Leeds Institute of Molecular Medicine

UNIVERSITY OF LEEDS

The future of pathology

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University of Leeds

2008

Contents

- Pathology data
- Value of large pathology datasets
- Pathology in a digital world
- Clinical trials as a test bed for NCIN?
- International collaborations

Importance of pathology data

- Quality control of pathology
- Quality control of surgery
- Quality control radiology
- Evaluation of prognostic & predictive factors
- Evaluation of effect of screening programmes
- Stratification of patients for comparison of treatments/outcomes between clinicians

Problems

- Text based reporting
- No automatic submission
- Minimum datasets not being used/returned
- Needs official policy that is audited
- National software system – regular updates and retro proofed

Opportunities

-
- RCPath minimum datasets
- NHS
- Digital pathology
- Unique opportunity to be the best in the world

Examples

- APE & operative mortality - correction for pathology data
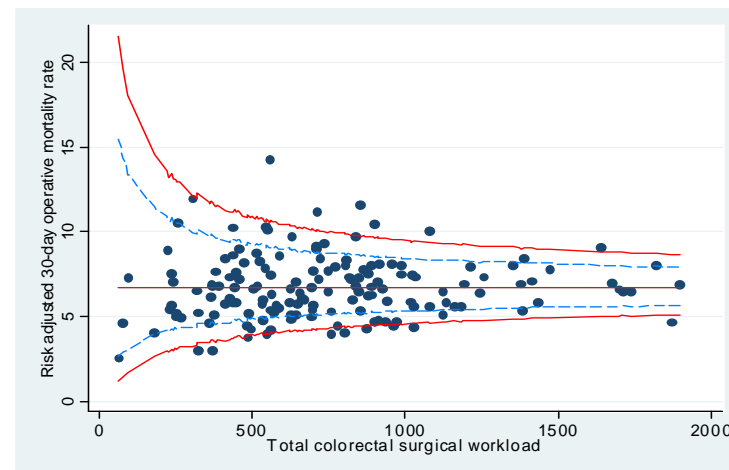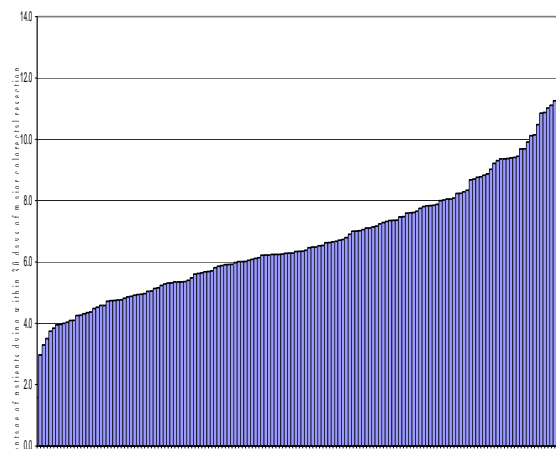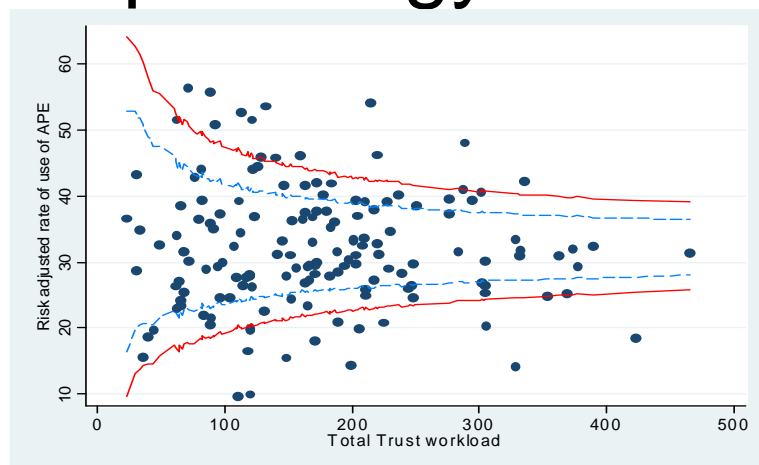
Lymph node yields in a population
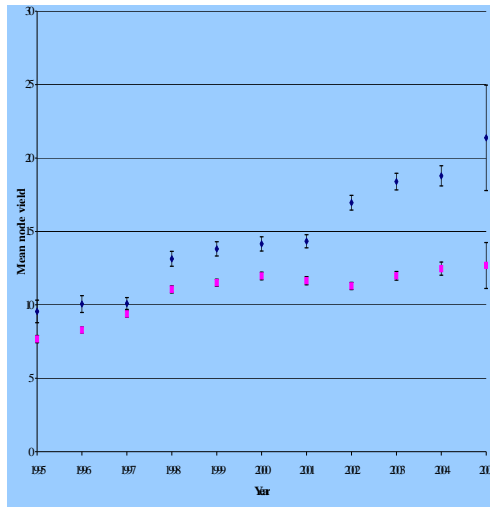
Lymph node yield over time

