PET/CT-Based Bone Marrow Assessment Shows Significant Promise in Replacing Routine Bone Marrow Biopsy in Newly Diagnosed Extranodal Natural Killer/T-Cell Lymphoma

Yiqin Wang、Ming Jiang et al.

Center of Medical Oncology, West China Hospital,Chengdu, China

Disclosure slide

- There are not any financial interest in, or arrangement with, a company those products or services are discussed in our presentation

- There are any financial interest in, or arrangement with, a competing company

- There are any other financial connections, direct or indirect, or other situations that might raise the question of bias in the work reported or conclusions, implications, or opinions states – including pertinent commercial or the sources of funding for the individual presenter or for the associated department or organization, personal relationship, or direct academic competition

INTRODUCTION

- Extranodal natural killer /T-cell lymphoma (ENKTL)

- <1% of malignant lymphomas in Western countries and about 3-10% in East Asia

- early stage:70–80%, 5-year survival 66–80%; advanced-stage: 20–30%, 2-year survival 40%

BACKGROUND

- BMA of ENKTL routinely comprises bone marrow biopsy (BMB) and ^{18}F-FDG-PET/computed tomography (PET/CT).

- The routine method of BMB is unilaterally or bilaterally blind, leading to overlooking of the disease[1,2], pain[3] and even needle tract seeding[4,5]

- ENKTL is consistently ^{18}F-FDG-avid[6,7]

- PET/CTpresents a satisfactory performance in lesion detection and staging[8,9]

- We investigated the diagnostic performance and prognostic value of PET/CT in ENKTL, with a view to find whether it could obviate the requirement for BMB under some conditions.

1. Cheng G et al. European Journal of Nuclear Medicine and Molecular Imaging. 2011;38: 1469-1476.
2. Kwee TC et al. Thescientificworldjournal. 2011;11: 391-402.
3. Brunetti GA et al. Ann Hematol. 2011;90: 1233-1235.
4. Fowler N et al. Leukemia & Lymphoma. 2008;49: 156-158.
5. Hopkins Eet al. Br J Haematol. 2014;166: 635-635.
6. Wu H-B et al. Nucl Med Commun. 2010;31: 195-200.
7. Storto G et al. Br J Haematol. 2010;151: 195-197.
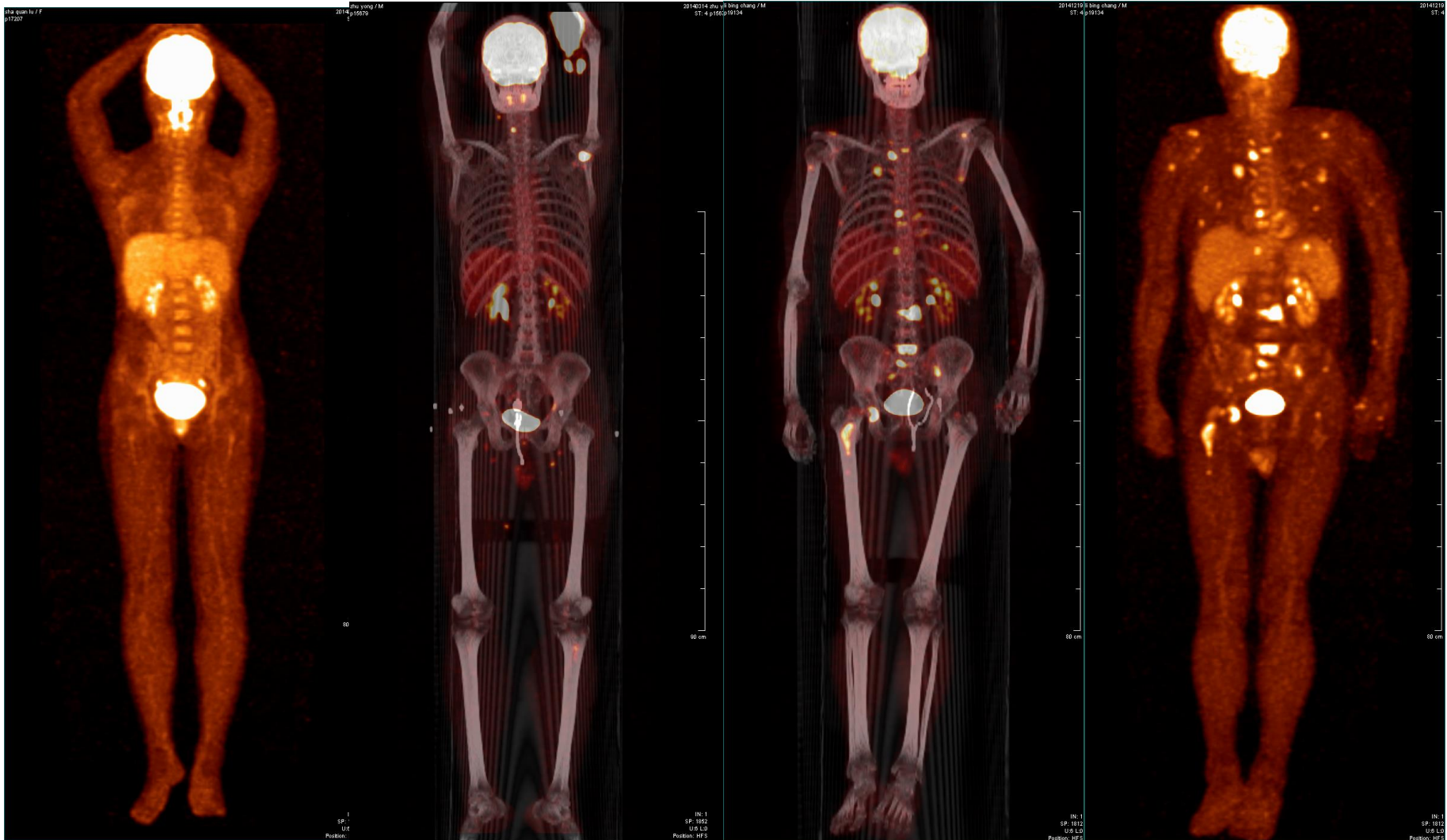8. Xu B et al. Blood. 2014;124.
9. Zhou Z et al. Ann Hematol. 2015;94: 963-967.

