Baseline metabolic tumor volume Prognosis value in Hodgkin lymphoma

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Background

- CT Tumor volume influences the outcome of HL patients (*Willet CG, JCO 1988; Gobbi P, JCO 2001*): difficult to implement in routine clinical practice

- Few studies have evaluated the prognosis impact of the total baseline metabolic volume (TMTV0) in Hodgkin lymphoma

(*Song MK, Cancer Sci 2013; Tseng D, Radiat Oncol2012*)

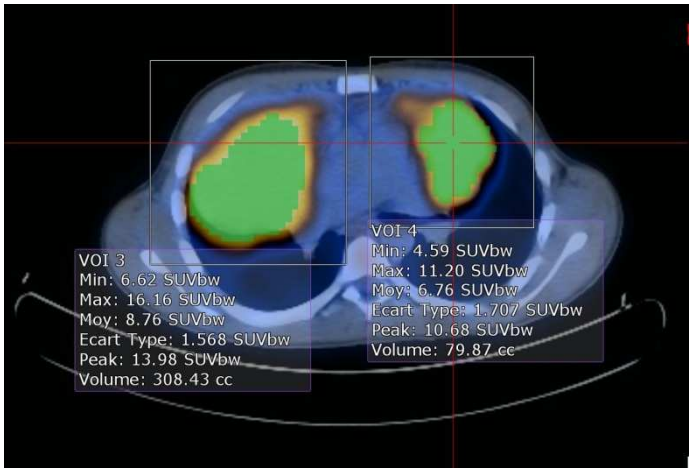
– Various methodologies
– Contradictory results

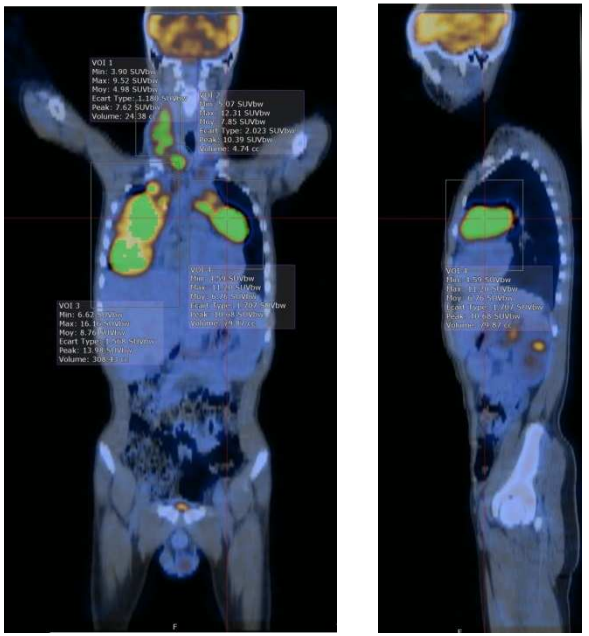
Study design

- Retrospective single center study
- **59 consecutive patients** with a first diagnosis of HL between January 2007 and January 2010
- PET performed at baseline (PET0) and after 2 cycles of chemotherapy (PET2)
- **No treatment change on the basis of PET2 results**
- Assessment of:
  - **Total Metabolic Tumor Volume at baseline (MTV0)**
  - **Tumor bulk (>10 cm) at baseline (CT scan)**
  - **ΔSUVmaxPET 0-2**

TMTV0 Assessment

- A region of interest (ROI) was drawn around each foci FDG uptake.
- In each ROI, voxels presenting a threshold of 41% SUVmax were incorporated to define tumor volumes *(Meignan M et al, EJNM 2014;41:1113-22)*
- Extranodal involvement :
  - the liver, lung and bone marrow were considered involved only if there was focal uptake,
  - Spleen involvement was considered if there was focal uptake or diffuse uptake >150 % of the liver background.
- All tumors volume were added to assess the TMTV0
- All of the images were reviewed by 2 nuclear medicine physicians blinded to the patients' outcomes





Patients characteristics

- Median age 36 y (16 – 76)
- Histological type: NS = 76%, MC 12%
- Stage III/IV = 63%, Bulk>10cm = 15%
- IPS>3 = 61%

