Experiences with Deauville scoring in the EuroNet-PHL-C1 trial

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EuroNet-PHL-C1 (2007 – 2013)
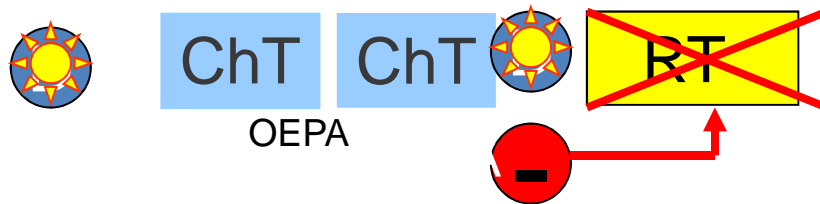# Paediatric Hodgkin Lymphoma

- 2131 registered patients from 18 countries

- Central review of all imaging

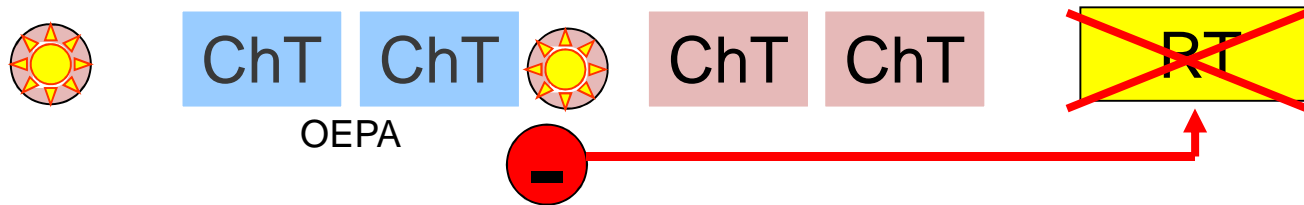- Paediatric Hodgkin Network

EuroNet-PHL-C1
Paediatric Hodgkin's lymphoma
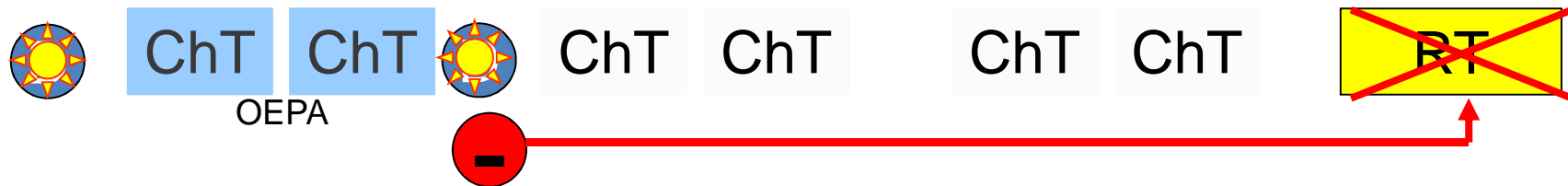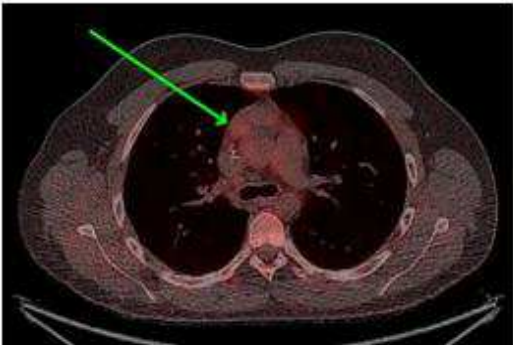## Treatment of low, intermediate and high risk patients
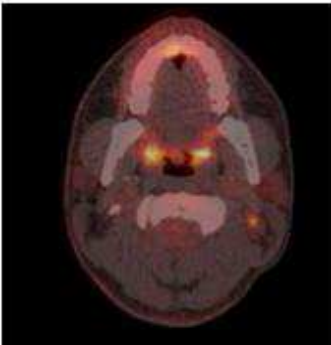
Borderline cases and differences in interpretation

D3 or D4?

Inter-reader study - Design

- N=100 consecutive cases from 51 PET-centres

- 5 international experts (Paris, Vienna, Cologne, Bydgoszcz, Sofia)

- Identical software (Hermes Hybrid Viewer)

- PET/CT initially and after 2 cycles OEPA

- List of 33 regions

- Task:
  - ➢ Localise and score up to 3 most intensive residual uptake areas

Frequency of Deauville scores by reader

D score	R1	R2	R3	R4	R5
1	49	52	(10)	49	(14)
2	12	10	13	18	(49)
3	19	24	(52)	16	18
4	15	13	(21)	14	14
5	5	1	4	3	5

Readers differ in frequency of using specific Deauville scores.
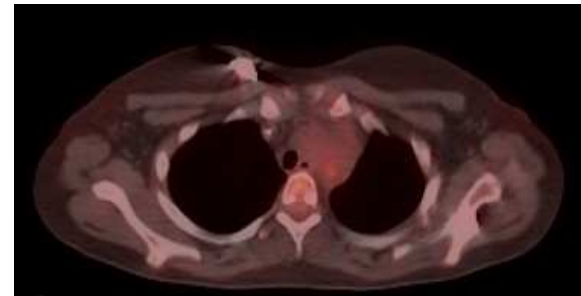
Probability of concordance

