

## Multiple Myeloma Updates from ASH 2024

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**UW** Medicine

### Disclosures

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### Overview – ASH Updates 2024

- Smoldering MM
- Newly diagnosed MM novel BsAb combinations, quad therapies
- MRD relapse
- Relapsed / refractory MM
- AL Amyloidosis

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## Smoldering multiple myeloma in 2025



Years since Diagnosis

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Kyle RA NEJM 2007

Standard of care for SMM:

- Observation: Q3 month monitoring with annual to biannual imaging
- Escalate to monthly monitoring if change in FLC/M spike kinetics or evolving anemia

Treatment:

New data from AQUILA presented at ASH upends this paradigm for high risk SMM

### SMM treatment trials to date



37

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72

Lonial S et al JCO 2020

- practice in the US. Most oncologists still prefer observation

### **AQUILA:** Study Design

#### Screening

#### Key eligibility criteria

- ≥18 years of age
- Confirmed SMM diagnosis (per IMWG criteria) for ≤5 years
- ECOG PS score 0-1
- Clonal BMPCs ≥10% and ≥1 of the following risk factors:
- Serum M-protein ≥30 g/L
- IgA SMM
- Immunoparesis with reduction of 2 uninvolved Ig isotypes
- Serum involved:uninvolved FLC ratio  $\geq 8$  and < 100
- Clonal BMPCs >50% to <60%</li>

All patients were required to have CT/PET-CT and MRI imaging during screening



- High risk criteria evolving; most now use 20/2/20 criteria
- No crossover allowed (as compared to ECOG E3A06)

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#### Post-treatment phase

- Efficacy follow-up until progression by SLiM-CRAB
- Survival follow-up every 6 months until end of study

#### Primary endpoint

 PFS by IRC per IMWG SLIM-CRAB criteriac

#### Key secondary endpoints

- Overall response rate
- Time to first-line treatment for MM
- PFS on first-line treatment for MM
- Overall survival

### Progression criteria

#### Progression to active MM was based on the IMWG SLIM-CRAB diagnostic criteria for MM<sup>1</sup>

Clonal BMPCs ≥10% or biopsy-proven bony or extramedullary plasmacytoma AND

≥1 of the below multiple myeloma-defining events:

CRAB criteria	Calcium elevation: serum calcium >0.25 mmol/L (>1 mg/dL) higher than the upper limit
	Renal insufficiency: creatinine clearance <40 mL/min <sup>+</sup> or serum creatinine >177 umol/L
	Anemia: hemoglobin value >20 g/L below the limit of normal or a hemoglobin value <100 g/L
	Bone disease: ≥1 osteolytic lesions on skeletal radiography, CT, or PET-CT
	Clonal BMPCs: ≥60% BMPCs
SLiM criteria	Serum FLC: involved:uninvolved serum FLC ≥100
	Focal lesions: ≥1 focal lesions on MRI studies

- Clinical significance of SLiM criteria debatable
- What's really most important morbidity due to progression of myeloma CRAB criteria

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of normal of >2.75 mmol/L (>11 mg/dL)
_ (>2 mg/dL)
-

## Baseline demographics, disease characteristics

Characteristic	DARA (n = 194)	Active monitoring (n = 196)	Characteristic	DARA (n = 194)	Active monitoring (n = 196)				
Age			Type of SMM, n (%)	Type of SMM, n (%)					
Median (range), years	63.0 (31-86)	64.5 (36-83)	lgG	127 (65.5)	138 (70.4)				
18 to <65 years, n (%)	106 (54.6)	98 (50.0)	IgA	55 (28.4)	42 (21.4)				
65 to <75 years, n (%)	67 (34.5)	74 (37.8)	Other	12 (6.2)	16 (8.2)				
≥75 years, n (%)	21 (10.8)	24 (12.2)	AQUILA risk factors for progression to MM,	n (%)ª					
Sex, n (%)			<3	154 (79.4)	156 (79.6)				
Female	99 (51.0)	103 (52.6)	≥3	40 (20.6)	40 (20.4)				
Male	95 (49.0)	93 (47.4)	Cytogenetic risk profile <sup>b</sup>	n = 167	n = 170				
ECOG PS score, n (%)			≥1 of del(17p), t(4;14), and/or t(14;16),	29 (17.4)	22 (12.9)				
0	165 (85.1)	160 (81.6)	n (%)						
1	29 (14.9)	36 (18.4)	Mayo 2018 risk criteria, n (%) <sup>c</sup>						
Median time from diagnosis of SMM to			Low	45 (23.2)	34 (17.3)				
randomization (range), years	0.80 (0-4.7)	-4.7) 0.67 (0-5.0)	Intermediate	77 (39.7)	76 (38.8)				
Median BMPCs (range), %	20.0 (8.0-59.5)	20.0 (10.0-55.0)	High	72 (37.1)	86 (43.9)				

