

A106

Semiautomatic method for discrimination between adequate and inadequate early response in FDG PET/CT of paediatric Hodgkin lymphoma patients

R. Kluge, D. Hasenclever, L. Kurch, A. Elsner, L. Tchavdarova, F. Montravers, M. Hoffmann, C. Kobe, O. Sabri, C. Mauz-Körholz,
D. Körholz

**Universities of Leipzig, Halle, Paris, Vienna,
Cologne, Hermes Med. Sol. Stockholm**

Visual comparison of residuals with liver or mediastinum may be problematic

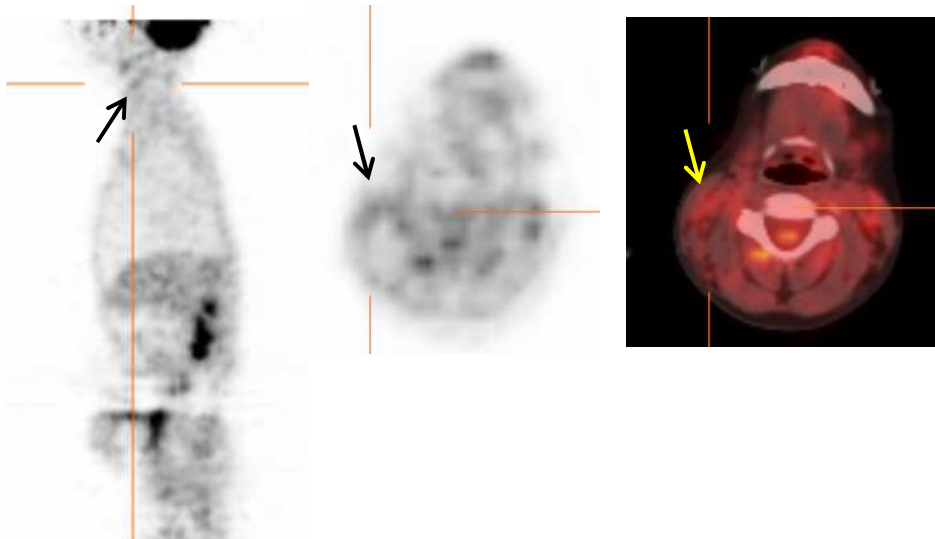
Visual illusion:

Estimation of a focus depends on background activity

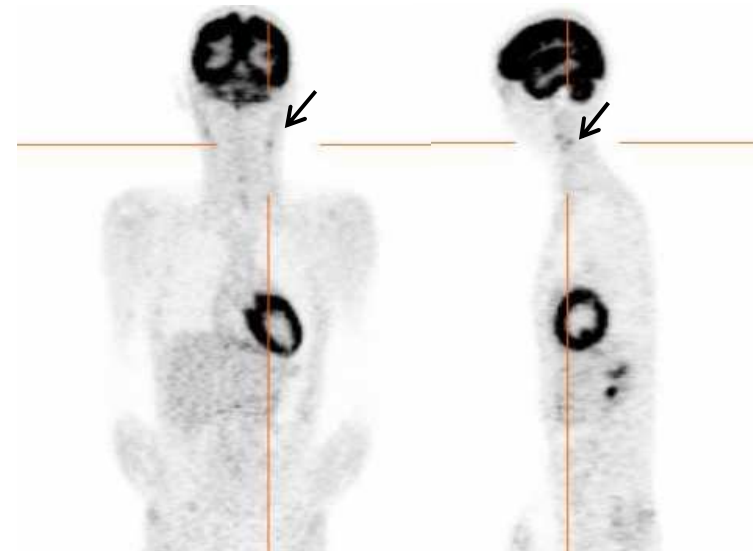


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Dark background

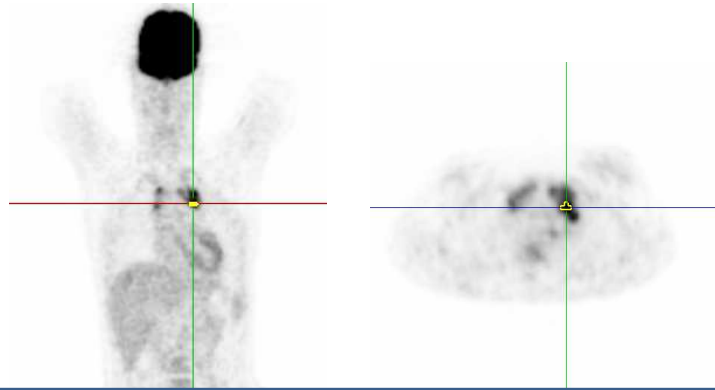


Small foci



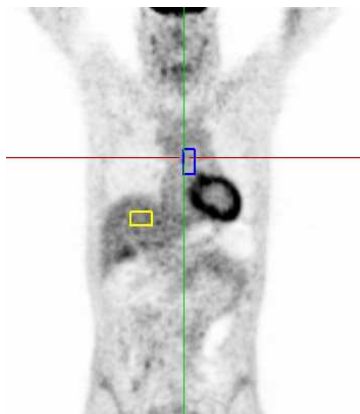
Semiautomatic method: VOI positioning

Tumor residuals
SUV_{peak} (4 voxels)