Table 2. Odds of Retrieving 12 or More Nodes From a Patient Multivariate Analysis

Characteristic	Odds Ratio	95% CI	P
Age, per year	0.98	0.98 to 0.99	< .01
Sex			
Male	1.00		
Female	1.19	1.07 to 1.33	< .01
Maximum tumour diameter, per cm	1.05	1.03 to 1.06	< .01
Local invasion			
T1	1.00		
T2	1.81	1.30 to 2.51	< .01
T3	3.49	2.58 to 4.71	< .01
T4	3.03	2.20 to 4.76	< .01
Unknown	1.54	0.71 to 3.35	.28
No. of positive nodes, per node	1.15	1.13 to 1.18	< .01
Year of diagnosis, per year	1.17	1.14 to 1.19	< .01
Pathologist			
General	1.00		
MDT	2.16	1.93 to 2.41	< .01
Surgeon			
General	1.00		
MDT	1.40	1.24 to 1.58	< .01

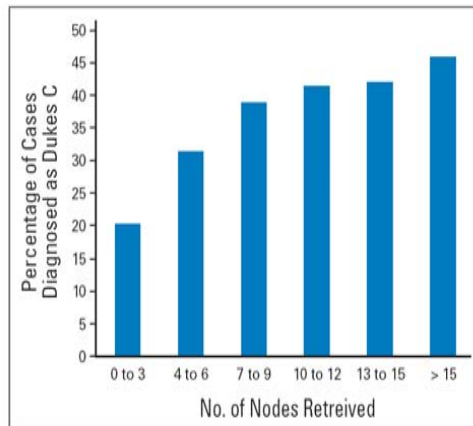Abbreviation: MDT, multidisciplinary team.

Fig 1. Percentage of cases diagnosed as stage III in relation to the number of nodes retrieved.

% cases diagnosed Stage III/Dukes C by lymph node yield in Yorkshire

Multivariate analysis of factors affecting nodal yield

Stage II high risk features

Factor	Category	Yorkshire (rectal)			
		survival	95% CI	X^2	p value
Extent of spread beyond muscularis propria	<3m	76.3	70.3 - 81.3	26.2 (4)	<0.00 01
	3 to 5 mm	69.1	55.9 - 79.2		
	>5mm	54.1	42.9 - 64.0		
	Not reported T3	73.5	61.3 - 82.4		
	Not reported T4	44.8	31.7 - 57.0		
Peritoneal involvement	Absent	71.4	66.7 - 75.6	24.1 (2)	<0.00 01
	Present	39.1	24.4 - 53.5		
	Not reported	63.7	51.1 - 73.8		
Venous invasion	Not evident	70.2	65.4 - 74.4	15.0 (2)	0.0006
	Present	53.0	40.7 - 63.9		
	Not reported	70.1	51.5 - 82.7		
Margin involvement	Not involved	71.9	67.3 - 76.0	15.1 (2)	0.0005
	Present	48.0	36.6 - 58.5		
	Not reported	59.8	33.6 - 78.5		
Tumour perforation	Absent	77.0	68.6 - 83.4	6.28 (2)	0.0434
	Present	52.8	28.9 - 72.0		
	Not reported	65.4	60.2 - 70.1		
Dukes C - one positive node		57.4	50.1 - 63.9		