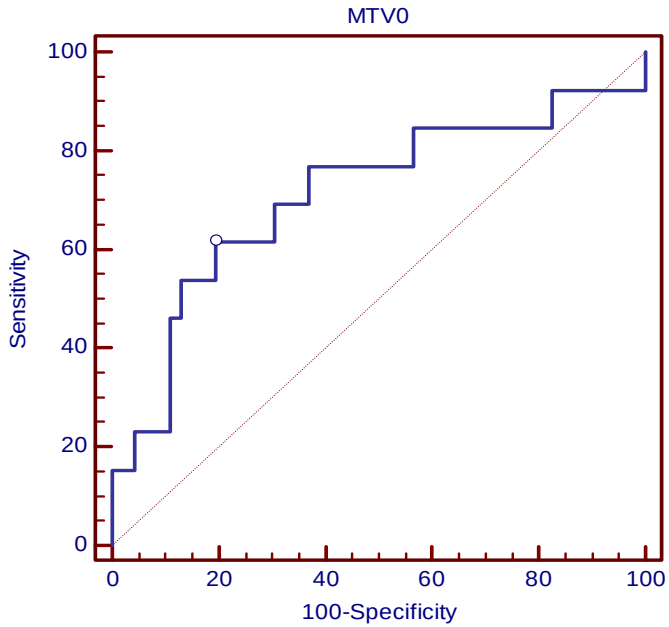
- ABVD = 85%, Radiotherapy = 23%
- Median Fu = 50 months :
- 10 progression/relapse (17%),
- 5 Death (8%)

Kanoun S et al , EJNM 2014, 41:1735-43

TMTV0

- Median (range): 117 ml (4 - 1611)
- Cut-off value to predict treatment failure: **225 ml**

AUC = 0.709 (p<0.026; [0.577-0.819])



- Reproducibility between the 2 readers:
  - Mean absolute difference = 21 ml
  - TMTV0 <225 or >225 ml: Kappa = 0.9 (very good)

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	TMTV0 >225 ml n = 17	TMTV0 ≤225 ml n = 42	p
	n (%)	n (%)	
Median age at diagnosis (years)	31 (17 - 63)	37.5 (16-76)	NS
Gender			
Male	14 (82)	26 (62)	NS
Female	3 (18)	16 (38)	
Histological type			
Lymphocyte rich	1 (6)	4 (10)	NS
Mixed cellularity	2 (12)	5 (12)	
Nodular sclerosis	12 (71)	33 (79)	
Unclassified	2 (12)	0	
Ann Arbor Stage			
- I	1 (6)	4 (10)	NS
- II	2 (12)	15 (36)	NS
- III	2 (12)	8 (19)	NS
- IV	12 (71)	15 (36)	<0.025
Bulky Tumor (mass>10cm)	7 (41)	2 (5)	<0.002
IPS ≥ 3	14 (82)	22 (52)	0.04

