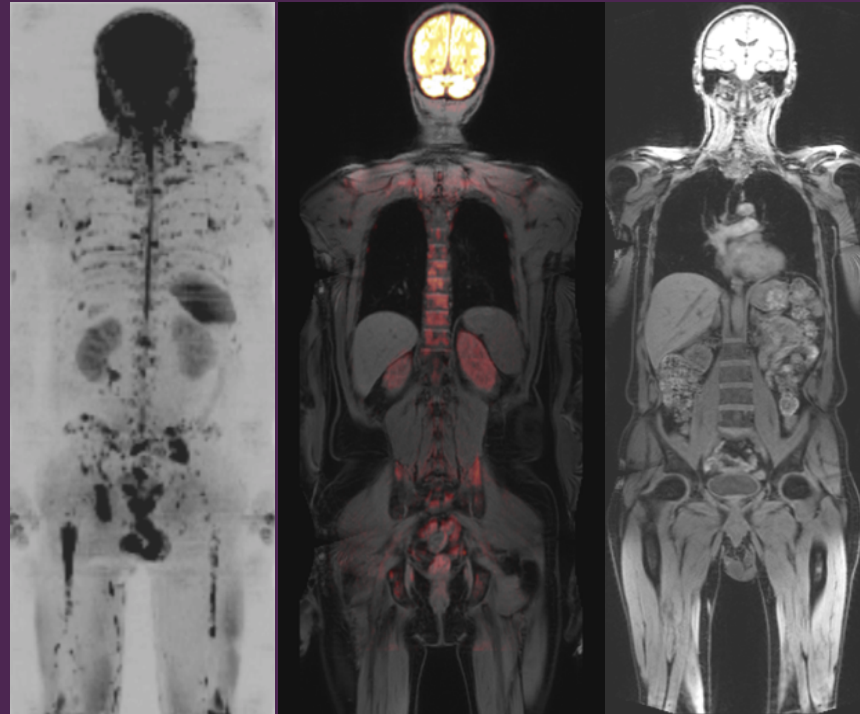


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Whole Body Diffusion Weighted MRI in Multiple Myeloma



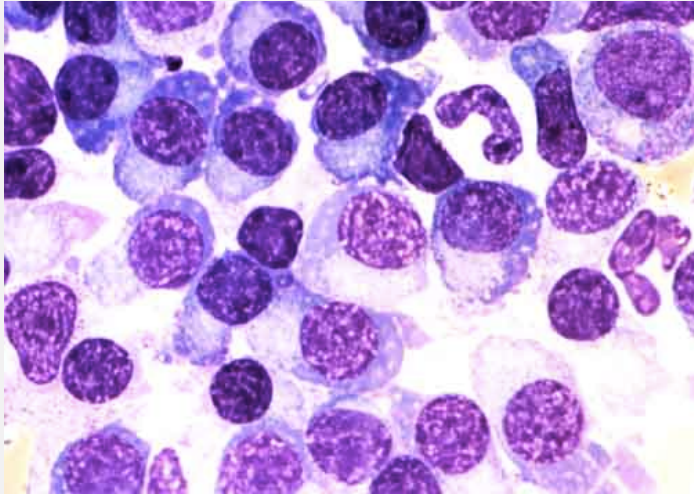
Christina Messiou

Consultant Radiologist, The Royal Marsden Hospital



NHS

Traditional view of myeloma



New view of myeloma

Why ?
How ?
When ?



Role of Magnetic Resonance Imaging in the Management of Patients With Multiple Myeloma: A Consensus Statement

International Myeloma Working Group JCO 2015

1. Patients with more than one lesion >5mm on MRI should be considered as having symptomatic disease requiring therapy.
2. Whole body MRI: work up of **solitary bone plasmacytoma** and all patients suspected of having **asymptomatic or smouldering** multiple myeloma. (spine+pelvis MRI if WB not available)

Imaging for people with suspected myeloma

- 1.3.1 Offer imaging to all people with a plasma cell disorder suspected to be myeloma.
- 1.3.2 Consider whole-body MRI as first-line imaging.
- 1.3.3 Consider whole-body low-dose CT as first-line imaging if whole-body MRI is unsuitable or the person declines it.
- 1.3.4 Only consider skeletal survey as first-line imaging if whole-body MRI and whole-body low-dose CT are unsuitable or the person declines them.

