5th International Workshop on PET in Lymphoma

Poster discussion - Technical

L. Kostakoglu – T. Vander Borght

IMPACT OF SPECIFIC TRAINING IN THE PERFORMANCE OF THE CENTRAL REVIEW PANEL IN THE ONGOING IELSG37 STUDY OF PRIMARY MEDIASTINAL LYMPHOMA.

L. Ceriani [1], S. Barrington[2] , A. Biggi [3], B. Malkowski [4], U. Metser [5], A. Versari [6], E. Zucca [1], S.,Chauvie [3]

***1**- Oncology Institute of Southern Switzerland –IOSI , Bellinzona, CH ;*
***2**- St Thomas Hospital, London, UK ;*
***3**- Santa Croce Hospital, Cuneo, Italy ;*
***4**- Oncological Centre, Bydgoszcz, Poland ;*
***5**- Princess Margareth Hospital, Toronto, Canada;*
***6**- Arcispedale S. Maria Nuova, Reggio Emilia, Italy*

B2. IMPACT OF SPECIFIC TRAINING IN THE PERFORMANCE OF THE CENTRAL REVIEW PANEL IN THE ONGOING IELSG37 STUDY OF PRIMARY MEDIASTINAL LYMPHOMA

- Web based system (WIDEN) for image exchange
- Performance = agreement rates for 6 reviewers
- Assessment at 3-time points

Evaluation phase	Krippendorf's alfa	Cohen's kappa	Median review time
1. Training (20 pts)	0.42	0.23 – 0.72	N/A
2. Early clinical (10 pts)*	0.45	0.29 – 0.80	74h 12 m
3. Late clinical (50 pts)	0.59	0.54 – 0.91	38h 56m
Overall, clinical (60 pts.) April '14	0.56	0.50 - 0.83	45h 37 m
Overall, clinical (90 pts.) August '14	0.63	0.48 - 0.84	31h 01m

* Investigator meeting with revision discussion of practical rules for reading

B2. IMPACT OF SPECIFIC TRAINING IN THE PERFORMANCE OF THE CENTRAL REVIEW PANEL IN THE ONGOING IELSG37 STUDY OF PRIMARY MEDIASTINAL LYMPHOMA

Cohen's Kappa

0.81 – 1.0

0.61 - 0.80

0.41 - 0.60

0.21 - 0.41

0.0 - 0.20

1. Training (20 pts)

	Mean	1	2	3	4	5	6
1	0.51		0.40	0.80	0.58	0.50	0.29
2	0.51	0.40		0.60	0.46	0.78	0.32
3	0.55	0.80	0.60		0.40	0.76	0.20
4	0.53	0.58	0.46	0.40		0.78	0.43
5	0.64	0.50	0.78	0.76	0.78		0.38
6	0.32	0.29	0.32	0.20	0.43	0.38	

Kripperndorf's alfa = 0.42

2. Early clinical (10 pts)

	Mean	1	2	3	4	5	6
1	0.55		0.40	0.80	0.60	0.53	0.40
2	0.49	0.40		0.58	0.40	0.76	0.29
3	0.57	0.80	0.58		0.40	0.76	0.29
4	0.51	0.60	0.40	0.40		0.76	0.40
5	0.63	0.53	0.76	0.76	0.76		0.32
6	0.34	0.40	0.29	0.29	0.40	0.32	

Kripperndorf's alfa = 0.45

3. Late clinical April '14 (50 pts)

	Mean	1	2	3	4	5	6
1	0.81		0.74	0.84	0.91	0.74	0.84
2	0.66	0.74		0.66	0.67	0.61	0.64
3	0.73	0.84	0.66		0.77	0.54	0.84
4	0.75	0.91	0.67	0.77		0.65	0.76
5	.067	0.74	0.61	0.54	0.65		0.80
6	0.78	0.84	0.64	0.84	0.76	0.80	

Kripperndorf's alfa = 0.59

Clinical April – August '14 (30 pts)

	Mean	1	2	3	4	5	6
1	0.78		0.60	0.84	1	0.73	0.74
2	0.53	0.60		0.45	0.55	0.46	0.59
3	0.70	0.84	0.45		0.87	0.67	0.67
4	0.77	1	0.55	0.87		0.66	0.79
5	.073	0.73	0.46	0.67	0.66		0.66
6	0.69	0.74	0.59	0.67	0.79	0.66	