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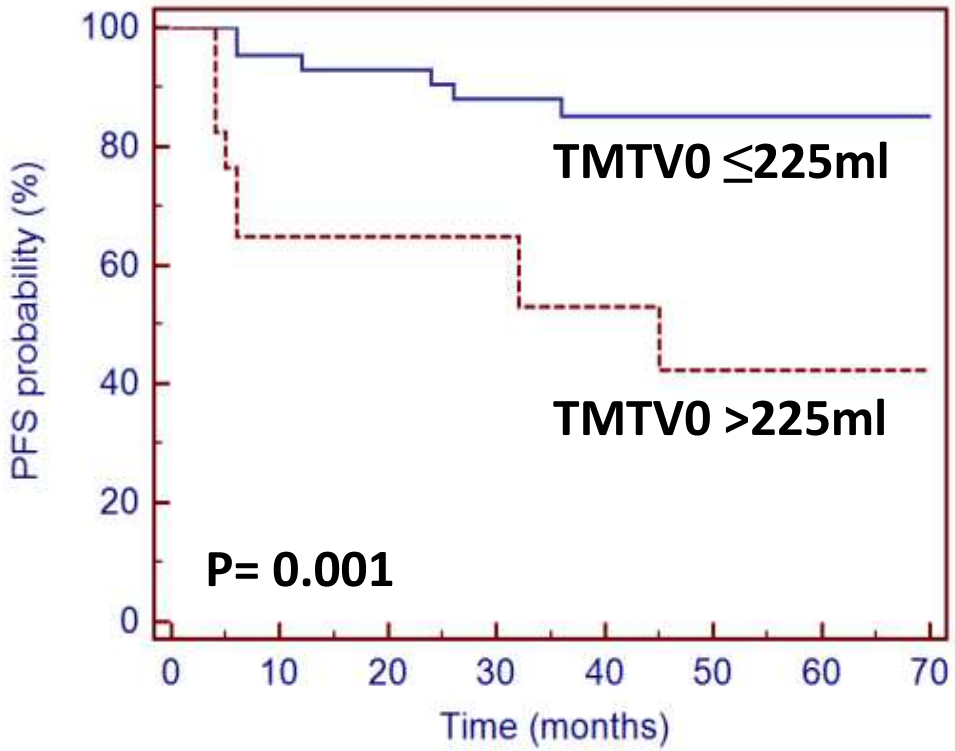
PFS according to TMTV0



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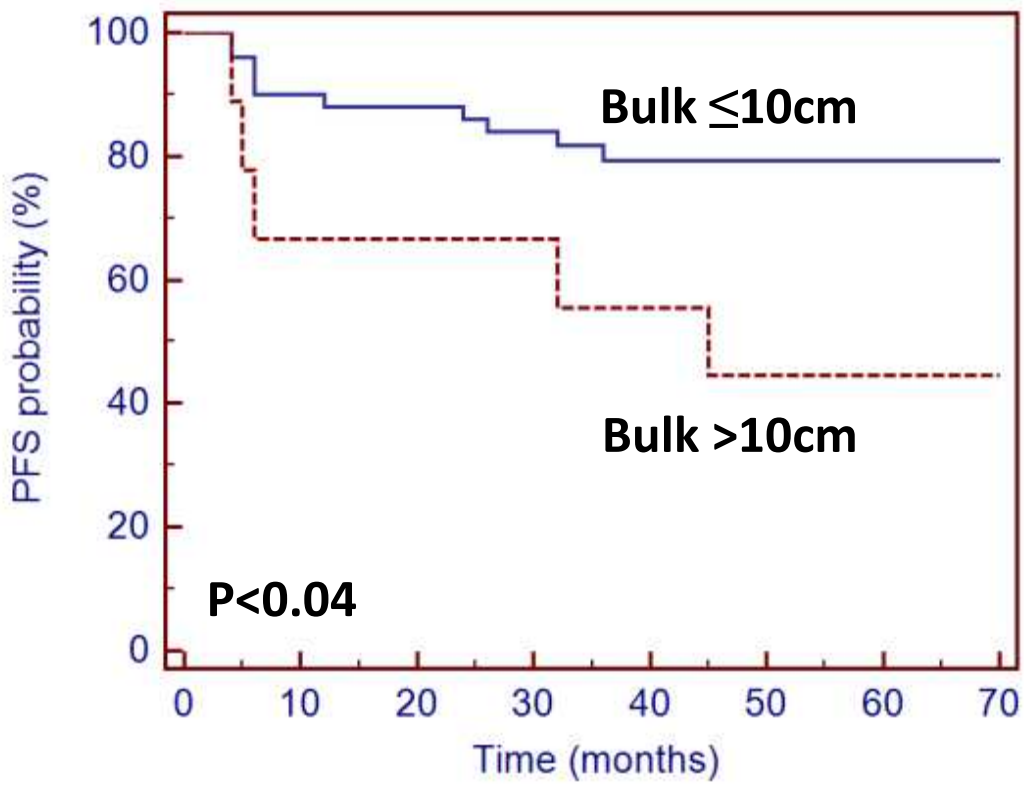
PFS according to Bulk



