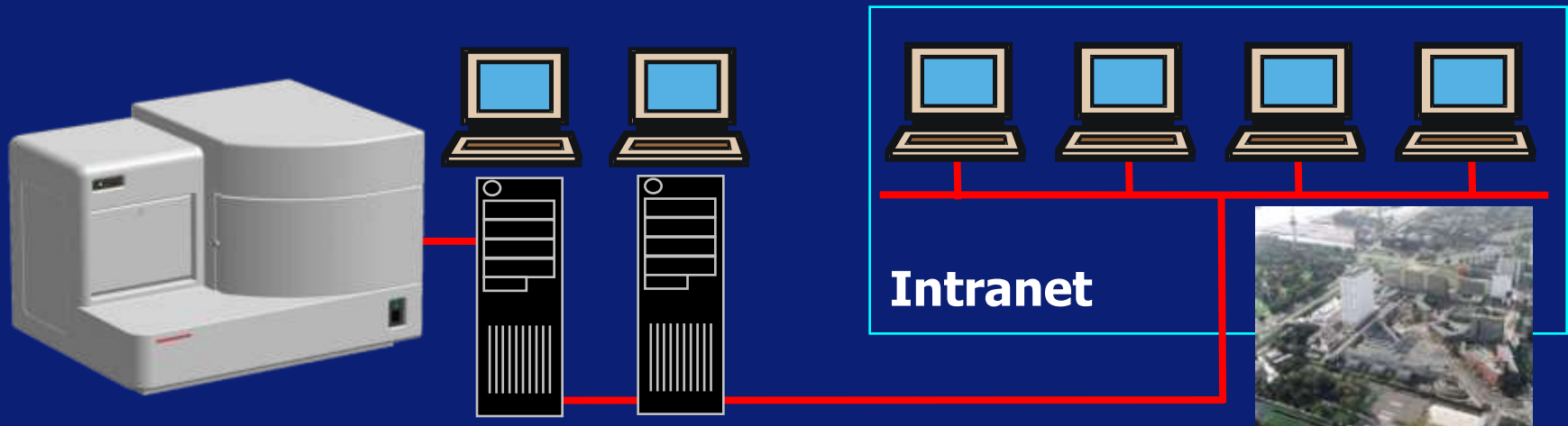
Advantages Virtual Microscopy

- Glass slides won't break
- Contact over large distances and time
- Large groups can all work with the original slide
- Better interaction during presentations or education
- Improved logistics (link in LIMS and digital report)
- Digital networks
- Digital archive
- Digital searches

Virtual Microscopy Niches

- Education / Teaching
- Work discussions (routine clinical meeting) / Presentations
- “Virtual” diagnostic panel, slide clubs, histopathology forum
- Pathology review in multi-center studies
- Tissue Micro Array Analyses
- Research
- Consultation
- External Quality Assessment (ring trials)
- Support Tissue Bank

Erasmus MC Virtual Microscopy Networks



Education

aanwezig om te helpen bij het bestuderen van de stof en om eventuele vragen te beantwoorden. Tussendoor wordt aanvullende informatie verstrekt middels Power-Point presentaties.

2 Handleiding

De opdrachten worden gemaakt aan de hand van de volgende acht microscopische preparaten:

- [Maag, fundus](#) (HE, aap)
- [Maag, pylorus](#) (HE, mens)
- [Maag, pylorus \(PAS, mens\)](#)
- [Maag, gastritis](#)
- [Duodenum](#)
- [Ileum](#)
- [Colon, normaal](#)
- [Colon, M. Crohn](#)
- [Colon, colitis ulcerosa](#)