Liver: SUV_{mean} 30 ml

Mediastinum: SUV_{mean} 13 ml

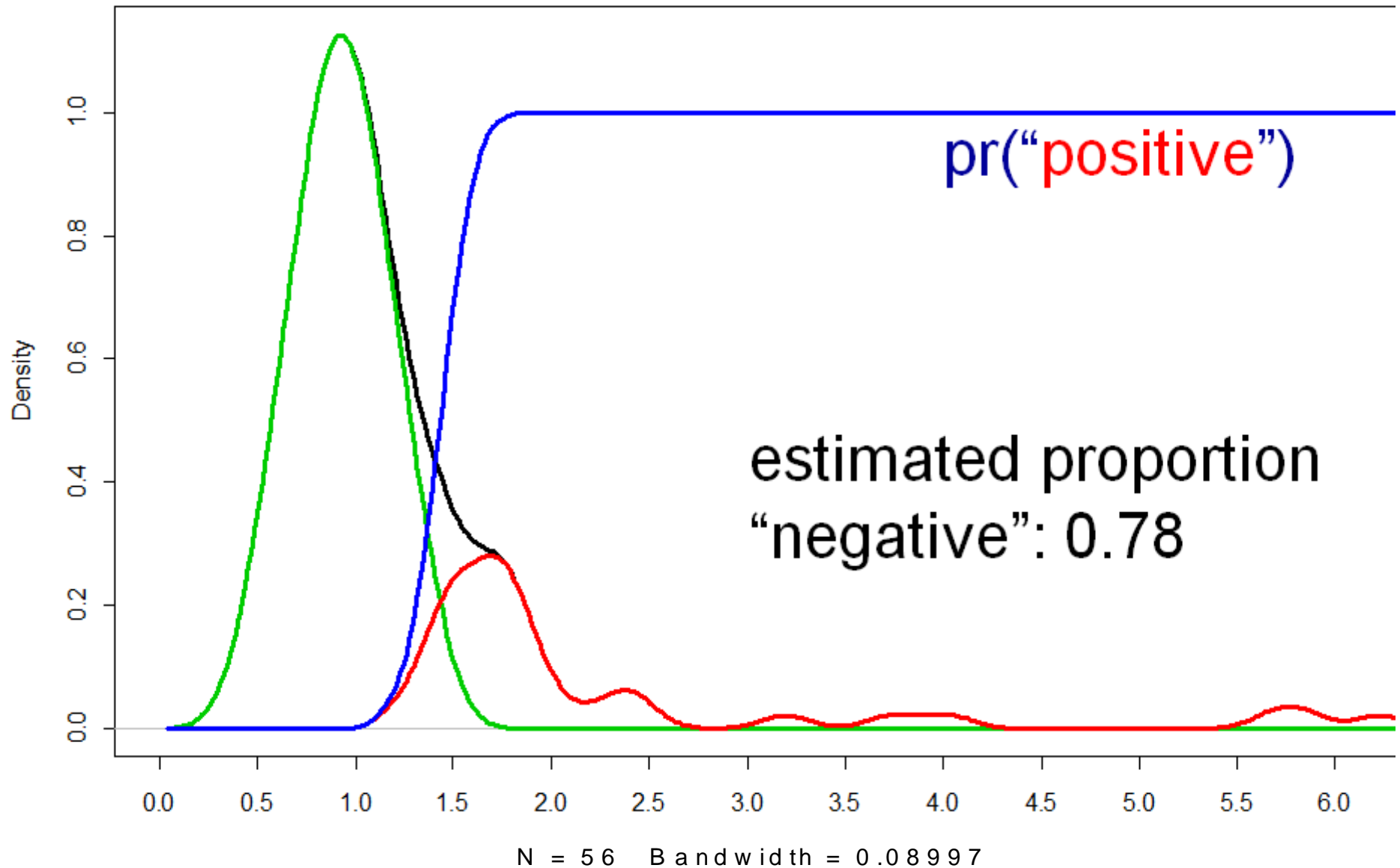


$$Q_{\text{resid/liver}} = \text{SUV}_{\text{peakResiduum}} / \text{SUV}_{\text{meanLiver}}$$

$$Q_{\text{resid/mediast.}} \approx Q_{\text{resid/liver}} * 0.68$$

Residual uptake of all patients
can be projected on a single scale

Density curve of $Q_{\text{resid}}/\text{liver-values}$ ($n = 152$ from EuroNet-PHL-C1)



Conclusion

Robust and reproducible method

All residuals projected on a single scale.

Calculation of „negative“ and „positive“ part and best cut-off value.

In our population:

-best cut-off at $Q_{\text{resid/liver}} = 1.3$

-78 % „negatives“ and 22 % „positives“

C101

‘Tumor-Finder’ and ‘Response-Controller’ - Semiautomatic Algorithms for Detection and Quantification of Tumor Lesions in Lymphoma

A. Elsner, L. Kurch, L. Tchavdarova, A. Barthel, O. Sabri, R. Kluge,
D. Körholz

**Hermes Medical Solutions, Sweden - Dept. Of
Nuclear Medicine, Univ. Leipzig - Dept.
Paediatrics, Univ. Halle, Germany**

Tumor Finder

Hermes Hybrid PDR 1.3B.17

File Tools Help

PET/CT 3D 50 mm 27 Jan 2011

Posterfall
01 Jan 2000
3092-5
T: 156/324
C: 83/168
S: 83/168
5683 BQML, 2.03 SUVbw

PET Lesion Segmentation 8
258.3ml
2.80SUVavg
13.75SUVmax
PET Transversal

Max: 13.6%
Min: 0.0%

Name	Vol.[ml]	SUVtype	avg.SUV	min.SUV	max.SUV	std.Dev.SUV	TLG	std.De
27 Jan 2011								
SUVbw								
Hodgkin Wizard	638.971	SUVbw	2.773	1.014	13.747	1.142	1771.548	3195.5
PET Lesion Segmentation 8	258.346	SUVbw	2.804	1.089	13.747	0.932	724.339	2608.3
PET Lesion Segmentation 17	132.731	SUVbw	2.345	1.465	5.861	0.524	311.252	1466.8
PET Lesion Segmentation 27	69.824	SUVbw	2.677	1.458	8.654	0.939	186.896	2628.3
PET Lesion Segmentation 28	48.673	SUVbw	3.909	1.014	12.449	1.971	190.253	5515.5
PET Lesion Segmentation 35	45.687	SUVbw	3.017	1.279	7.420	1.080	137.826	3021.4
PET Lesion Segmentation 36	29.662	SUVbw	3.868	1.556	9.645	1.686	114.717	4716.7
Hodgkin Wizard: Background	28.218	SUVbw	1.473	1.039	2.014	0.170	41.570	475.80
PET Lesion Segmentation 18	8.560	SUVbw	2.621	1.923	4.684	0.526	22.437	1470.9
PET Lesion Segmentation 33	3.733	SUVbw	2.724	1.929	4.277	0.628	10.166	1756.1
PET Lesion Segmentation 12	2.837	SUVbw	2.525	1.715	3.914	0.503	7.163	1407.4
PET Lesion Segmentation 26	1.593	SUVbw	2.159	1.950	2.467	0.136	3.439	381.11
PET Lesion Segmentation 30	1.543	SUVbw	2.343	1.990	2.943	0.266	3.615	744.72
PET Lesion Segmentation 31	1.443	SUVbw	3.110	1.989	5.644	1.002	4.488	2803.3
PET Lesion Segmentation 23	1.394	SUVbw	2.140	1.826	2.407	0.154	2.982	430.25
PET Lesion Segmentation 15	1.294	SUVbw	2.303	1.990	3.060	0.266	2.980	743.70
PET Lesion Segmentation 19	1.194	SUVbw	2.200	2.001	2.481	0.131	2.628	367.49
PET Lesion Segmentation 24	1.145	SUVbw	2.199	2.017	2.461	0.113	2.517	316.14
PET Lesion Segmentation 13	1.095	SUVbw	2.082	1.860	2.250	0.084	2.280	236.05
RT Structure Set	0.000	SUVbw	0.000	0.000	0.000	0.000	0.000	nan