Kripperndorf's alfa = 0.68

B2. IMPACT OF SPECIFIC TRAINING IN THE PERFORMANCE OF THE CENTRAL REVIEW PANEL IN THE ONGOING IELSG37 STUDY OF PRIMARY MEDIASTINAL LYMPHOMA

A11. QPET - A QUANTITATIVE EXTENSION OF THE DEAUVILLE SCALE TO ASSESS RESPONSE ON INTERIM FDG-PET SCANS IN LYMPHOMA

R. Kluge, L. Kurch, D. Hasenclever, C. Mauz-Körholz, A. Elsner, T. Georgi, H. Wallace, J. Landman-Parker, A. Moryl-Bujakowska, M. Cepelová, J. Karlén, A. Alvarez Fernández-Teijeiro, M. Hoffmann, O. Sabri, D. Körholz

- Deauville scale :
  - 5 ordinal categories for a continuous response
  - May be disturbed by optical illusion
- Deauville scale <-> qPET values*
  - SUVpeak = average over the maximum SUV voxel and the three hottest adjacent ones
  - Average liver uptake = 30 ml cuboid VOI in the right liver
  - qPET value = $\frac{\text{SUVpeak}}{\text{Average liver uptake}}$

*Hasenclever et al. *Eur J Nucl Med Mol Imaging* 2014;41:1301-8.

A11. QPET - A QUANTITATIVE EXTENSION OF THE DEAUVILLE SCALE TO ASSESS RESPONSE ON INTERIM FDG-PET SCANS IN LYMPHOMA

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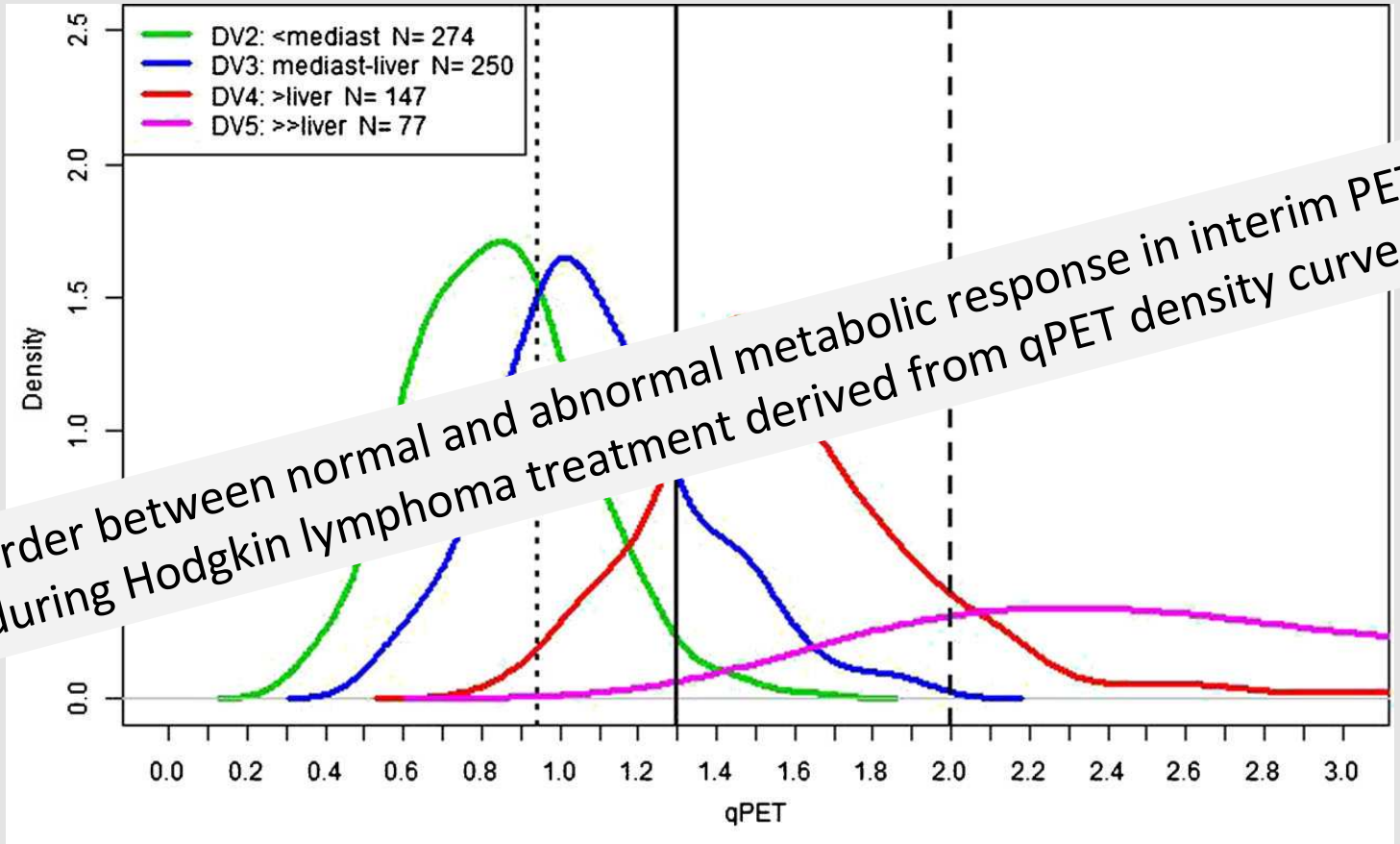