- Median age mid 60's
- Median time from diagnosis to randomization: 0.8 and 0.67 years
- 37% in Dara group, and 43% in obs group had high risk by Mayo 2018 criteria (20/2/20)

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### Treatment and disposition

DARA	Active monitoring
194	196
35.0 (0-36.1)	25.9 (0.1-36.0)
38 (1-39)	-
127 (65.5)	80 (40.8)
66 (34.2)	116 (59.2)
42 (21.8)	82 (41.8)
13 (6.7)	1 (0.5)
5 (2.6)	22 (11.2)
3 (1.6)	1 (0.5)
1 (0.5)	4 (2.0)
2 (1.0)	6 (3.1)
	DARA 194 35.0 (0-36.1) 38 (1-39) 127 (65.5) 66 (34.2) 42 (21.8) 13 (6.7) 5 (2.6) 3 (1.6) 1 (0.5) 2 (1.0)

- Majority (65%) of patients completed all 39 cycles of daratumumab
- Most common reason for discontinuation was progressive disease; only 6.7% of patients in • dara arm discontinued due to AEs

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## Progression to MM Improved With Daratumumab Monotherapy



194 188 181 179 166 156 149 145 142 139 138 135 129 121 118 114 106 102 99 96 Daratumumab 90 ctive monitoring 196 180 175 160 142 131 120 111 100 91 87 83 78 71 67 65 60 55 51 50 49 33 19 8 2

- Note early drop off in first 12 months these patients likely had evolving MM
- Real benefit seems to be amongst group of patients with high risk of progression in the first 24 months
- Note high rate of CRAB progression amongst active monitoring

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	DARA (n = 194)	Active monitoring (n = 196)
event, n (%)	67 (34.5)	99 (50.5)
ath without disease progression	5 (7.5)	5 (5.1)
sease progression <sup>ab</sup>	62 (92.5)	94 (94.9)
CRAB criteria <sup>c</sup>	12 (19.4)	34 (36.2)
Calcium elevation	0	2 (2.1)
Renal insufficiency <sup>d</sup>	0	0
Anemia	2 (3.2)	14 (14.9)
Bone disease	10 (16.1)	18 (19.1)
SLiM criteria <sup>c</sup>	50 (80.6)	65 (69.1)
Clonal BMPCs	5 (8.1)	16 (17.0)
Serum FLC	33 (53.2)	33 (35.1)
Focal lesion by MRI	12 (19.4)	16 (17.0)

### PFS2 was also improved with Daratumumab monotherapy



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- Active monitoring
- RVD was the most common front line treatment for MM (dara in 9.8%, active monitoring 14.8%)
- 25% in Dara group, and 33% in active monitoring group received anti CD38 regimens
- Addresses concerns about impact on subsequent LOT

# Time to initiation of treatment improved with Daratumumab for smoldering MM



- First line treatment for MM initiated by 33.2% in DARA group and 53.6% in the active monitoring group
- Median time to initiation of treatment in active monitoring: 50.2 months; daratumumab

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## n the active monitoring group aratumumab

### Summary

- Data from the AQUILA randomized trial in high risk SMM shows that daratumumab monotherapy improves:
  - PFS
  - OS
  - **PFS2**
  - Time to next treatment
- Side effect profile manageable
- Awaiting FDA approval
- Is this practice changing? YES, in my opinion
- I will recommend this (daratumumab monotherapy) for patients who fit the eligibility criteria for AQUILA given OS, PFS2, and PFS benefits

## **Current treatment of Newly Diagnosed MM in** 2025

### **Transplant Eligible**

4 drug combinations Dara-RVd or Dara KRd 3 drug combinations:

RVd, KRd, VCd (renal failure) Autologous stem cell transplantation Vs Deferred

### Not Transplant Eligible

Dara Rd Dara-RVd Isa-RVd/Dara RVd

Supportive Care



Maintenance Standard: Lenalidomide High risk: PI/IMiD, CD38/IMID

### Maintenance

### Newly diagnosed multiple myeloma, ASH 2024 updates

- Addition of BCMA Bispecific antibodies to upfront treatment: MAJESTEC-5 results
- Updated results for transplant ineligible: IMROZ MRD analysis
- Updated results for GMMG HD7: First randomization PFS analysis
- Frailty-guided treatment de-escalation and dexamethasone dose reductions
- Significance of MRD only progression compared to traditional methods of assessing progression

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### MAJESTEC-5: Role of using BCMA BsAb in Frontline Therapy



- Teclistamab BCMA x CD3 bispecific antibody; FDA approved in >4 LOT based on MAJESTEC 1 trial ٠
- MAJESTEC-5: Frontline MM trial incorporating teclistamab with 3 arms of 6 cycle induction:
  - Tec weekly + DR
  - Tec Q4 week + DR
  - Tec Q4 week + RVD
- AHCT consolidation for all followed by Tec-D maintenance

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## Maintenance<sup>b,c</sup>

#### Primary endpoint:

• AEs, SAEs

#### Select secondary endpoints:

- MRD negativity (10<sup>-5</sup>)
- ORR
- ≥CR
- ≥VGPR
- · Stem cell yield

## MAJESTEC-5: Nonhematologic AEs

		-		2.2		-		
	Arn	n A:	Arm	A1:	Arm	1 B:		N 14297
	Tec (Q	W)-DR	Tec (Q4	W)-DR	Tec (Q4)	W)-DVR	То	tal
	(n=10)		(n=20)		(n=19)		(N=49)	
	All	Grade	All	Grade	All	Grade	All	Grade
TEAEs, n (%) <sup>a</sup>	grade	3/4	grade	3/4	grade	3/4	grade	3/4
Nonhematologic <sup>b</sup>								
CRS	6 (60)	0	14 (70)	0	12 (63.2)	0	32 (65.3)	0
Pyrexia	6 (60)	1 (10)	9 (45)	2 (10)	7 (36.8)	0	22 (44.9)	3 (6.1)
URTI	6 (60)	0	8 (40)	1 (5)	6 (31.6)	0	20 (40.8)	1 (2)
Rash	5 (50)	2 (20)	5 (25)	0	7 (36.8)	0	17 (34.7)	2 (4.1)
GGT increased	3 (30)	0	6 (30)	3 (15)	5 (26.3)	3 (15.8)	14 (28.6)	6 (12.2)
Diarrhea	6 (60)	0	4 (20)	1 (5)	4 (21.1)	0	14 (28.6)	1 (2)
Hypokalemia	1 (10)	0	8 (40)	2 (10)	4 (21.1)	0	13 (26.5)	2 (4.1)
Nausea	1 (10)	0	4 (20)	0	7 (36.8)	0	12 (24.5)	0
Peripheral sensory neuropathy	1 (10)	0	5 (25)	0	4 (21.1)	0	10 (20.4)	0
BAP increased	4 (40)	0	1 (5)	0	3 (15.8)	1 (5.3)	8 (16.3)	1 (2)
ALT increased	3 (30)	0	2 (10)	1 (5)	2 (10.5)	2 (10.5)	7 (14.3)	3 (6.1)
Nasopharyngitis	3 (30)	0	2 (10)	0	2 (10.5)	0	7 (14.3)	0
Lipase increased	1 (10)	1 (10)	5 (25)	3 (15)	1 (5.3)	1 (5.3)	7 (14.3)	5 (10.2)
Hyperglycemia	3 (30)	0	3 (15)	1 (5)	0	0	6 (12.2)	1 (2)
Constipation	0	0	1 (5)	0	5 (26.3)	0	6 (12.2)	0

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- Rates of grade 3 and 4 events were low
- All CRS events were grade 1 and 2, mostly during cycle 1
- No ICANS
- No grade 5 TEAEs