PATIENTS AND METHODS

- July 2010 to September 2013

- All patients underwent staging procedures, including clinical and laboratory tests, PET/CT imaging, and unilateral iliac crest BMB. Staging results and BMI were compared with and without BMB. Data were reviewed weekly to assign stage, determine the prognostic score and plan treatment regimens.
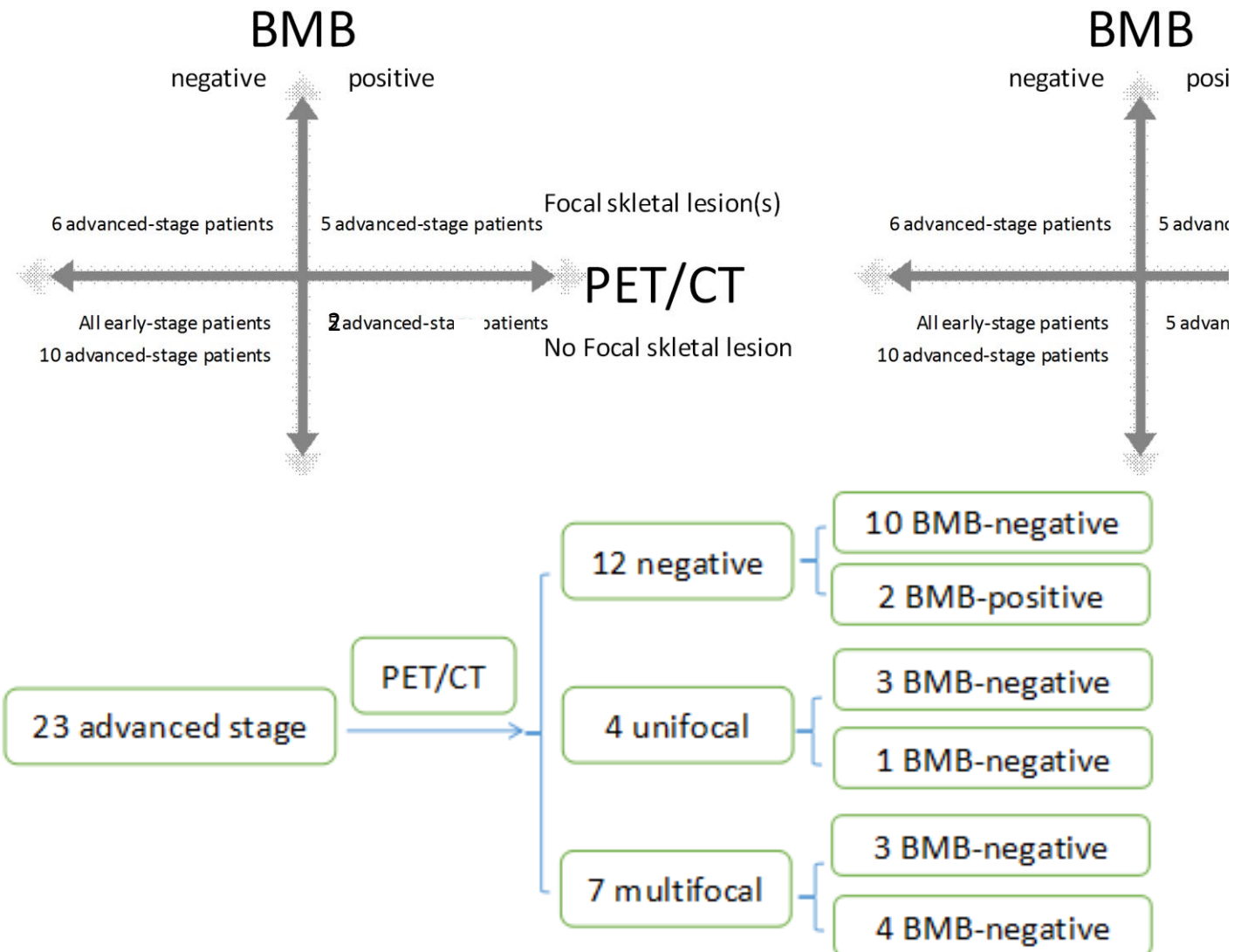
Bone marrow involvement (BMI) diagnosis by PET/CT