Border between normal and abnormal metabolic response in interim PET during Hodgkin lymphoma treatment derived from qPET density curves

reviews

Annals of Oncology 25: 921–927, 2014
doi:10.1093/annonc/mdt533
Published online 18 December 2013

Systematic review and meta-analysis on the diagnostic performance of FDG-PET/CT in detecting bone marrow involvement in newly diagnosed Hodgkin lymphoma: is bone marrow biopsy still necessary?

H. J. A. Adams[1], T. C. Kwee[1*], B. de Keizer[1], R. Fijnheer[2], J. M. H. de Klerk[3], A. S. Littooij[1] & R. A. J. Nievelstein[1]

[1]*Department of Radiology and Nuclear Medicine, University Medical Center Utrecht, Utrecht;* [2]*Departments of Hematology;* [3]*Nuclear Medicine, Meander Medical Center, Amersfoort, The Netherlands*

Table 5. Results of seven of nine included studies that allowed calculation of sensitivity and specificity

Study (year)	Sensitivity (%)		Specificity (%)	
	Value	95% CI	Value	95% CI
Cortés-Romera et al. (2013) [17]	100	75.3–100	100	92.6–100
Agrawal et al. (2013) [18]	87.5	47.3–99.7	100	85.2–100
Muzahir et al. (2012) [19]	100	90.5–100	100	95.8–100
El-Galaly et al. (2012) [20]	94.9	87.4–98.6	100	99.0–100
Mittal et al. (2011) [22]	100	47.8–100	86.7	59.5–98.3
Cheng et al. (2011) [23]	100	39.8–100	100	87.2–100
Moulin-Romsee et al. (2010) [24]	100	81.5–100	100	94.5–100
Pooled estimate	96.9	93.0–99.0	99.7	98.9–100

Recommendations for Initial Evaluation, Staging, and Response Assessment of Hodgkin and Non-Hodgkin Lymphoma: The Lugano Classification

Bruce D. Cheson, Richard I. Fisher, Sally F. Barrington, Franco Cavalli, Lawrence H. Schwartz, Emanuele Zucca, and T. Andrew Lister

JOURNAL OF CLINICAL ONCOLOGY SPECIAL ARTICLE

- Almost perfect diagnostic performances
- BMI often associated with other signs of advanced disease

"…Thus, if a PET-CT is performed, a bone marrow aspirate/biopsy is no longer required for the routine evaluation of patients with HL… »

UNIVERSITÄT LEIPZIG

Semiautomatic detection of skeletal lesions in PET/CT in pediatric patients with Hodgkin´s Lymphoma (PHL)

Georgi T[1], Epstude M[1], Kurch L[1], Elsner A[2], Mauz-Körholz C[3], Körholz D[3], Hasenclever D[1], Holzendorf V[1], Wallace WH[4], Balwierz W[4], Cepelova M[4], Karlen J[4], Landman-Parker J[4], Fossa A[4], Sabri O[1], Kluge R[1]

[1]University of Leipzig, [2]Hermes Medical Solution, [3]University of Halle, [4]for the European PHL Study Group

Helfen. Forschen. Informieren.