### MAJESTEC-5: Infections

	Arm A: Tec (QW)-DR (n=10)		Arm Tec (Q4 (n=	A1: 4W)-DR 20)	Arn Tec (Q4 (n=	Arm B: (Q4W)-DVR Total (n=19) (N=49)		tal :49)	<ul> <li>17 (34.7%) patients had grade 3/4 infections</li> </ul>
TEAE, n (%) <sup>a</sup>	All grade	Grade 3/4	All grade	Grade 3/4	All grade	Grade 3/4	All grade	Grade 3/4	<ul> <li>URTI and COVID-19 were the most common all grade</li> </ul>
Any infection	10 (100)	4 (40)	18 (90)	9 (45)	11 (57.9)	4 (21.1)	39 (79.6)	17 (34.7)	<ul> <li>No discontinuations due to infection</li> </ul>
Infections <sup>b</sup>							1		<ul> <li>No grade 5 infections</li> </ul>
URTI	6 (60)	0	8 (40)	1 (5)	6 (31.6)	0	20 (40.8)	1 (2)	<ul> <li>Hypogammaglobulinemia<sup>c</sup> was</li> </ul>
COVID-19	2 (20)	0	4 (20)	1 (5)	3 (15.8)	3 (15.8)	9 (18.4)	4 (8.2)	reported in 45 (91.8%) patients
Nasopharyngitis	3 (30)	0	2 (10)	0	2 (10.5)	0	7 (14.3)	0	<ul> <li>44 (89.8%) received</li> </ul>
Bronchitis	2 (20)	0	0	0	0	0	2 (4.1)	0	≥1 dose of IVIg <sup>d</sup>
Infection (NOS)	0	0	1 (5)	1 (5)	2 (10.5)	1 (5.3)	3 (6.1)	2 (4.1)	<ul> <li>Infection prophylaxis, including</li> </ul>
Pneumonia	1 (10)	1 (10)	1 (5)	0	2 (10.5)	2 (10.5)	4 (8.2)	3 (6.1)	Ig replacement, was strongly recommended <sup>e</sup>

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### MAJESTEC-5 Response Rates



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### Isatuximab: Background



### Isatuximab targets a specific epitope of CD38, a transmembrane glycoprotein widely and uniformly expressed on myeloma cells<sup>4,5</sup>

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Goldschimdt et al, ASH 2024

Isatuximab has recently been approved in combination with RVd for adults with Ti NDMM based on the results of the Phase 3 IMROZ trial<sup>1</sup>

Isatuximab is approved in several countries in combination with dexamethasone plus either pomalidomide or carfilzomib in adult patients with relapsed/refractory MM who have received prior therapies<sup>2,3</sup>



### Study Design – Part 1



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Goldschimdt et al, ASH 2024

## GMMG HD7 – Initial results – MRD at end of induction

#### Patients with MRD– at the end of induction therapy



lsa-VRd

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### PFS from time of first randomization



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Goldschmidt H et al, ASH 2024

	48	60
tion		
)	122 (116)	6 (111)
)	104 (102)	5 (92)

### MRD updates from IMROZ



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Orlowski RZ et al, ASH 2024

### MRD Analyses on IMROZ



- MRD results show deepening of responses over time, much more pronounced in the Isa RVD arm
- At 60 months, 76% of evaluable patients were MRD negative at 10<sup>-5</sup>

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Orlowski RZ et al, ASH 2024

### IFM 2017-03 – Newly diagnosed MM, Frail – dexamethasone sparing

### Phase 3 study of DR vs Rd in TNE frail NDMM (n = 295)



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Manier S et al, ASH 2024

### IFM 2017-03 PFS results



Manier S et al, ASH 2024

#### DR, median: 53.4 mo



### IFM 2017-03 – Response rates



VGPR or better rate was significantly higher with DR Deeper responses were obtained with DR at all time points, including at early time points

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Manier S et al, ASH 2024

### IMWG Frailty Score-adjusted therapy delivery reduces the early mortality risk in newly diagnosed TNE multiple myeloma: Results of the UK Myeloma Research Alliance (UK-MRA) Myeloma XIV FiTNEss trial.