- negative
- unifocal
- multifocal

Patient Characteristics

Characteristic	No.	(%)
Age		
Median	42 (y)	
Range	13 to 70(y)	
Sex		
Male	65	(64.4)
Female	36	(35.6)
Primary site[1]		
Nasal	88	(87.1)
Non-nasal	13	(12.9)
Disseminated	3	(3.0)
Ann Arbor stage		
I	38	(37.6)
II	40	(39.6)
III	5	(5.0)
IV	18	(17.8)
ECOG PS[2]		
0-1	86	(85.2)
2	15	(14.8)

Characteristic	Patients	(%)
IPI[3] Score		
Low (0 or 1)	81	(80.2)
Intermediate Low (2)	9	(8.9)
Intermediate High (3)	8	(7.9)
High (4 or 5)	3	(3.0)
KPI[4] Score		
0-2	81	(80.2)
3-4	20	(19.8)
B Symptoms Present	51	(50.5)
Serum LDH[5] Increase	40	(39.6)
Other involved sites[6] by PET/CT		
Skin	3	(3.0)
Lung	3	(3.0)
Muscle, Soft tissue	9	(8.9)
Liver	2	(2.0)
Spleen	3	(3.0)
Kidney or Adrenal grand	2	(2.0)
Gastric and Intestine	2	(2.0)

BMI diagnostic results (PET/CT *v.s.* BMB)

Comparison of the BMI Diagnostic Performance (BMB *V.S.* PET/CT)