HERMES

mitteldeutsche kinderkrebsforschung

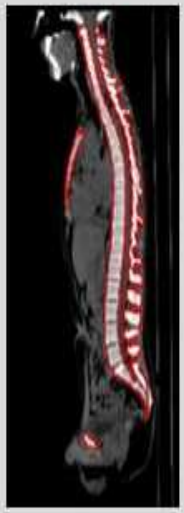
Paediatric Hodgkin Network

Executive Agency for Health and Consumers

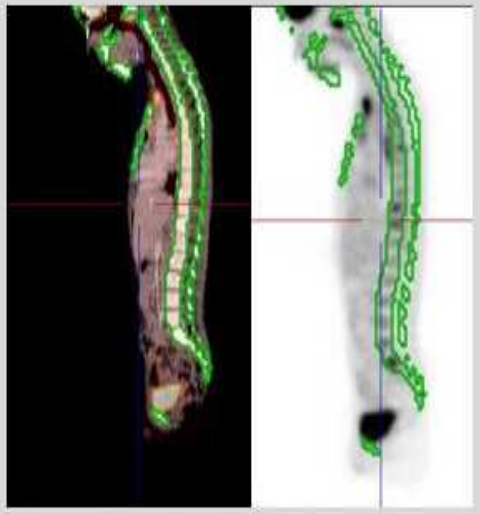
A10. SEMIAUTOMATIC DETECTION OF SKELETAL LESIONS IN PET/CT IN PEDIATRIC PATIENTS WITH HODGKIN´S LYMPHOMA (PHL)

Methods:

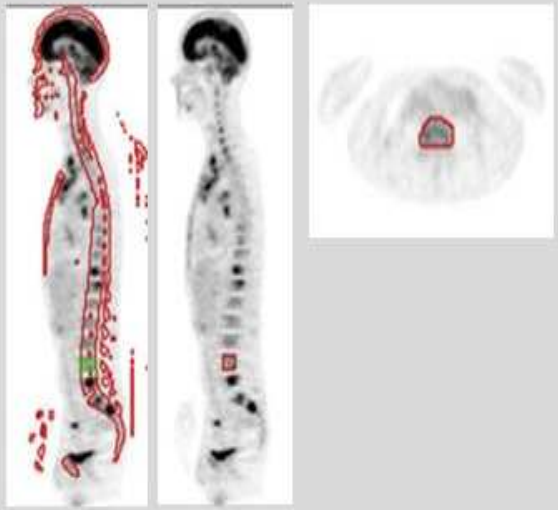
1) Skeletal mask in CT, threshold = 160 HU



2) Hole Filling Filter



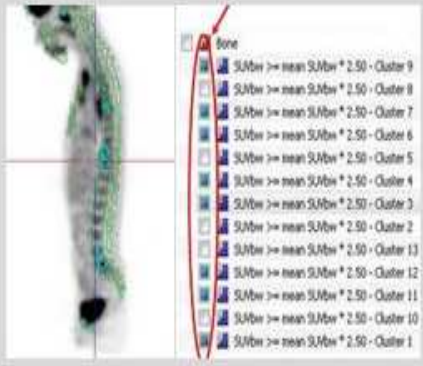
3) Transfer of the skeletal mask to the PET images



4) Reference VOI (RV) in a non-involved lumbar vertebra

$$SUV > SUV_{meanRV} + 2{,}5\ SD_{RV} \quad \text{and} \quad Vol. > 0{,}25\ ml$$

5) Search algorithm



6) Acceptance or rejection of the pre-selected skeletal lesions

A10. SEMIAUTOMATIC DETECTION OF SKELETAL LESIONS IN PET/CT IN PEDIATRIC PATIENTS WITH HODGKIN´S LYMPHOMA (PHL)

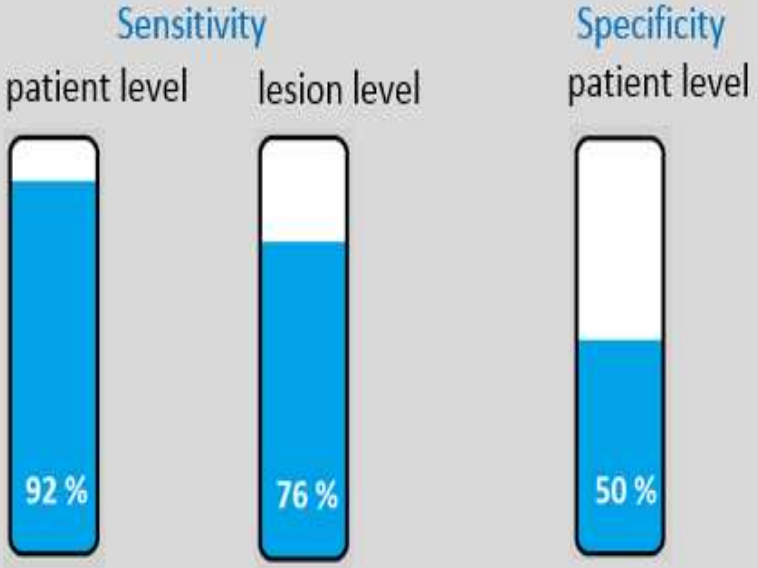
Algorithm was tested in:

192 EuroNet-PHL-C1 patients

142 patients **with** visual skeletal involvement

50 patients **without** visual skeletal involvement

Results:



Sensitivity
- in 130/142 (92 %) pat. skeletal lesions were detected
- 774/1015 (76.3%) visible skeletal lesions were found

Specificity
- in 25/50 (50%) patients possibly false positive skeletal lesions were detected

BUT: overall only 49 lesions
14/25 pat. with only 1 positive lesion
34 (69%) lesions < 0.5 ml

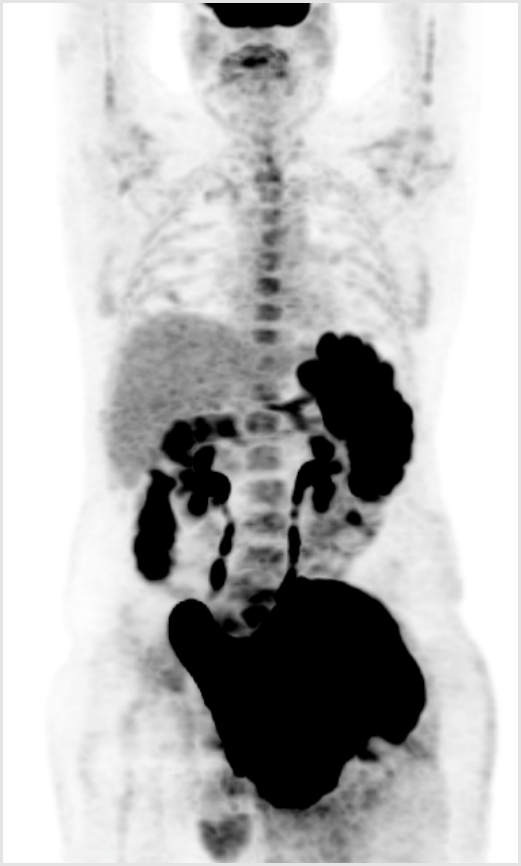
Menton 2014 B8

Multicenter Study for Comparison of ^{18}F-FLT and ^{18}F-FDG PET/CT for Early Therapeutic Monitoring of Diffuse Large B-cell Lymphoma

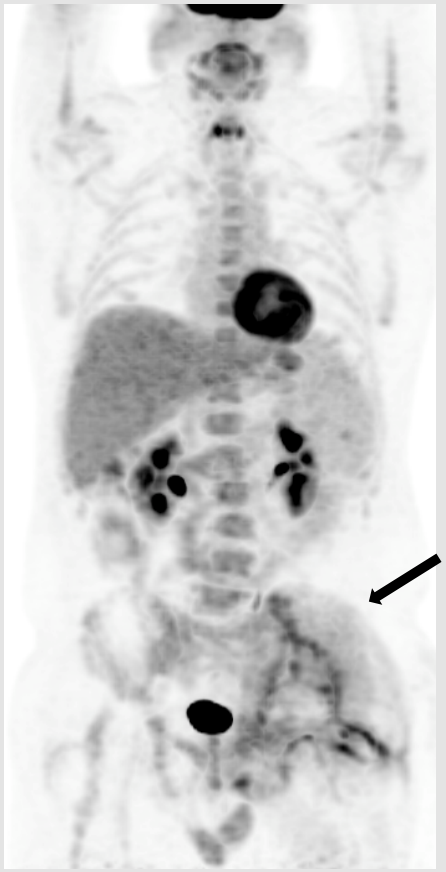
Malik Juweid[1], Ryogo Minamimoto[2], Julie Vose[3], Ranjana Advani[2]
Luis E Fayad[4], Homer A Macapinlac[4], Jane Meza[3], Jordan H Hankins[3]
Felix M Mottaghy[1], Andrew Quon[2]