Gordon Cook<sup>\*</sup>, Charlotte Pawlyn, Kara-Louise Royle, Ethan Senior, Dax Everritt, Jenny Bird, Stella Bowcock, Bryony Dawkins, Mark Drayson, Sharon Gillson, Catherine Olivier, Matthew Jenner, John Jones, Martin Kaiser, Bhuvan Kishore, David Meads, Neil Rabin, Roger Owen, Ruth de Tute, Christopher Parrish, Alan Chant, David Cairns and Graham Jackson.



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Cook G et al, ASH 2024





## UK-MRA Myeloma XIV FiTNEss Trial Design





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### Frailty-adjusted therapy - dosing

#### Reactive

		FIT	UNFIT	FRAIL
Lenalidomide	25mg D1-21	25mg D1-21	15mg D1-21	10mg D1-21
Ixazomib (weekly)	4mg	4mg	4mg	4mg
Dexamethasone (weekly)	<75: 40mg >75: 20mg	<75: 40mg >75: 20mg	20mg	10mg



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### Adaptive

## Trial Population: Baseline Characteristics (1)

	Reactive (n=365)	
Median Age (range) <70 70-79 ≥80	76 (62,90) 3.6% 68.5% 27.9%	
Male Female	56.6% 43.4%	
<u>Ethnicity</u> White Black Asian	94% 0.8% 3.1%	
<u>CA</u> Standard Risk High Risk missing	43.8% 8.3% 30.2%	
ECOG PS 0-1 $\geq 2$	71.7% 28.3%	



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#### Adaptive (n=368)

77 (62, 93) 3.8% 67.7% 28.5%	
55.6% 44.4%	
94.8% 1.9% 1.1%	
38.9% 4.8% 35.6%	
67% 33.1%	





## **Results – Overall survival (OS)**

**OS ITT Population** 





Median Follow-up: 14.7 mns (7.6,24,4)

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**UK Myeloma Research Alliance** 



### **OS Unfit/Frail Population**

### **Results – Event-free survival (EFS)** EFS defined as: PD, death from any cause, withdrawal from trial Research Alliance treatment, non-haematological (gd $\geq$ 3) & haematological (gd $\geq$ 4) toxicities

**EFS ITT Population** 



#### 1-year EFS:

- 1-year EFS: • Reactive arm 18.8% (95% CI: 14.8%, 23.0%)
- Adaptive arm 29.7% (95% CI: 25.0%, 34.5%) FiTNEss g.cook@leeds.ac.uk

 Reactive arm 16.9% (95% CI: 12.6%, 21.8%) Adaptive arm 25.7% (95% CI: 20.6%, 31.1%) Median Follow-up: 14.7 mns (7.6,24,4)

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#### **EFS Unfit/Frail Population**

### Background

### Biomarker-based definition of PD in MM

	IMWG Criteria (Kumar et al, 2016)	1990s, 2000s
•	>25% increase in serum M (absolute of 5 g/l, confirmed by repeat). >25% increase in 24 h urinary M (absolute of 200 mg/24 h, confirmed by repeat)	<ul> <li>Most patients achieve plateau</li> <li>CR uncommon, almost exclusive to context of ASCT</li> <li>Paradigm of observation after ASCT/Plateau. Conservative thresholds to prevent overtreatment</li> </ul>
•	>25% increase in <u>A</u> FLC, (absolute of 10 mg/dL, confirmation by repeat). <u>Only if no</u> <u>measurable serum and Urine M</u>	<ul> <li>FLC not broadly available</li> <li>FLC seen as hierarchically inferior to M component quantification</li> </ul>
•	>25% increase in PC in a bone marrow, absolute increase by 10%.	<ul> <li>High PC burden common at "plateau"</li> <li>Morphology as main tool for PC burden quantification (10% means 0.042 log<sub>10</sub>)</li> </ul>

In addition to biomarkers PD is also defined by the "appearance of a new lesion(s), ≥50% increase from nadir in SPD of >1 lesion, or ≥50% increase in the longest diameter of a previous lesion >1 cm in short axis; ≥50% increase in circulating plasma cells (minimum of 200 cells per µL) if this is the only measure of disease."