- 1.9.6 For people with myeloma and serological relapse or disease progression, consider one of the following (taking into consideration previous imaging tests):
- whole-body MRI
 - spinal MRI
 - fluorodeoxyglucose positron emission tomography CT (FDG PET-CT).

Miss 50% lesions
imaging spine alone
Bauerle 2009

DWI more sensitive
than conventional MRI

Why WB MRI?
Why WB DW MRI ?

DWI more sensitive
than FDG PET/CT for
diffuse and small
volume disease

Combined functional
and anatomical data-
risk of cord comp and
benign vs malignant
fractures

Better differentiation of
active vs treated disease
than
conventional MR

Quantitative

Well tolerated by
patients

No ionising radiation
No iv contrast
and ? more
cost effective

Prognosis and
Identifying disease and
treating early gives a
survival advantage



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Asymptomatic Patients

Asymptomatic patients with
positive MRI have a shorter
time to progression *Hillengass
2010, Moulopoulos 1995, Kastritis
2013...*

Patients with high risk SMM
randomised between
lenalidomide + low dose Dex vs
observation, treatment gave a
sig OS advantage (Mateos 2013)

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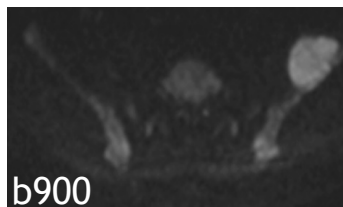
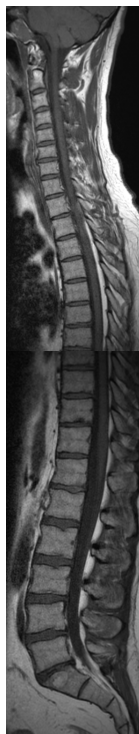
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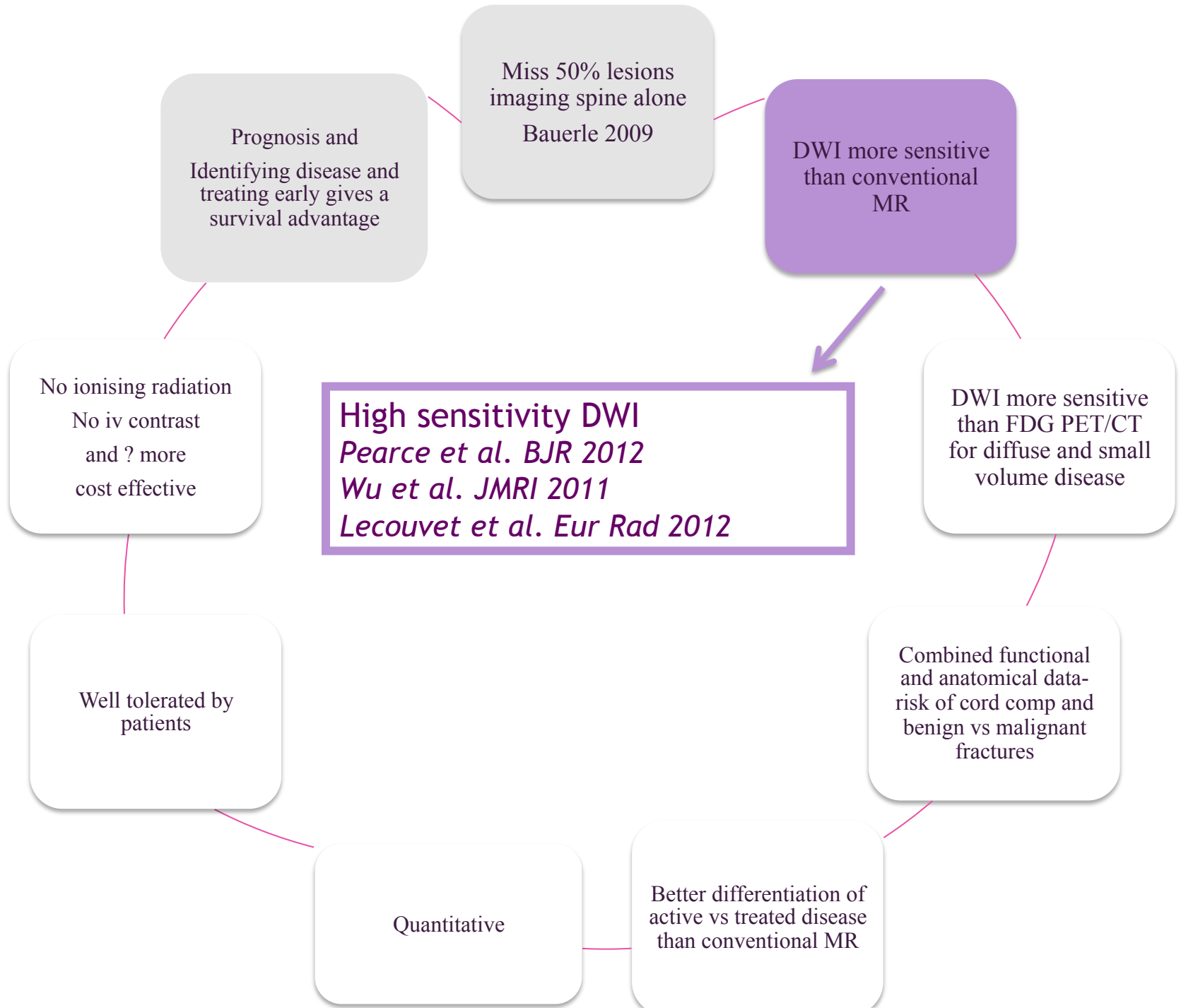