1.RWTH AACHEN UNIVERSITY
2.STANFORD UNIVERSITY
3.UNIVERSITY OF NEBRASKA
4. MD ANDERSON CANCER CENTER

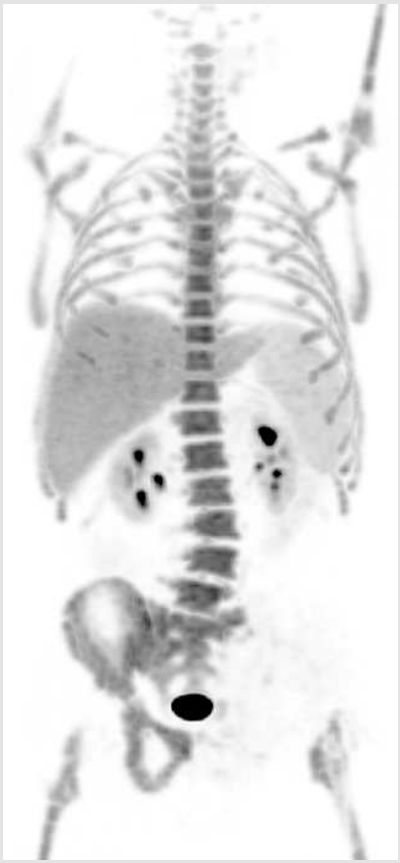
B8. MULTICENTER STUDY FOR COMPARISON OF 18F-FLT AND 18F-FDG PET/CT FOR EARLY THERAPEUTIC MONITORING OF DIFFUSE LARGE B-CELL LYMPHOMA



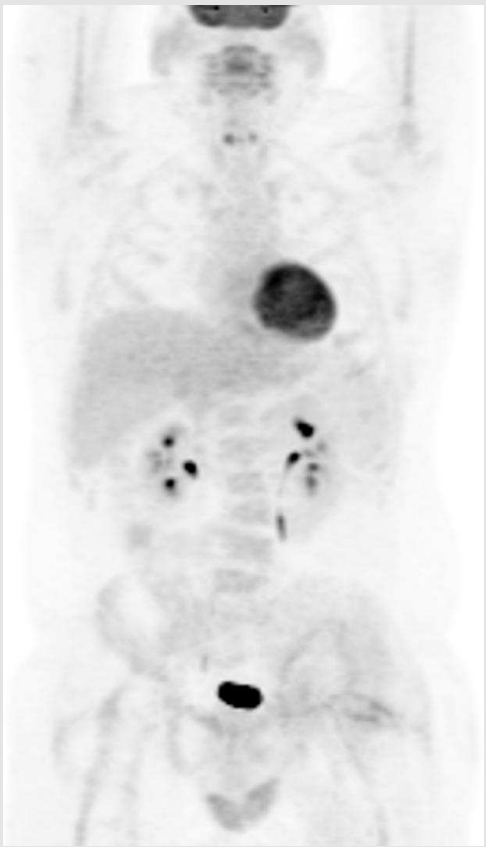
Baseline FDG



FDG after 2 cycles of R-CHOP



FLT after 2 cycles of R-CHOP



End of treatment FDG

B8. MULTICENTER STUDY FOR COMPARISON OF 18F-FLT AND 18F-FDG PET/CT FOR EARLY THERAPEUTIC MONITORING OF DIFFUSE LARGE B-CELL LYMPHOMA

Proportion of CR and nonCR patients in Interim PET

Criteria	Outcome	Imaging Summary		PPV (%)	NPV (%)
		CR	Non-CR		
IHP	CR (21)	8	13	18.8*	100.0
	RD (3)	0	3		
		CMR	Non-CMR		
EORTC	CR (21)	8	13	18.8*	100.0
	RD (3)	0	3		
		Negative	Positive		
Deauville	CR (21)	14	7	30.0	100.0
	RD (3)	0	3		
		CMR	Non-CMR		
PERCIST	CR (21)	11	10	23.1	100.0
	RD (3)	0	3		
		Negative	Positive		
FLT	CR (21)	20	1	**75.0**	100.0
	RD (3)	0	3		

70 *Current Drug Delivery*, 2011, *8*, 70-78

Emerging Role of ImmunoPET in Receptor Targeted Cancer Therapy

Jan Marik* and Jagath R. Junutula*

« The knowledge of distribution and expression levels of a given receptor is a key for successful receptor targeted cancer therapy »

- Is the target present and where is it?
- Does the drug reach the target?
- Is the dose sufficient to saturate the target?