<http://coo-digimic.erasmusmc.nl/ndpserve.dll?ViewItem?ItemID=335>

2.1 Maag

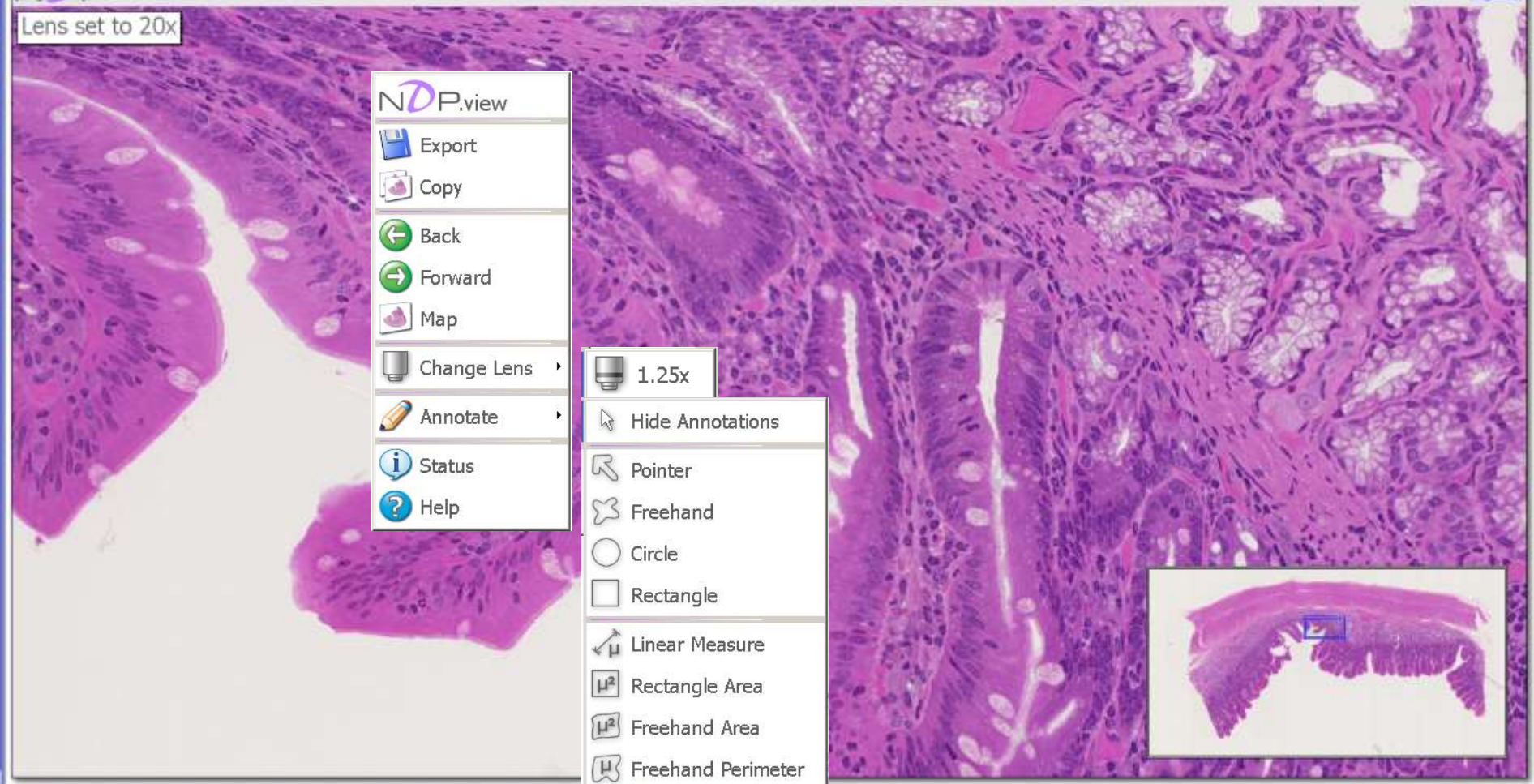


Lens set to 20x

NDP.view

- Export
- Copy
- Back
- Forward
- Map
- Change Lens
- Annotate
- Status
- Help

- 1.25x
- Hide Annotations
- Pointer
- Freehand
- Circle
- Rectangle
- Linear Measure
- Rectangle Area
- Freehand Area
- Freehand Perimeter
- Choose Colour





Developments in Erasmus MC study material



Traditional studybooks



Themabooks



Elektronic study methods in
WORD, PDF of HTML
format.