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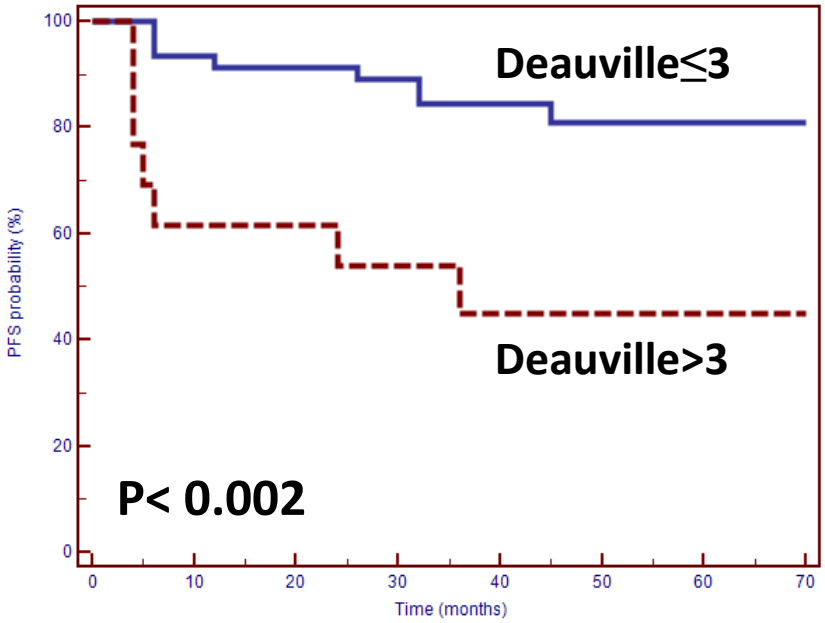
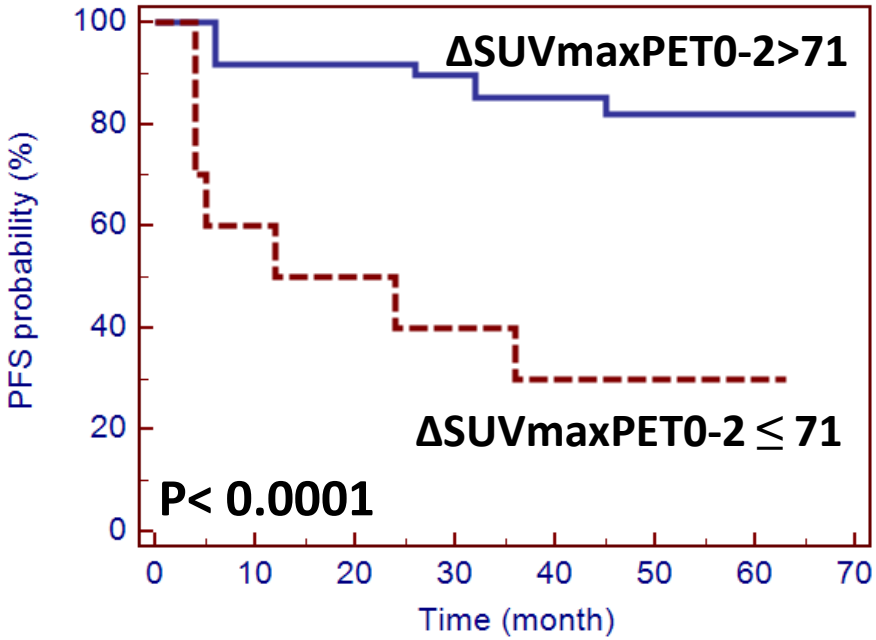
PFS according to PET2 results