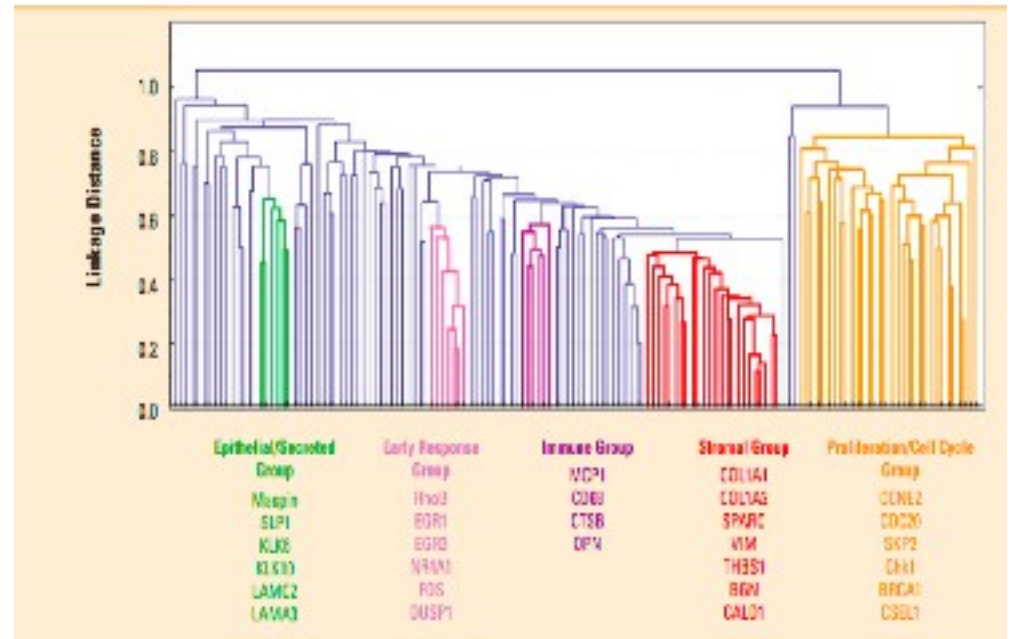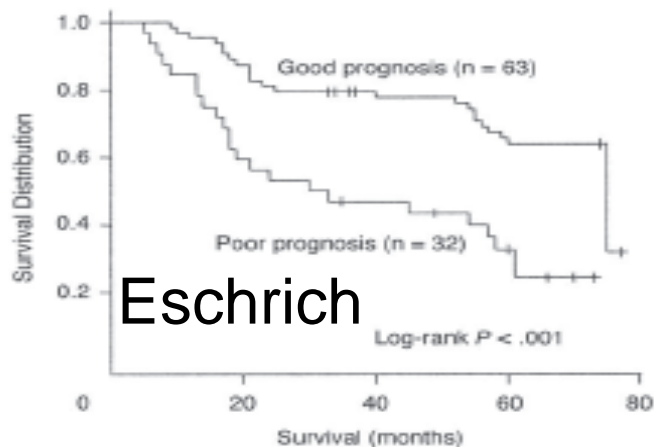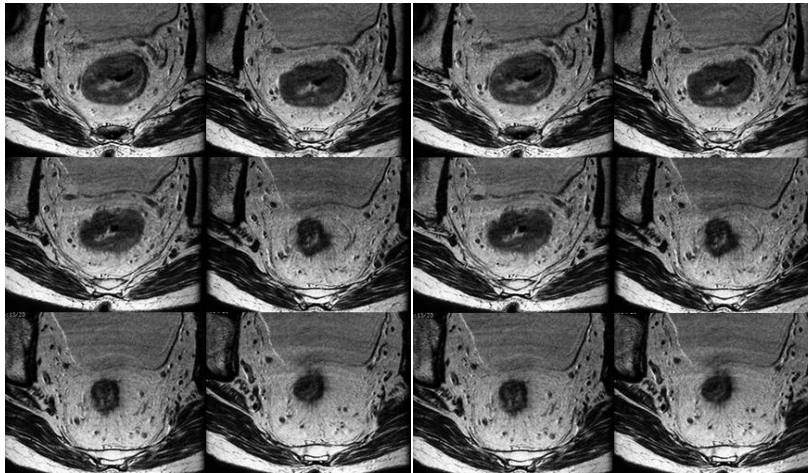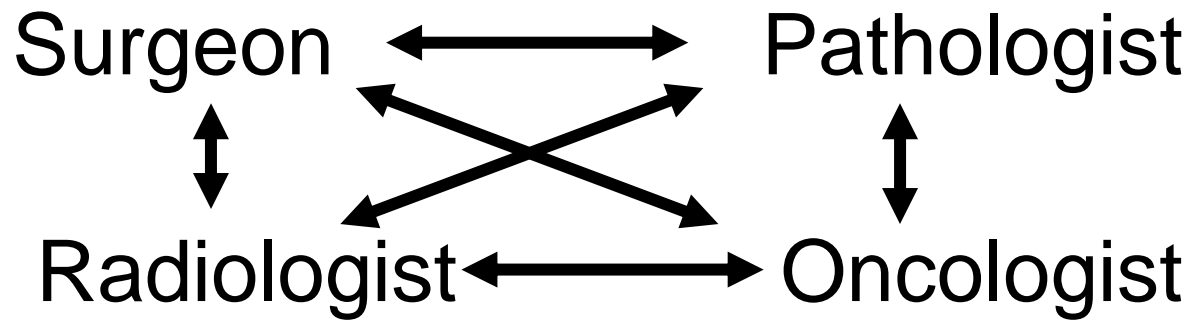# New prognostic tests