Virtual Microscopy coupled
through active links from the
elektronic studymaterial.

Development in education

Find the 3.186.704.593.493 differences.....



Development in education

- No need for many microscopes
- Only one single good quality slide required



Evaluation after 2 years

- Students prefer virtual microscope
- Some would like traditional microscope experience
- Reviewing tutorial “on-line” appreciated by students
- More efficient use of staff



Virtual microscopy in education

- Improved integration of pathology in curriculum
- Web resources with slide collections
 - <http://www.path.uiowa.edu/virtualslidebox/>
- Third party software tailored to teaching
 - Slidepath – [Digital Slidebox](#)





The screenshot displays the Digital Slidebox web interface. At the top, there is a navigation bar with links for Help, Contact, Profile, and Logout. Below this, a blue header contains the version number (4.4.1) and a welcome message for Michael den Bakker. The main content area features a table of folder contents with columns for Icon, Name, Description, Details, Delete, Visibility, and all/none. The table lists two folders: 'Example Folder' and 'Test1'. The 'Test1' folder has a description: 'Pathology of obstructive and restrictive lung diseases'. At the bottom of the interface, there are buttons for 'Create New Folder', 'Reset Order', 'Delete Selected', 'Copy Selected', and 'Paste Here'.

Icon	Name	Description	Details	Delete	Visibility	all/none
	Example Folder					
	Test1	Test Pathology of obstructive and restrictive lung diseases				



Content

Icon	Name	
	Case 01	<p>Clinical History: A 50 year old man presented with rectal b</p> <p>Physical Examination: Unremarkable.</p> <p>Investigation/Treatment: Colonoscopy (QuickTime needed to view l</p>
		<p>Clinical History: A 50 year old man presented with rectal b emptying after defecation.</p> <p>Physical Examination: Digital rectal examination revealed a mass</p> <p>Investigations: Colonoscopy (QuickTime needed to view l link) on the posterior wall of the rectum co ultrasound (QuickTime needed to view lin possibly breached, and that the anal sphincters may be involved. Ultrasound of the abdomen and liver ultrasound confirmed these findings and showed no evidence of metastases.</p>
	Case 02	<p>Initial Treatment: As the status of the anal sphincters was unclear and following discussion with the patient (who desired not to have radiotherapy) an abdominoperineal resection was performed.</p> <p>Macroscopic Pathology: The laboratory received a specimen comprised of rectum and anus 30 cm long with proximal resection diameter of 3cm, a distal (squamous mucosal) resection diameter of 2cm, a maximal rectal diameter of 6cm and attached mesorectum 30 x6 x6 cm. The serosal surface was unremarkable. On opening the specimen, an 8x8cm tumour was noted on the posterior aspect of the lower third of the rectum. This infiltrated but did not appear to breach the muscularis propria, invading to a depth of 2cm, coming to within 4cm of the nearest (posterior) mesorectal radial resection margin, 12.5cm of the nearest serosal surface, 16cm of the proximal resection margin, 4cm of the distal resection margin and 2.5cm of the dentate line (revise anorectal lymphatic drainage. The tumour did not appear to infiltrate the anal sphincters. 20 lymph nodes (grossly unremarkable 0.5-1.5cm in</p>



00:01



Afspelen



Select Slide

View Options

Answer Case



Annotation List



Narrative Annotations

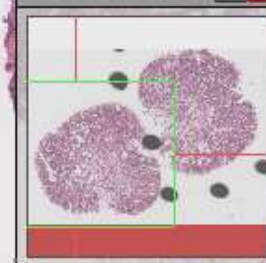
Polyp

These sections show an epithelial lesion.