Method of Uebersax
Kappa

	Overall probability of concordance	Specific probability of concordance for categories					Global kappa	Range of pairwise kappas
Scale		D1	D2	D3	D4	D5		
Five categories: D1, D2, D3, D4, D5	0.422	0.520	0.255	0.360	0.494	0.556	0.244	0.144 – 0.387
Three categories: D1,2, D3, D4,5	0.604	0.705		0.360	0.642		0.344	0.222 – 0.485
Two categories: D1,2, D3,4,5	0.674	0.705		0.636			0.358	0.189 – 0.514
Two categories: D1,2,3, D4,5	0.864	0.916			0.642		0.559	0.428 – 0.710

Concordance by region

Three categories: D1/2 – D3 – D4/5

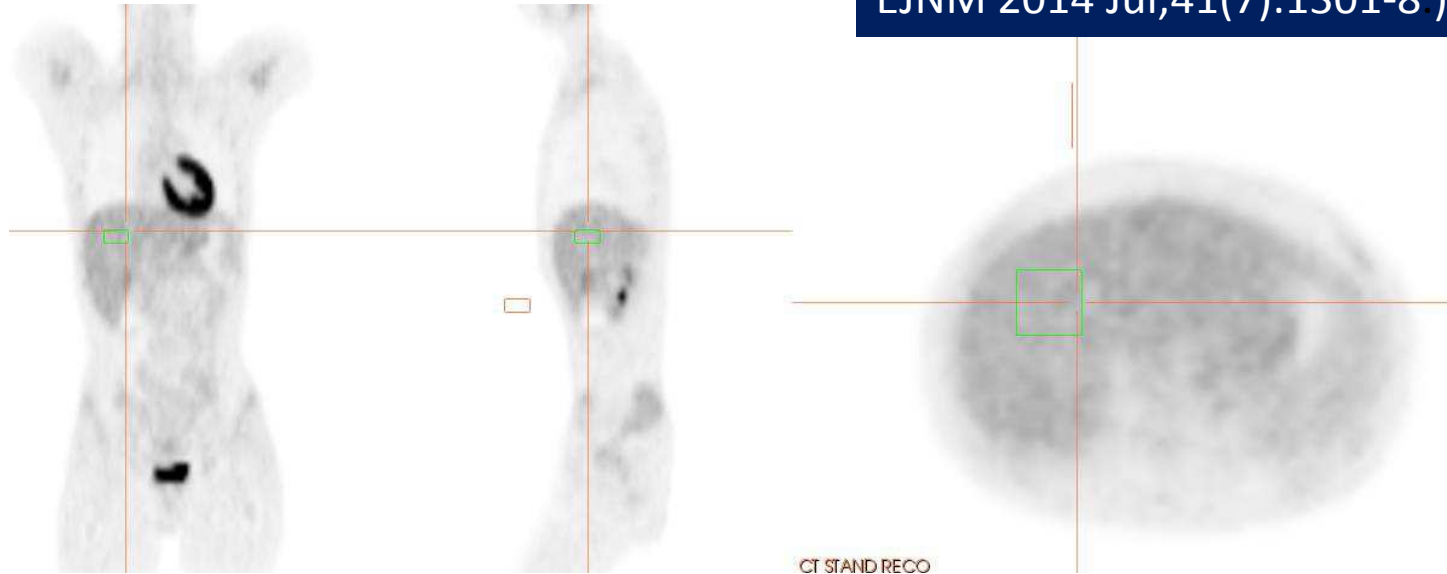|	Patientwise reader comparisons N = 100			
	Initially involved regions	All reader concord	Only minor discrepancies	Major discrepancies
Mediastinum	88	40	52	8
Neck left	74	72	18	10
Neck right	73	84	7	9
Abdomen	27	96	2	2
Skeleton	7	93	2	5
Axilla left	32	97	2	1
Axilla right	24	98	1	1
Spleen	18	99	1	0
Lung right	14	100	0	0
Lung left	12	98	1	1
Pelvic left	10	99	1	0
Pelvic right	4	100	0	0
Liver	1	100	0	0

Case 2848 - Mediastinum

32 Bq/cc

Readers:
3-3-4-4-4
in upper or
middle
mediastinum

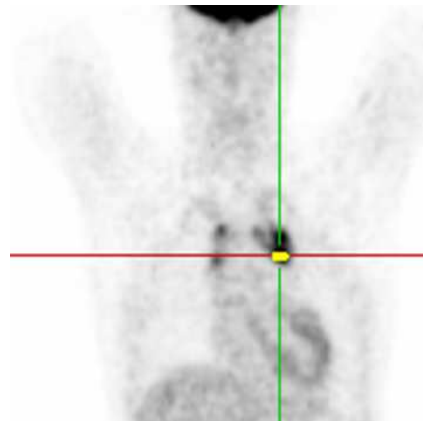# qPET – quantitative value for PET-positivity
Semi-automatic standardised method