Wang
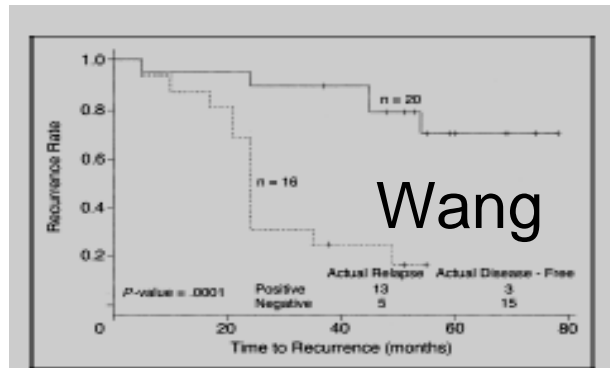
Fig 4. Kaplan-Meier curve and log-rank test of 36 independent patients. The risk of recurrence for each patient was assessed based on the 23-gene signature, and the threshold was determined by the training set. The high- and low-risk groups differ significantly (P = .0001).

Eschrich

Johnston

Surgeon ⟷ Pathologist

Surgeon ⟷ Oncologist

Radiologist ⟷ Pathologist

Radiologist ⟷ Oncologist
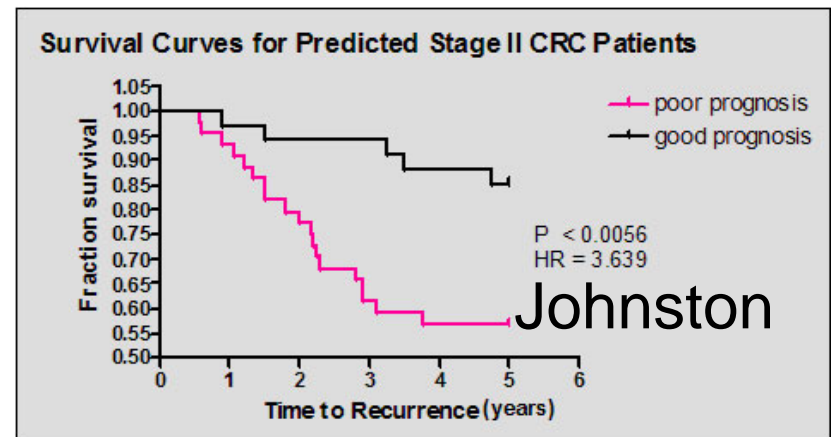
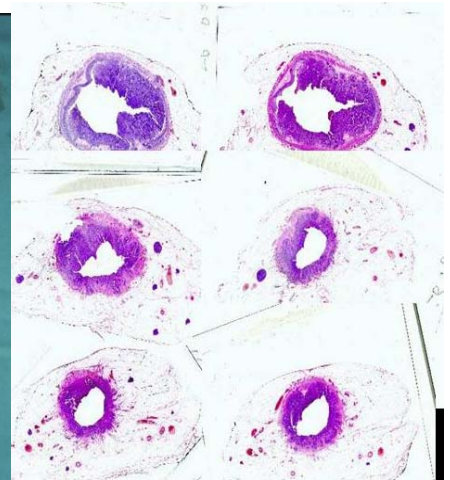MRI images for potentially clear radiological CRM