Low Power Architectural features (how the cells arrange themselves- discernable at lower magnification):

- At low power, more crowded, darker areas are discernible. These are likely to contain the most significant pathology and warrant closer scrutiny.
- The protruberant shape of the polyp can be seen in cross-section.
- At the base/stalk margin paler more.

Slide overview



X:30 Y:-10
Mag:1x

Annotation List

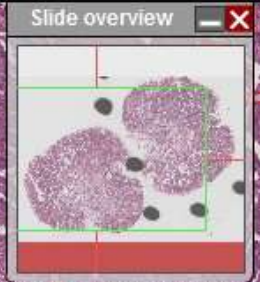
Narrative Annotations

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Case Questionnaire

Is this area normal or abnormal?

Normal

Abnormal

Is the abnormal area epithelial (cells tend to cohesion with formation of groups, sheets, islands, possibly with specific architectural features: tubules, glands, papillae)

Epithelial

Non-epithelial

If epithelial, is the architecture normal or abnormal?

Normal

Abnormal

Is there loss of normal architectural structures (e.g. lumens/papillae)?

Yes

No

Is there necrosis (is there a greater amount of cells dying in groups than is normally seen)?

Yes

No

Is there abnormal stratification (multilayering of cells where usually fewer-often only one-layers exist)?

Yes

No

Is there abnormal proliferation (greater numbers of mitoses including mitsoses occurring too far from the basal layer)?