ROI/VOIs

RT Structure Set

6899
13799

Response Controller

Labrat, Florian - Mar 29 2011 - Hermes Hybrid PDR 1.36.17

File Tools Help

Standard

50 mm

25 maj 2011

Transversal

Sagittal

Coronal

NoName
01 Jan 2000
1000-0
T: 222/326
C: 117/200
S: 109/200
9554 BQML, 4.45 SUVbw

Max: 18.9%
Min: 0.0%

ROIs/VOIs

Name	Vol.[ml]	SUVtype	avg.SUV	min.SUV	max.SUV	std.Dev.SUV	std.Dev.	T/G	Median SUV	Median	Voxel
25 maj 2011		SUVbw									
<input checked="" type="checkbox"/> PET Lesion Segmentation 9	4.628	SUVbw	1.619	1.161	2.257	0.225	482.347	7.492	1.618	3471.000	93
<input checked="" type="checkbox"/> 70.0%max,<0.20ml	0.199	SUVbw	2.024	1.879	2.257	0.167	358.222	0.403	1.979	4247.500	4
<input checked="" type="checkbox"/> PET Lesion Segmentation 16	0.995	SUVbw	1.224	0.776	1.878	0.320	687.230	1.218	1.236	2652.000	20
<input checked="" type="checkbox"/> 70.0%max,<0.20ml	0.199	SUVbw	1.711	1.542	1.878	0.139	298.267	0.341	1.711	3672.000	4
<input checked="" type="checkbox"/> PET Lesion Segmentation 14	0.995	SUVbw	1.246	0.874	1.414	0.131	280.772	1.240	1.273	2732.000	20
<input checked="" type="checkbox"/> 70.0%max,<0.20ml	0.199	SUVbw	1.434	1.305	1.532	0.099	212.634	0.286	1.450	3111.500	4
<input checked="" type="checkbox"/> PET Lesion Segmentation 12	614.534	SUVbw	1.312	0.136	4.854	0.534	1145.528	1068.715	1.317	2828.000	16366
<input checked="" type="checkbox"/> 30.0%max,<0.20ml	0.199	SUVbw	4.302	3.936	4.854	0.438	939.179	0.856	4.209	9032.000	4
<input checked="" type="checkbox"/> PET Lesion Segmentation 11	3.732	SUVbw	1.587	0.935	2.405	0.360	771.803	5.923	1.522	3265.000	75
<input checked="" type="checkbox"/> 70.0%max,<0.20ml	0.199	SUVbw	2.244	2.025	2.405	0.163	348.733	0.447	2.273	4877.500	4
<input checked="" type="checkbox"/> PET Lesion Segmentation 10	2.538	SUVbw	1.996	1.084	3.048	0.551	1182.921	5.066	1.989	4269.500	51
<input checked="" type="checkbox"/> 30.0%max,<0.20ml	0.199	SUVbw	2.691	2.117	3.048	0.436	936.484	0.536	2.799	6006.500	4
<input checked="" type="checkbox"/> HodgkinWizard:Background	28.216	SUVbw	1.292	0.706	2.045	0.236	505.421	36.465	1.268	2720.000	567
<input checked="" type="checkbox"/> 70.0%max,<0.20ml	0.199	SUVbw	1.819	1.453	2.045	0.260	957.627	0.362	1.888	4052.000	4

SUVbw

5350
10701

Conclusion

- Evaluated on 33 patients with newly diagnosed paediatric Hodgkin Lymphoma
- Compared to the results of conservative reading process
- *"Tumor-Finder"* module
 - Separation of the skeleton from the CT performed correctly in 22/33 patients
 - In 11 PET/CT studies positive oral contrast agent had been used, resulting in separation of parts of the intestine
 - Lesion segmentation correctly identified 157 of 170 lesions