Rossi C et al , JNM 2014, 55:569-73

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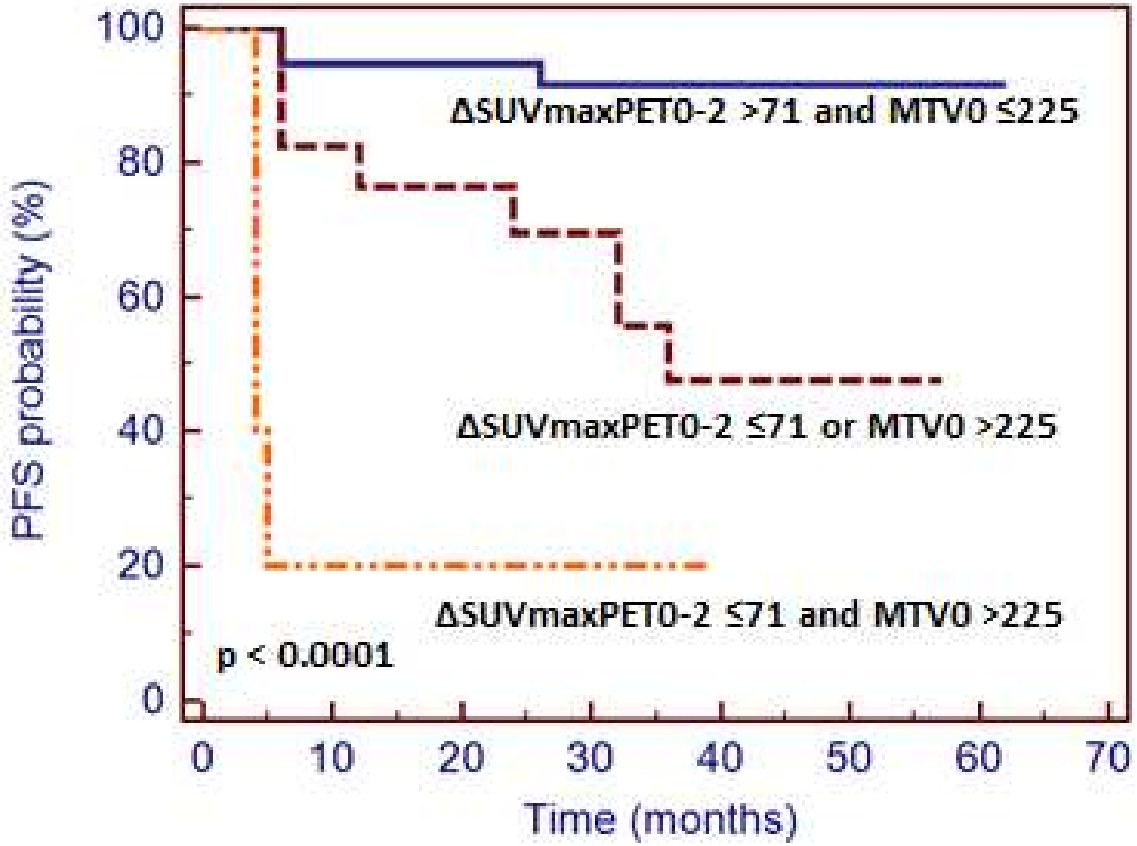
- IV	12 (71)	15 (36)	<0.025
Bulky Tumor (mass>10cm)	7 (41)	2 (5)	<0.002
IPS ≥ 3	14 (82)	22 (52)	0.04
ΔSUVmaxPET0-2			
>71%	12 (71)	37 (88)	NS
≤71%	5 (29)	5 (12)	

TMTV0 and ΔSUVmaxPET0-2-based prognostic model

- **In univariate analysis** :
  - **TMTV0** (≤225cc vs >225 cc):
    4y-PFS = 85% vs 42%; p = 0.001
  - **Bulky tumor** (>10cm vs ≤10cm):
    4y-PFS = 44% vs 78%; p <0.04
  - **ΔSUVmaxPET0-2** (≤71% vs >71%):
    4y-PFS = 82% vs 30%; p <0.0001

- **In multivariate analysis:**
  only **ΔSUVmaxPET0-2 (p= 0.0005; RR= 6.4) and MTV0 (p< 0.007; RR= 4.2)** remained independent predictors for PFS

PFS according to MTV0 and ΔSUVmaxPET0-2



N = 37 (63%)

N = 17 (29%)

N = 5 (8%)