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High sensitivity DWI
Pearce et al. BJR 2012
Wu et al. JMRI 2011
Lecouvet et al. Eur Rad 2012

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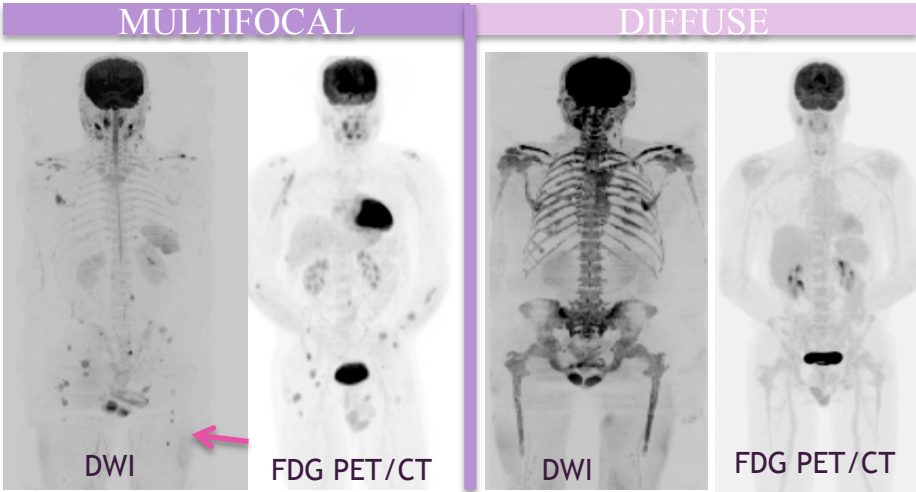
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$P < 0.02$. Pawlyn et al. *Leukaemia* 2016