Biodistribution and uptake of ^{89}Zr-rituximab and ^{89}Zr-ofatumumab in patients with relapsed diffuse large B cell lymphoma

YWS Jauw[1], MC Huisman[2], JAJ Janssen[2], D Vugts[2], S Zweegman[1], R Boellaard[2], GAMS van Dongen[2], OS Hoekstra[2], JM Zijlstra[1]

Dept. of Hematology[1] and Radiology & Nuclear Medicine[2]

VU University Medical Center, Amsterdam, the Netherlands

Aim: To determine biodistribution and uptake of ^{89}Zirconium(Zr)-rituximab(R) and Zr-ofatumumab(O)

Methods:

•6 patients with relapsed DLBCL

•Administration of 75.0 +/- 3.1 MBq Zr-R (n=5) or Zr-O (n=1) within 1 hour after a therapeutic dose of cold antibody

•PET-CT scans 1, 72 and 144 hours post injection

Results:

•In all CD20-positive DLBCL patients (n=4/5) tumor uptake of Zr-R was visible

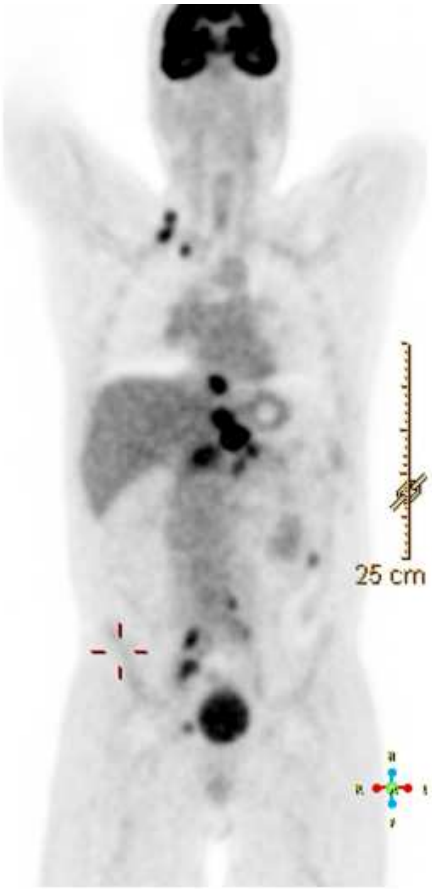
•Tumor uptake of Zr-O was observed in a CD20-negative patient (n=1/1)

•Biodistribution in normal tissue was similar for Zr-R and Zr-O

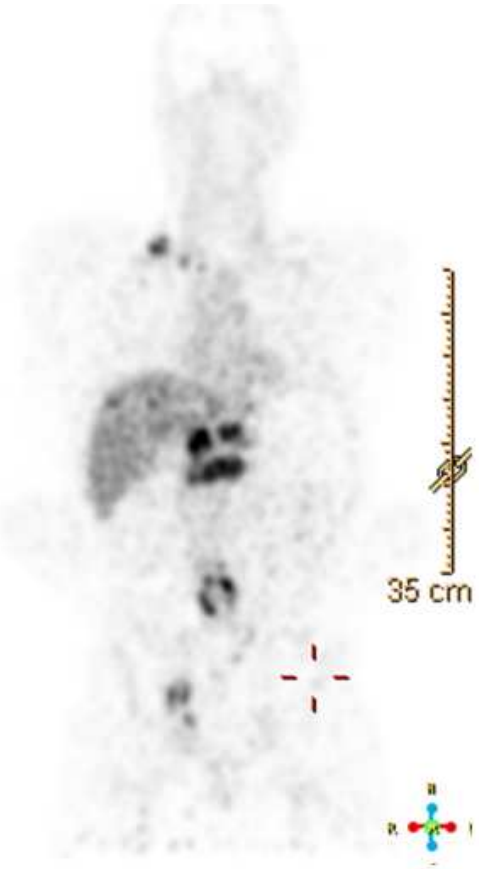
Conclusion: :

^{89}Zr-immuno-PET can be used for assessment of tumor targeting with R and O

FDG-PET



^{89}Zr-rituximab-PET



IN CONCLUSION

- FLT: more tumor specific > best for interim PET?
- ^{89}Zr-immuno-PET for assessment of tumor targeting

- Improved clinical impact of FDG PET/CT study = standardization of:
  - Equipment
  - Acquisition
  - Reading
  - Reporting

Thank you for your attention