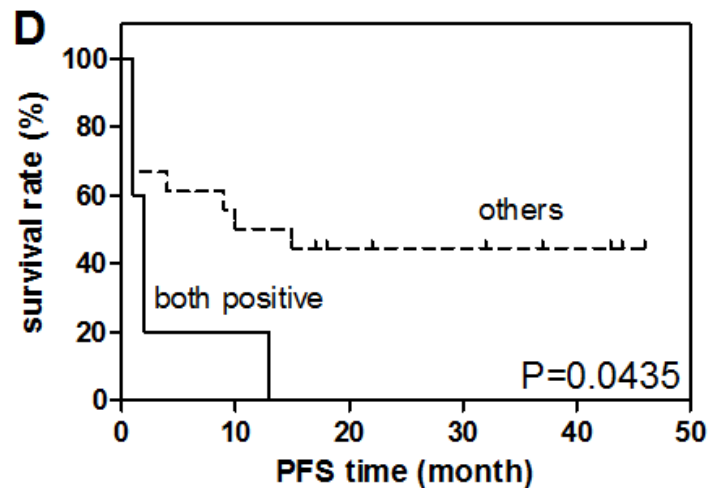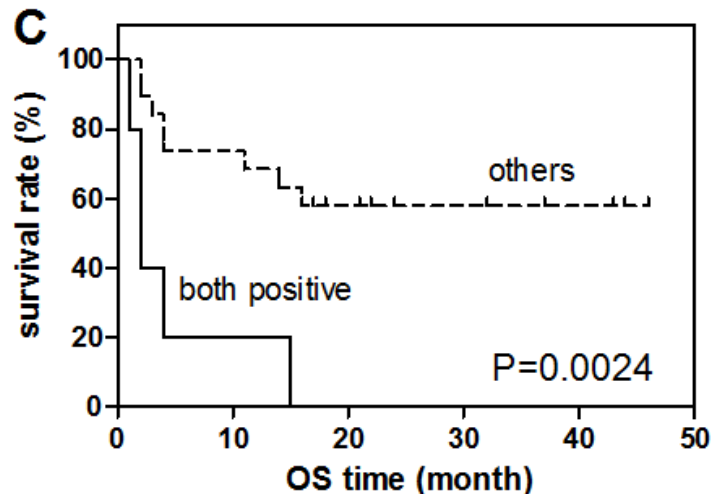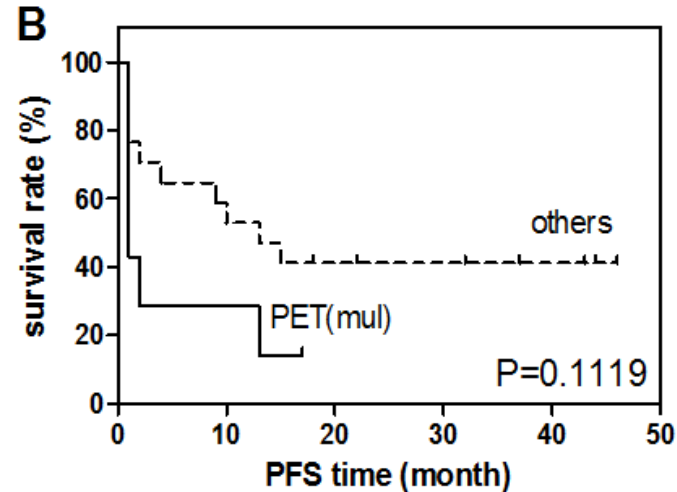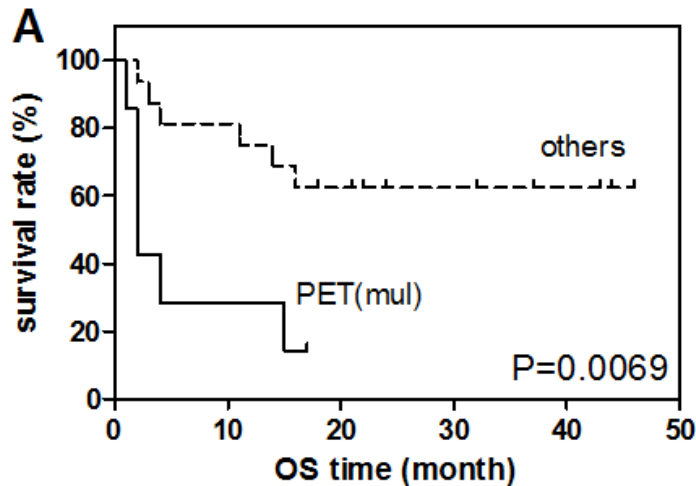| Diagnostic Modality	Bone/Bone Marrow Disease Defined Only by Positive BMB (N=7)		Bone/Bone Marrow Disease Defined by Positive BMB and/or Focal Skeletal PET/CT Lesion(s) (N=13)	
	%	95% CI	%	95% CI
BMB				
Sensitivity	N/A*		53.8	25.1-80.8
Specificity	N/A*		N/A^	
PPV	N/A*		N/A^	
NPV	N/A*		93.6	93.4-93.8
Accuracy	N/A*		94.1	93.9-94.3
PET/CT				
Sensitivity	71.4	29.0-96.3	84.6	54.6-98.1
Specificity	93.6	93.4-93.8	N/A^	99.8-100
PPV	45.5	16.8-76.6	N/A^	71.5-100
NPV	97.8	97.6-98.0	97.8‡	97.6-98.0
Accuracy	92.1	91.9-92.3	98.0‡	97.8-98.2

N/A, not applicable; NPV, negative predictive value; PPV, positive predictive value.
*N/A because BMB is considered the gold standard in this analysis.
^N/A because of missing reference for true positive.
‡P< 0 .05 for difference between BMB and PET/CT for detection of bone/bone marrow disease.

Prognostic performance of PET/CT and BMB in advanced-stage patients

Discussion

1. diagnostic procedures: BMB v.s. PET/CT:

Diagnostic procedures	routine BMB	PET/CT
Scope of examination	Unilaterally or bilaterally anterior or posterior iliac crests	Whole body
Invasiveness	Yes	No
Shortness	bleeding, pain, needle tract seeding	false-positivity

2.potential limitations in this study: finite study sample sizes, retrospective design of studies and heterogeneity .

Conclusion

- BMI diagnostic performance: PET/CT v.s. BMB

- BMI prognostic performance of BMB

- BMI prognostic performance of PET/CT:
  the Promise to replace BMB in patients of
  early stage / advanced stage