Pre neoadjuvant   Post neoadjuvant

Resected specimen for actual surgical plane

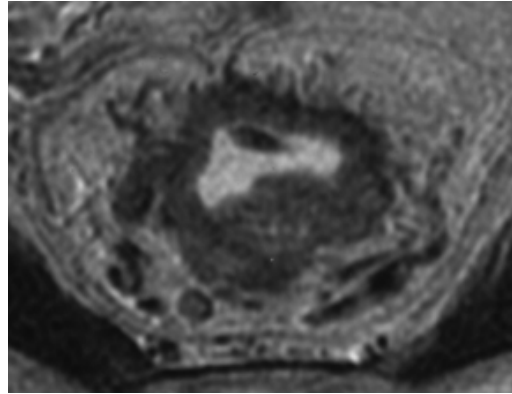Macro slices for surgical plane, CRM and radiology audit

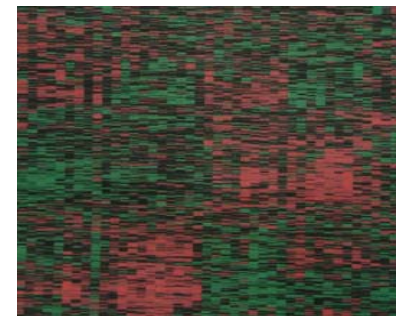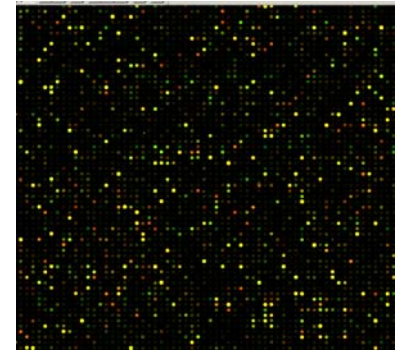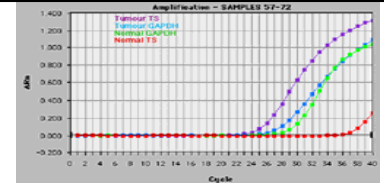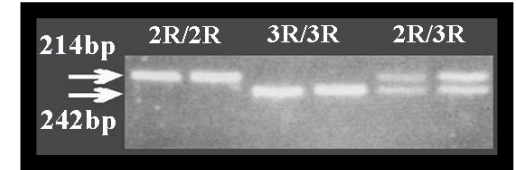Stained microscopic slices for CRM and high risk features

Current digital information

Patient records

Radiology

DNA and RNA data

Linking for trials – NCRI demonstrator
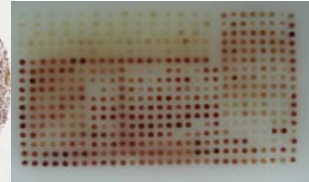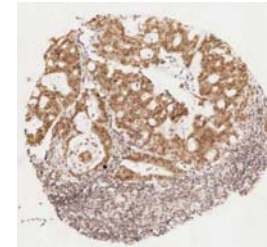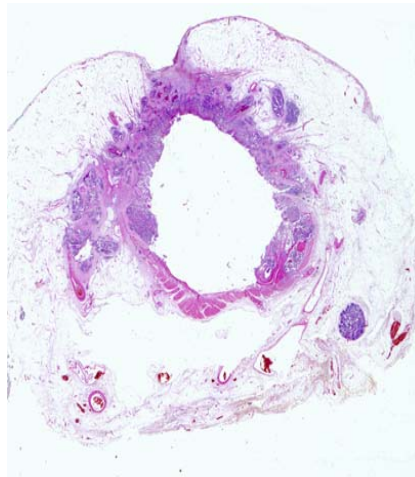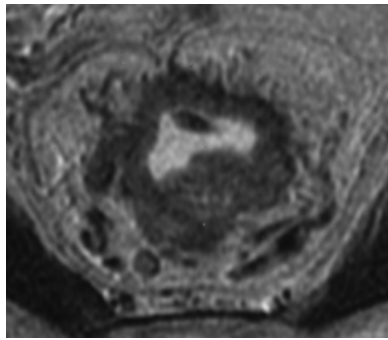## Patient ---- radiology ---- pathology---- biology