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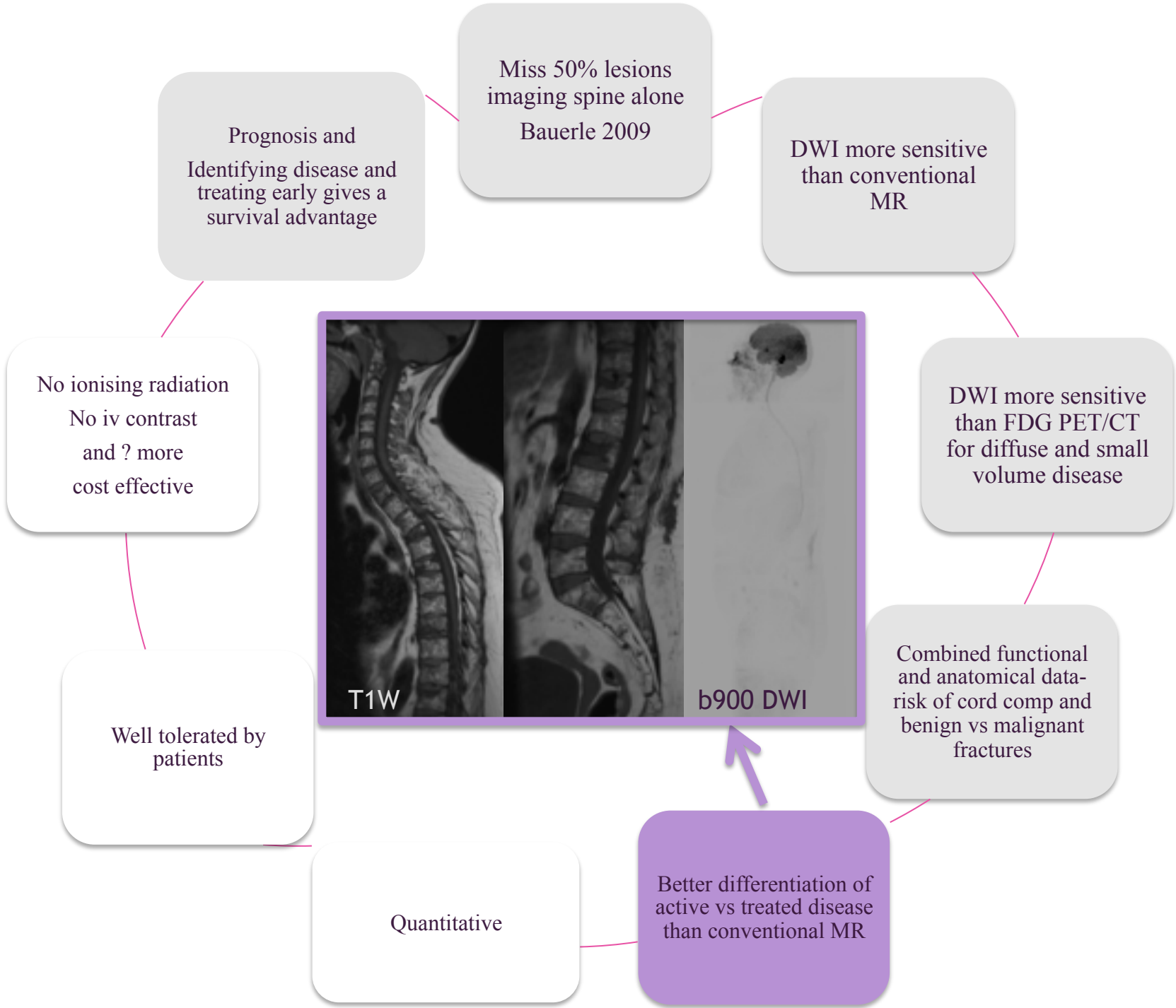
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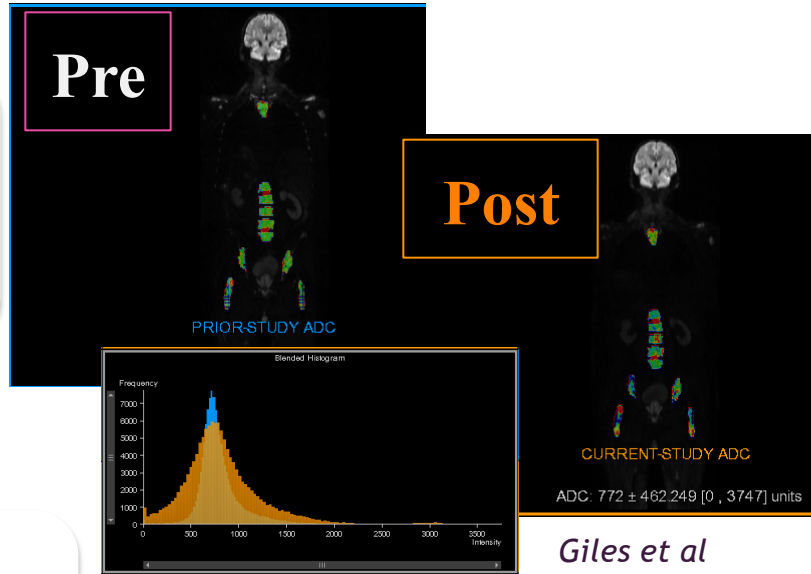


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*Giles et al
Radiology 2014*

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36 myeloma patients.
Q. Would you have the examination again?