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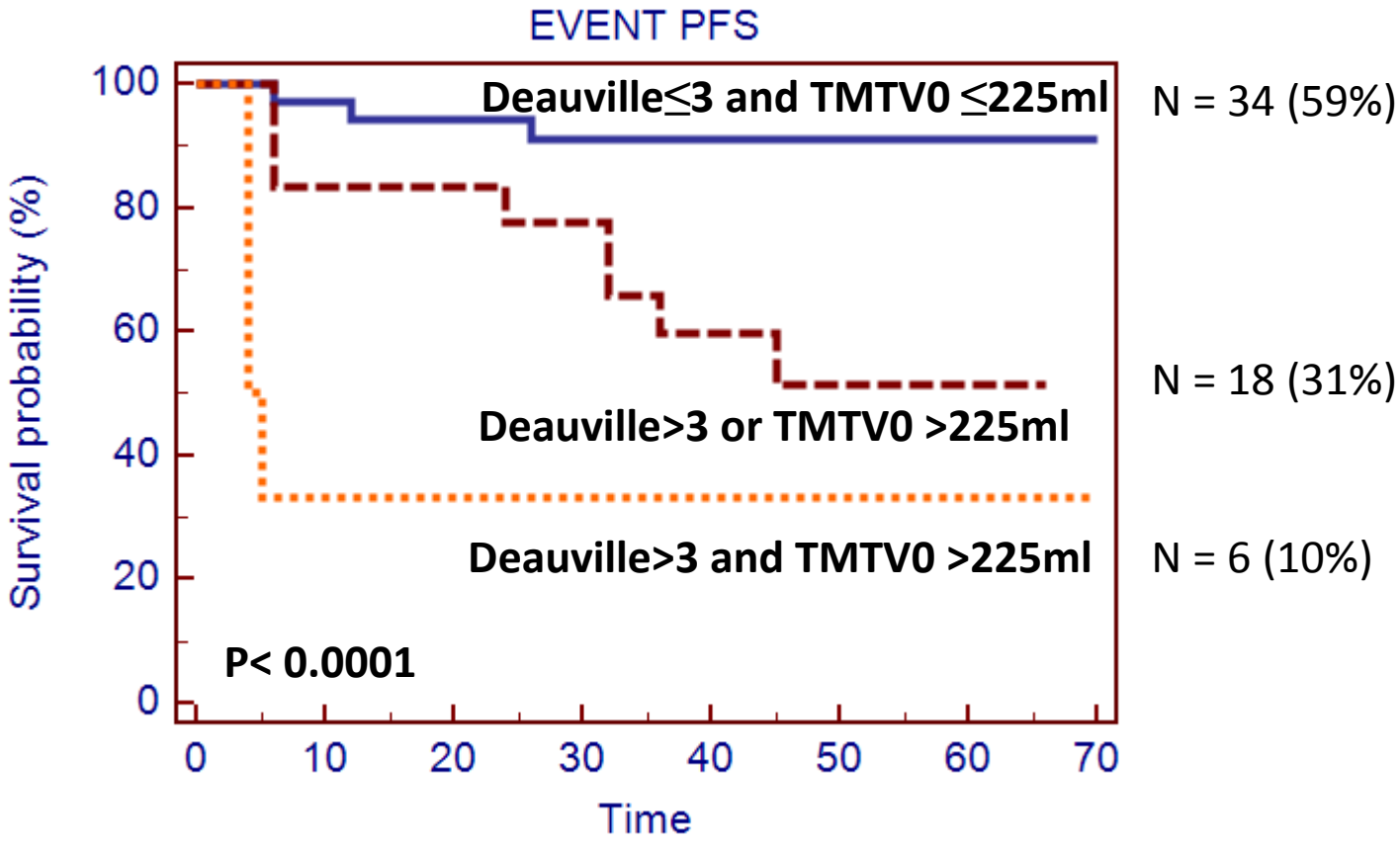
PFS according to TMTV0 and PET2 Deauville score



Conclusions

- **TMTV0 is more relevant that tumor bulk to predict outcome of patients with HL**, and adds significant prognosis insights to interim PET response assessment

- **The combination of TMTV0 with ΔSUVmaxPET0-2 allows identifying 3 subsets of HL patients with significantly different outcomes** that may help clinicians to guide therapeutic strategy

- These results have to be validated in larger series