Yes

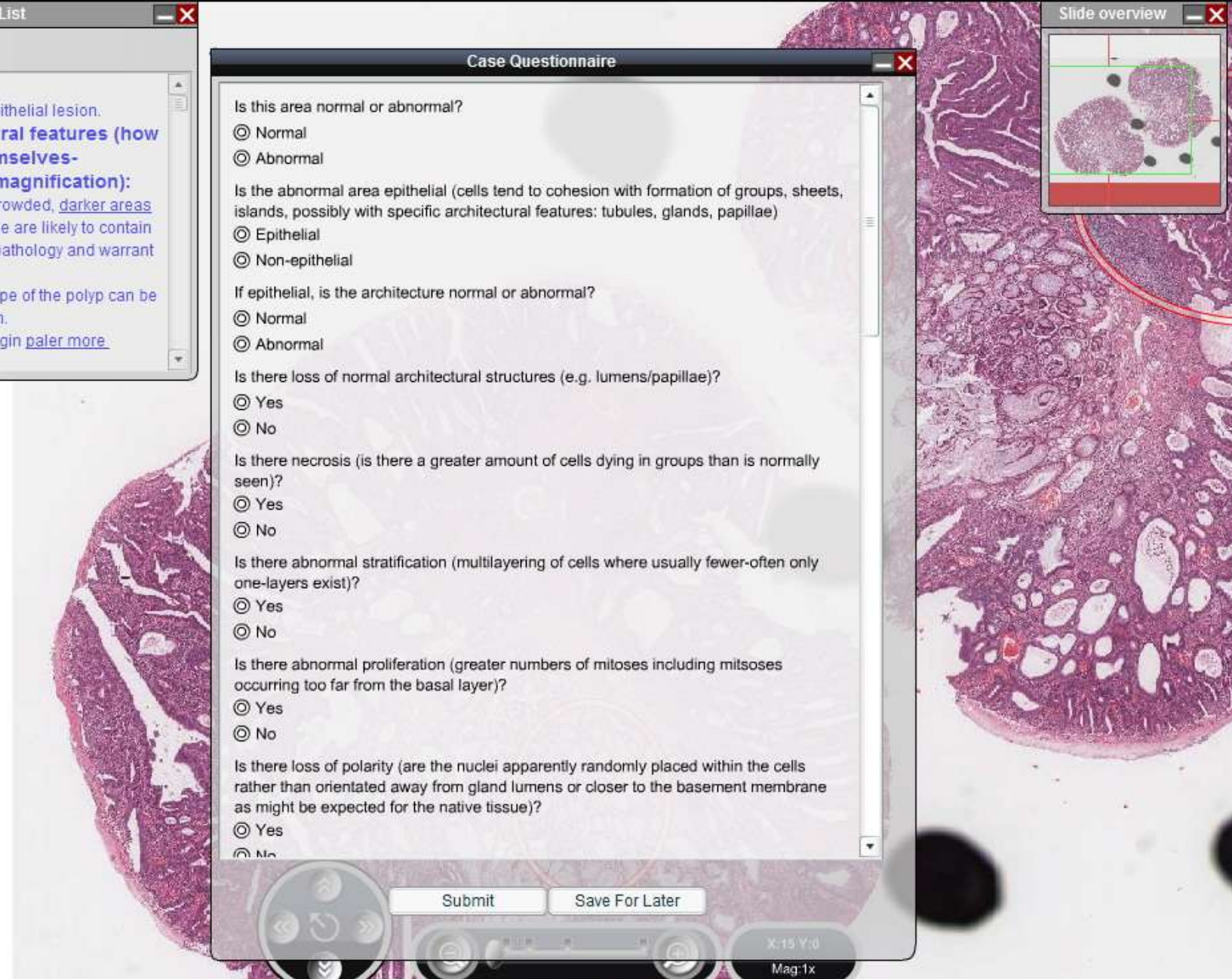
No

Is there loss of polarity (are the nuclei apparently randomly placed within the cells rather than orientated away from gland lumens or closer to the basement membrane as might be expected for the native tissue)?