Yes 93%
No 3%
Not sure 4%

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diffuse and small
volume disease

Q. How did you find the length of the scan?

Fine 71%
A little too long 25%
Far too long 4%

Otero et al ICIS 2015

Improved functional
anatomical data-
record comp and
benign vs malignant
fractures

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6. Better differentiation
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Patient Preference

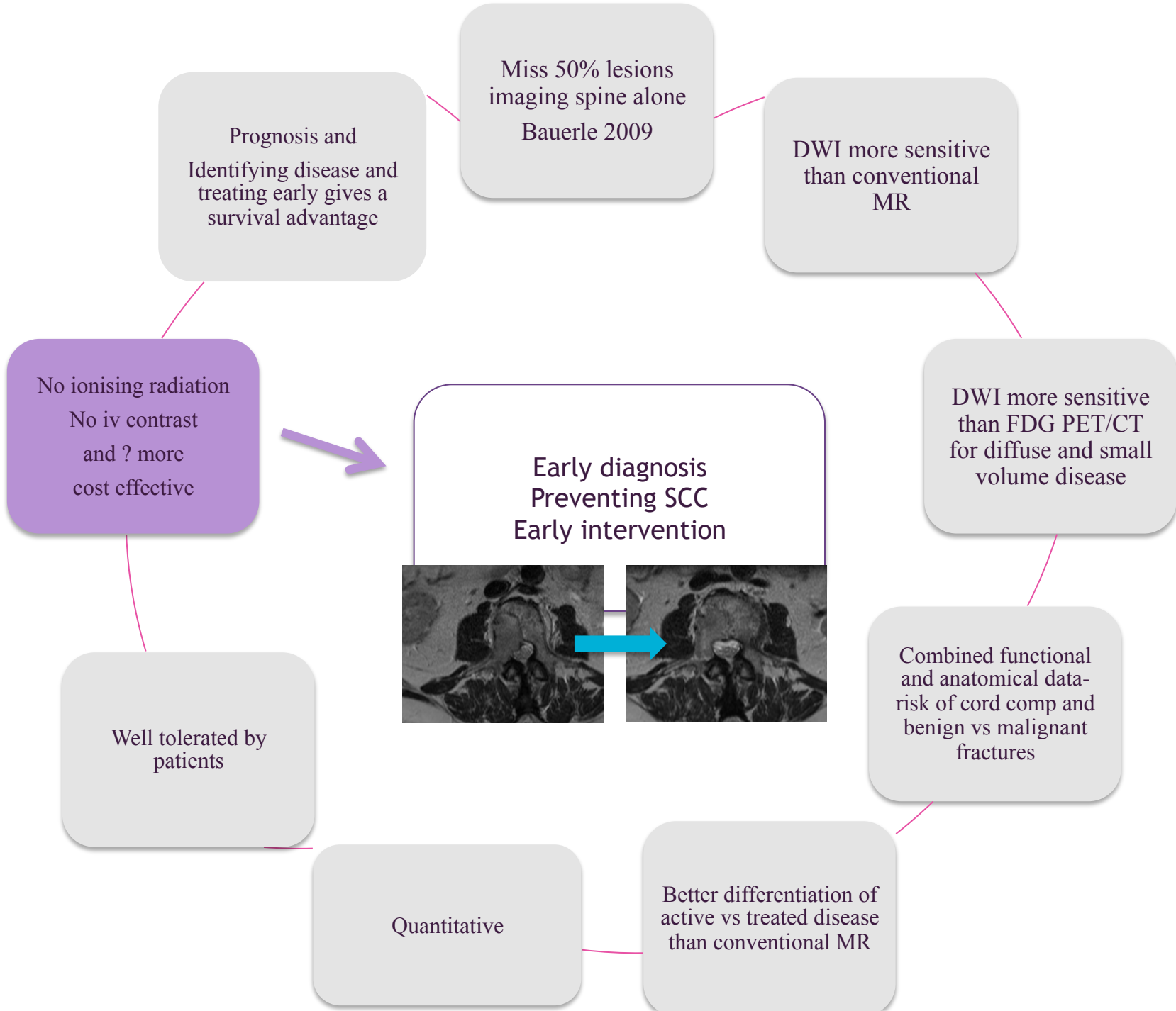
2D-4 PREDICTORS OF PATIENT PREFERENCES FOR WHOLE BODY MAGNETIC RESONANCE IMAGING COMPARED WITH STANDARD STAGING PATHWAYS FOR THE INVESTIGATION OF SYMPTOMS OF SUSPECTED COLORECTAL OR LUNG CANCER