Hasenclever et al.
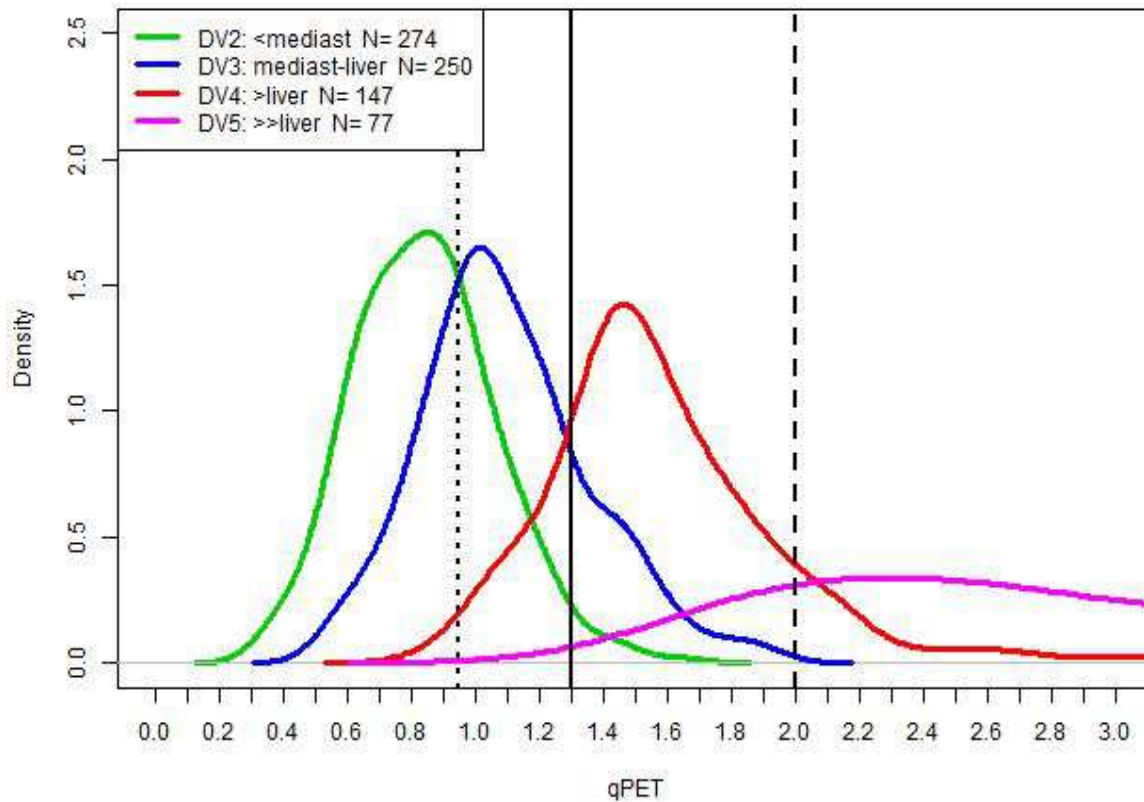**EJNM 2014 Jul;41(7):1301-8)**

**TumourFinder™
software Hermes**

Liver: cuboid VOI standard

Tumor residuum:
4 hottest connected voxels

CT STAND RECO

$$qPET = \frac{\text{peak residual uptake}}{\text{average uptake in liver}}$$

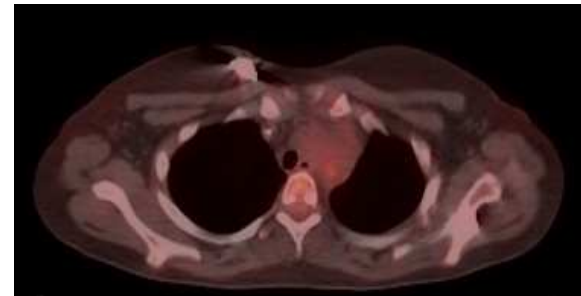# qPET values of cases visually scored as Deauville 2, 3, 4 or 5
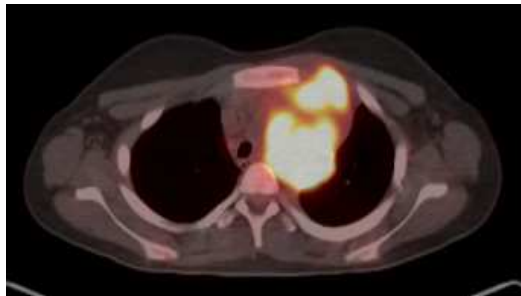

Thresholds

- qPET = 0.95   Deauville 2/3
- qPET = 1.3   Deauville 3/4
- qPET = 2.0   Deauville 4/5

qPET is a quantitative extension of the Deauville Criteria

Case 2848 - Mediastinum

32 Bq/cc

Readers:
3-3-4-4-4
in upper or
middle
mediastinum

qPET=1,43

≙Deauville 4

EuroNet-PHL-C2 open since October 2015

- qPET method instead of visual scoring

- threshold of 1.3 (corresponding to D3/4)

- about 80% negative PET

- clearer decisions

- Improved reproducibility