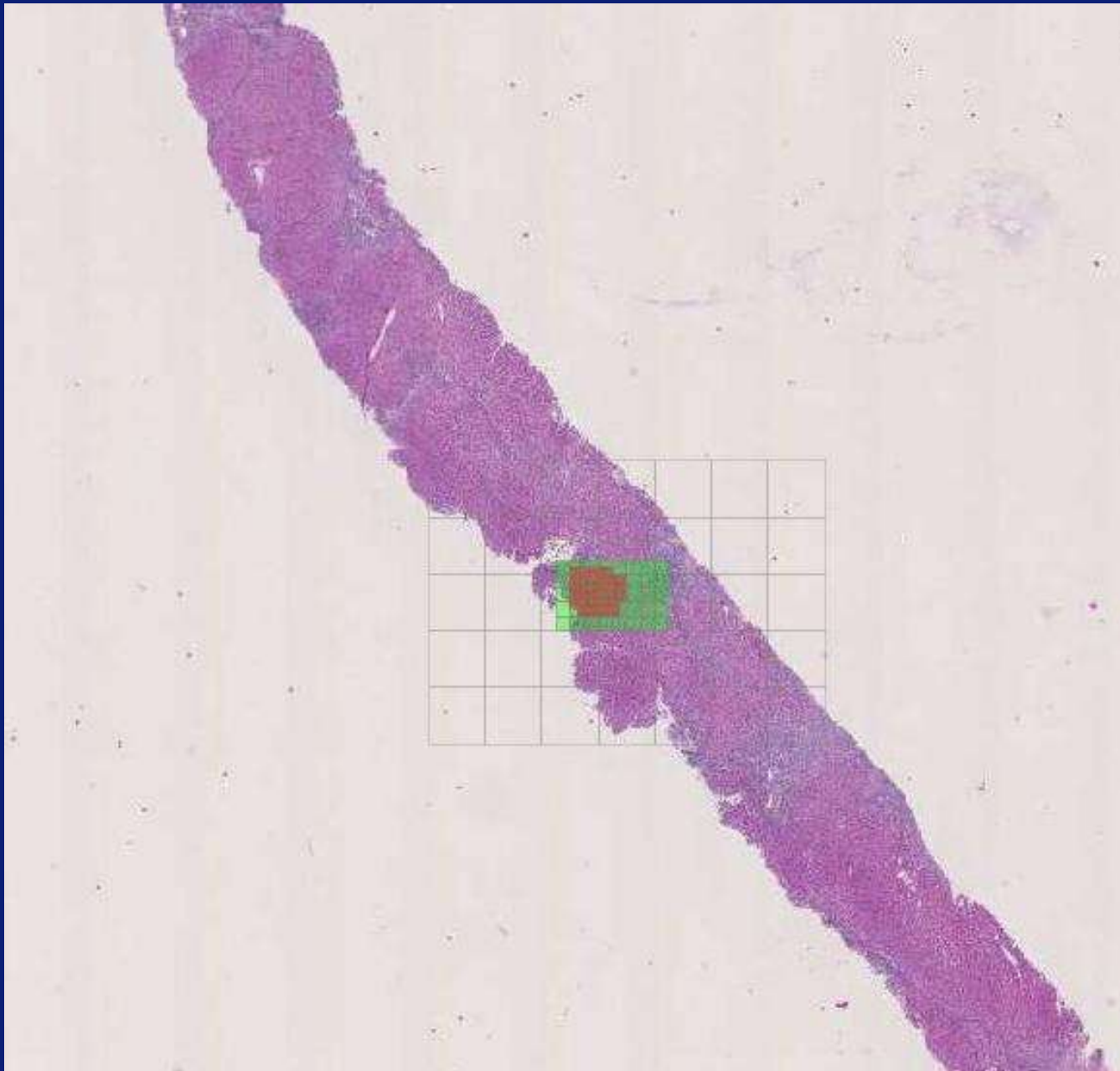
Yes

No

Submit Save For Later



X:15 Y:0 Mag:1x



OEI Histopathology Forum

Virtual Histopathology Forum

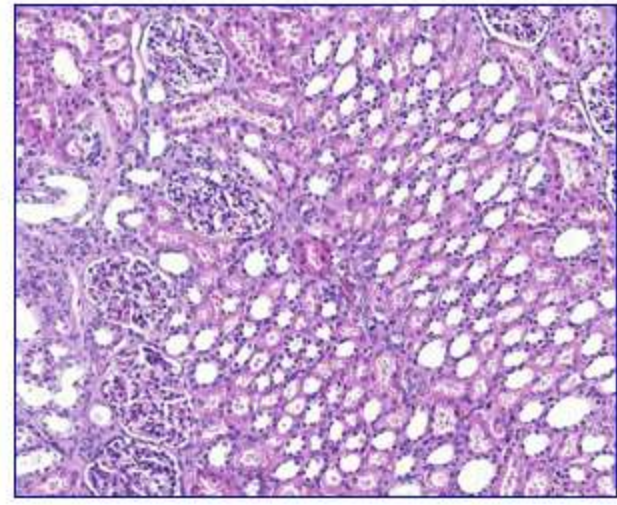
OEI Virtual Histopathology Forum

Menu

- Home
- Open Cases
- Closed Cases
- Search
- Admin Panel
- Logout
- Submit a case
- About us

This forum aims for harmonization of the histopathology in European Cancer Institutes. Members of the [Organization of European Cancer Institutes \(OEI\)](#) can discuss difficult, interesting and innovative histology cases on this site, after proper [registration](#).

The discussions are supported by means of virtual microscopy, making the complete histology available on your computer, allowing you to make a fair judgment. The person delivering the case will become the moderator of the case by following the [Enter a new case procedure](#). Every visitor to the case can post comments to the case on which others can react. Only the moderator and the administrator are allowed to make changes in the comments on a case and in addition of course also the visitor can change his own comments. Although, it is preferred to shape the case by comments and arguments instead of changes. To make a scan of the glass slide the slide has to be send to the virtual



microscope following the [Scanning procedure](#). The Virtual Histopathology Forum is an initiative of the OEI Pathobiology Workgroup supported by [Erasmus MC pathology](#) equipment of the Tissue Micro Array Platform of the [Erasmus MC Tissue Bank](#). Equipment and involvement of volunteers to support this website and the forum are found at the [about us](#) page.