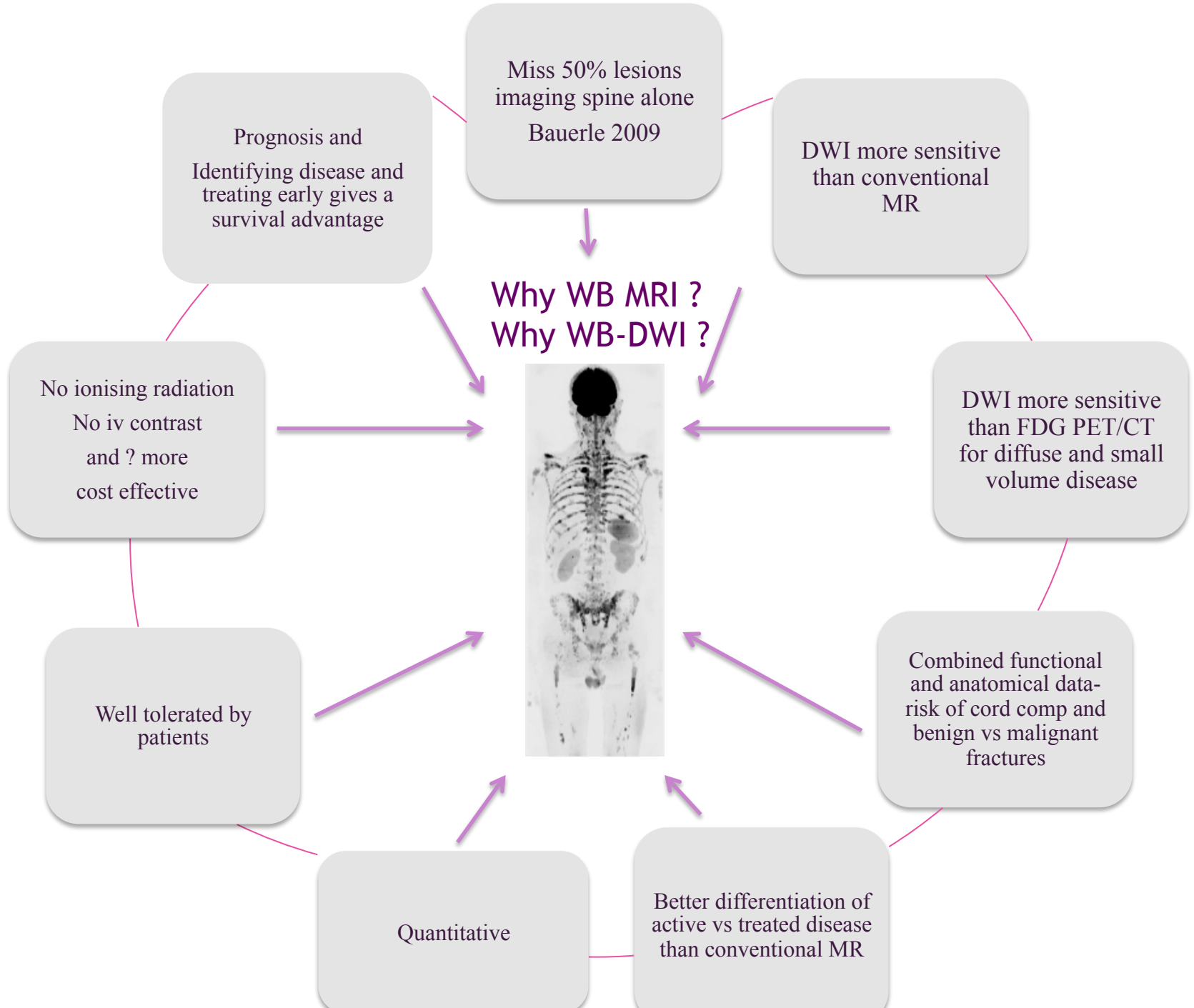
Anne Miles et al SMDM 2016

107 patients completed questionnaires in the streamline study

Over half of patients undergoing staging scans for suspected colorectal or lung cancer would prefer to have a WB-MRI than CT/ PET-CT

Awareness that WB-MRI does not impart a radiation dose was the item that predicted patient preference for WB-MRI yet only 42% of patients were aware of this attribute.