HES/Registry

Clinical trials

Local data
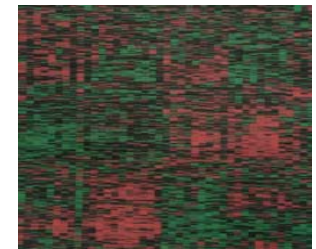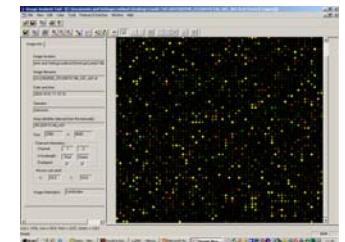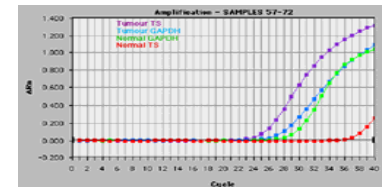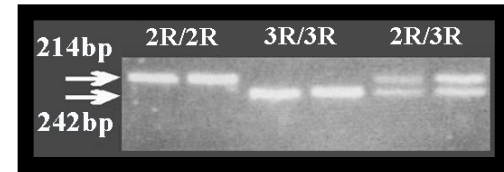
Why digital pathology?

- Advantages of microscopy
- PLUS
  - Permanent record
  - Always available
  - Viewed anywhere
  - Further digital manipulation
    - Image analysis
    - 3D
  - Integration with other digital data
- Disadvantages
  - User interface
  - Data storage
 - Networks
  - Pathologists

HOME PAGE

| Home | Public | Teaching | Diagnosis | EQA | Tissue bank |

Virtual pathology at the University of Leeds

Virtual slides can be made available for **commercial users**. For details please email with your requirements. All slides on this site are the property of the University of Leeds and no commercial use is sanctioned without prior permission.

Available on this site are the following:

- Virtual slides of common human cancers. These may be of interest to cancer patients or individuals studying cancer at any level.
- Our slide database of educational slides available for viewing.
- Undergraduate and postgraduate teaching packages.
- National external quality assurance schemes for renal, liver, gastrointestinal and haematological malignancies.
- Leeds Gift Tissue Bank site. View cases that have been added to this tissue bank.
- National Cancer Research Institute clinical trial demonstrator linking radiology with pathology.

- Clinical trials running from Leeds. Classic trial pathology and macros.
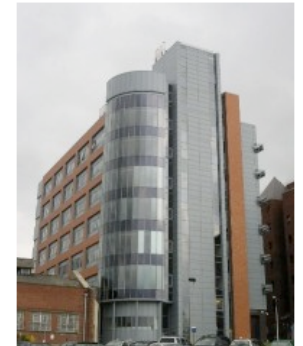
JIF Building SJUH

Site privacy statement. Comments or suggestions to the web editor. Help and FAQs.

NHS Pathology & Tumour Biology
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MRC CLASICC