The last three new cases are:
[Cardial myxoma with.....](#)
[Usual Interstitial Pneumonia \(UIP\)](#)

Virtual Histopathology Forum

Menu

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[Submit a case](#)

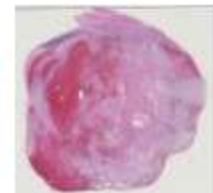
[About us](#)

Cardial myxoma with.....

Posted by: Riegman on: December 23, 2006, 10:46 am

[Post a reply](#) [Edit case](#)

A 60-year-old woman was found to have mass in the left atrium discovered after work-up for a stroke. The mass was removed and was found to be attached to the inter-atrial septum. The pathologist received a gelatinous and partly hemorrhagic partly beige colored tumour of about 3 cm.



Thee H&E stained slide shows a mixed fibro-collagenic and partly myxoid stroma with hemorrhagic areas with iron pigment deposits, and with typical "Gamna-Gandy" bodies. In addition, strands of cells and glandular structures are seen formed by cubical to cylindrical cells. The later showed atypia and proliferative activity, which is unusual.

This tumour must be seen as:

A cardial myxoma with:

- A) Glandular atypia
(Where do the ephthelial cells originate from?)
- B) Adenocarcinoma
- C) Metastasis of an adenocarcinoma of other origin

[Post a reply](#)

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What can be discussed in the forum

- Difficult cases
- Interesting cases
- Innovative procedures

**Closed cases form a reference set
Directly applicable in Pathology education**

People

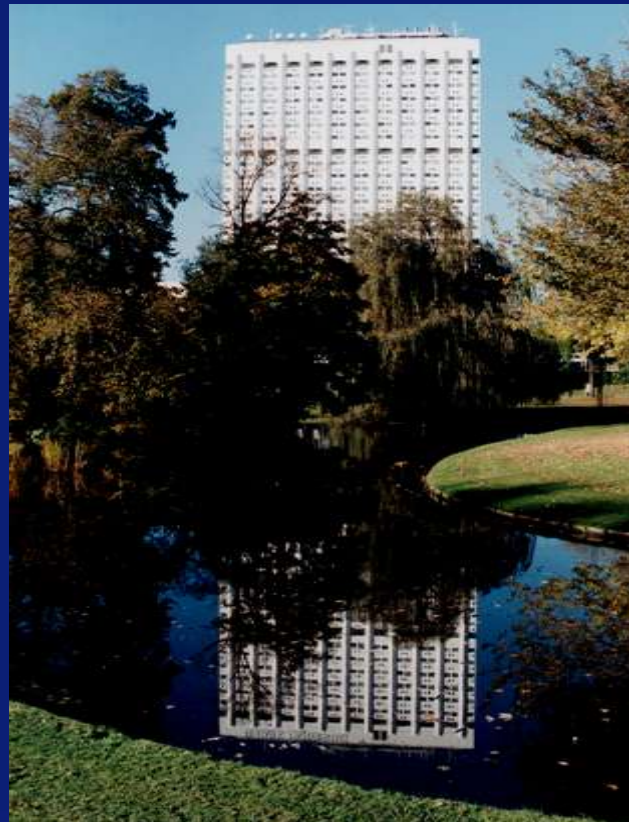
Erasmus MC:

Peter Riegman
Monique Oomen
Rosa Scholte
Pim Clotscher
Wouter Sjoerdsma
Frans Spruit
Daan Riegman
Winand Dinjens
Wolter Oosterhuis

Hamamatsu:

Uwe Denzer
Erk Mennenga-Klopp
Karl Weinbuch

Masafumi Oshira
Uchiyama
Walter Gräwe



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