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Why? ✓

How to perform WB-DWI for patients with myeloma

When



NHS

Minimum Protocol

Mechanical complications



T2W

T1W

Screen 1

AVN

Trephine sampling

b900

b50

Quantitative

ADC

Sensitive staging focal and diffuse disease Extramedullary disease

b900 MIP

Screen 2

45 minutes

Why? ✓

How? ✓

When to perform WB-DWI
for patients with myeloma -
cases not on web version.



iTIMM

Image Guided Theranostics in Multiple Myeloma

Prospective Observational Study

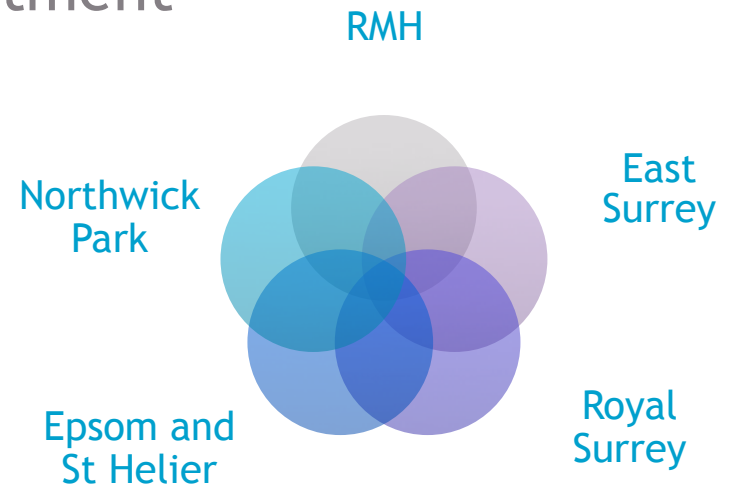
Can we detect very small volume residual disease post auto and how does this relate to outcomes?

Response adapted strategies

Can we use WB-DWI to escalate treatment and improve outcomes?

Diagnostic

WB DWI vs FDG PET/CT vs CT



A non invasive, sensitive imaging tool designed to provide a package of information tailored to the needs of patients with myeloma

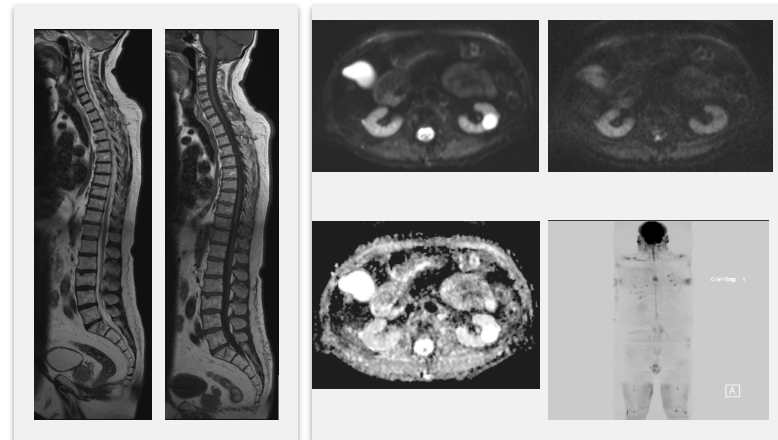
Sensitivity - diffuse and focal disease

Mechanical complications

Quantitative

Acceptable to patients

Providing tools which enable precision and personalized medicine everyday



First line imaging at diagnosis and relapse in UK

Standard of care- trial costs ↓

Future proofing clinical trials

Aligned with other tumour type developments and technologies ie MR-Linac
? PET/MRI

EDUCATION

Royal College of Radiologists ASM - 2015, 2016 and 2017

Royal Marsden Whole Body MRI course - 2015

BIR Hands on Whole Body MRI in Myeloma Course - 2017

International Cancer Imaging Society - 2017

Hands on Royal Marsden Whole Body MRI course 2017

Acknowledgements



The Patients !

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Prof Gareth Morgan, Prof Faith Davies

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