CORE STUDY

Newer developments

Other sites

Leeds

Oxford

Europe

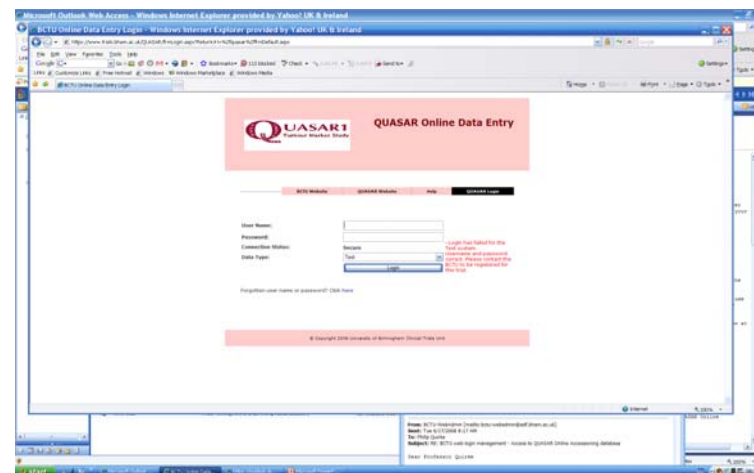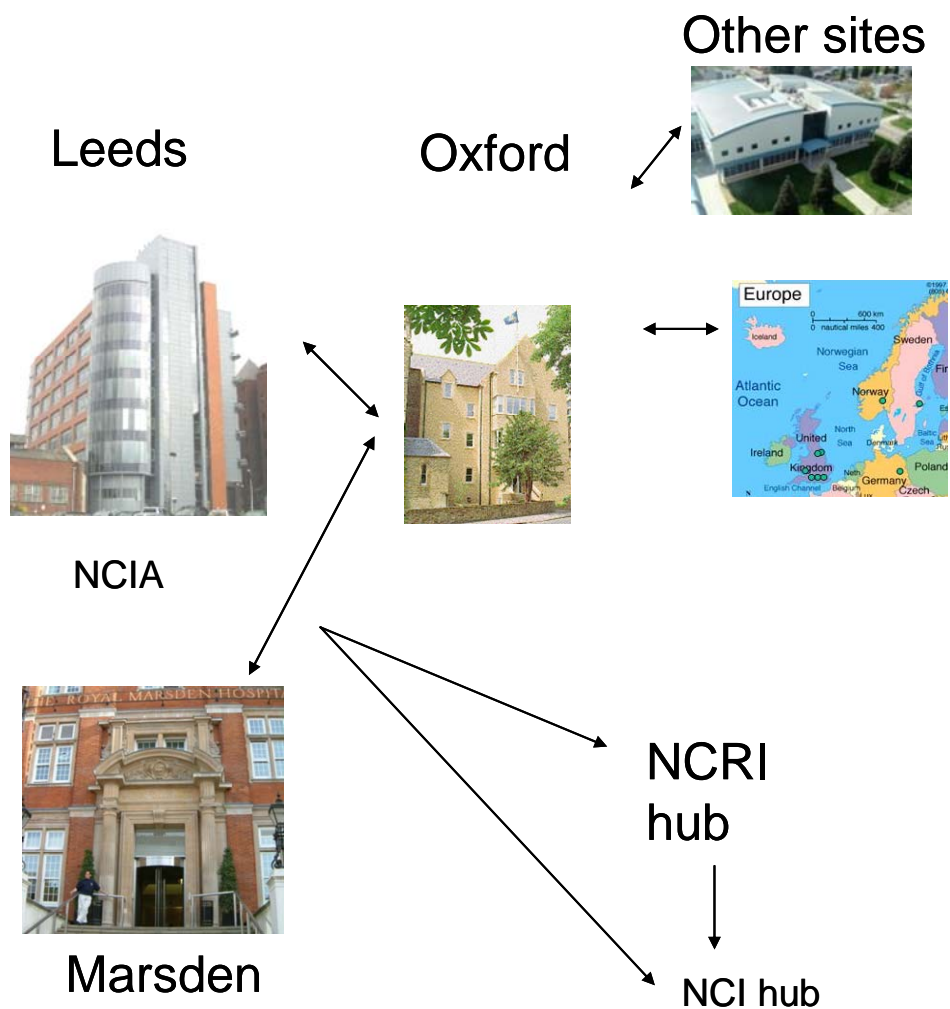National Cancer Institute
Imaging Archive node only
one outside USA

CaBig collaboration with Ohio
Grid analysis of neuroblastomas

Nijmegen- Sweden testing of
TNM4/5/6 on Clasicc
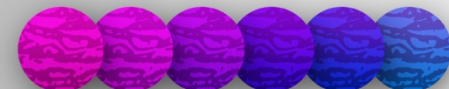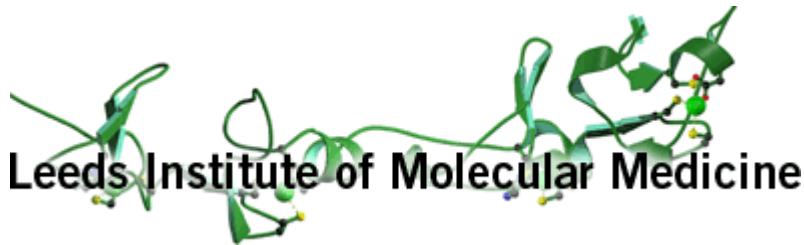
NCIA

NCRI
hub

NCI hub

Marsden

Summary

Pathology datasets are essential for modern cancer care

Unique opportunity to become world leading

Additional benefit of digital technology

Trials can act as test bed for data integration

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Thanks to:

- NHS
- NCRI, CRUK,MRC
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- Gina Brown and Mike Brady
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