Blade et al. Br J Haematol 102:1115-1123, 1998 Durie et al. Leukemia 20:1467–1473, 2006 Kumar et al. Lancet Oncol 17: e328–46, 2016

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#### Current

- Most patients achieve CR
- Paradigm of continuous therapy. PD most often means replacing an ongoing therapy that is no longer adequate.
- FLC near-ubiquitously available
- FLC measurement reliable and precise
- FLC more rapidly reflect disease course
- Most patients will achieve <1% PC</li>
- NGF and NGS can quantify PC burden across a 6 log<sub>10</sub> range

### **Background** Pattern of PD - Impact on Outcome



Chakraborty et al. Am J Hematol 94:439, 2019 Goldman-Mazur et al. Blood Advances 7:909-917, 2023

Costa LJ et al ASH 2024

For <u>40-50% patients, current biomarker-</u> <u>based criteria fail</u> to anticipate clinical progression

Clinical progression more likely to have high-risk features: High LDH, HRCA, ISS3

In 70-80% clinical progression is skeletal event

### **Methods**

- Patients with NDMM, enrichment for high-risk disease
- MASTER trial (N=113)



\*24 and 72 weeks after completion of therapy

• Consecutive, similarly treated and monitored patients from institutional database (N=103) -Dara-VRd instead of Dara-KRd

Costa LJ et al. Lancet Haematol10:e890, 2023 Ravi G et al. Blood 140(suppl 1):8048, 2022

## **Methods**

- MRD by clonoSEQ® assessed not less often than every 12 months, regardless of IMWG response category.
- MRD-P arbitrarily defined as at least 1 x  $\log_{10}$  increment of MRD burden from nadir.
- Treating physician informed of MRD result and could modify treatment.
- Described and compared outcomes for -MRD-P -IMWG-defined PD not preceded by MRD-P
- Survival free of failure of 2<sup>nd</sup> line therapy (SFF2T) -From progression event (MRD-P or PD)
  - -Regardless of when 2<sup>nd</sup> LOT was started
- Overall survival (OS)
  - -From progression event (MRD-P or PD)
  - -Regardless of when 2<sup>nd</sup> LOT was started





## **Results** *MRD-P events*

- 17 (89%) most recent MRD <10<sup>-5</sup>
- 10 (53%) most recent MRD <  $10^{-6}$



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#### Median T from MRD-P to PD was 10.1 mo.

## **Results** SFF2T and OS

SFF2T 100% 100% of Failure of Second Line Therapy HR=0.56, 95% C.I. 0.24-1.29, P=0.18 80% 80% MRD-P Overall Survival 60% 60% 40% 40% Survival Free PD without prior MRD-P 20% 20% 0% 0% 12 36 24 48 0 Number at risk Months Number at risk (number censored) (number censored) MRD-P 9 (2) 3 (7) 1 (8) 0 (9) 19 (0) MRD-P 19 (0) 5 (9) IMWG PD 2 (11) 0 (14) 0 (14) 30 (0) IMWG PD 30 (0)

> **1-year SFF2T** MRD-P = 56% PD not preceded by MRD-P= 35%

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#### **2-year OS** MRD-P = 78% PD not preceded by MRD-P= 54%

'	12	24	36	48
		Months		
	13 (2)	5 (9)	2 (12)	0 (14)
	10 (15)	4 (19)	1 (21)	0 (22)

HR=0.71, 95% C.I. 0.23-2.17, P=0.55



### Summary – ASH 2024 Newly Diagnosed Multiple Myeloma

- Benefit of CD38, IMID, PI and dexamethasone induction regimens in transplanted and non-transplanted patients
- MRD negative response continue to deepen with time (IMROZ)
- Significance of MRD progression is clear (MASTER analysis)
- Frailty adjusted dosing has significant impact on outcomes (UK MRA Fitness Trial)

## Management of Relapsed Multiple Myeloma in 1+ line of therapy in 2025

#### Most patients:

Dara RVD → autologous HCT → Lenalidomide (+/- Dara) maintenance

OR

Dara/Isa RD / RVD  $\rightarrow$  lenalidomide

maintenance

**Progression of Disease** 

4+ Lines of

therapy

CD38 + IMID: Carfilzomib, pomalidomide, dexamethasone

1-3 Lines of

therapy

CD38 + PI:Carfilzomib + either Daratumumab/Isatuximab and dexamethasone

BCMA CAR T cells: Cilta-cel (1 LOT) or ide-cel (2 LOT)

Selinexor regimens

**Clinical trial** 

BCMA CAR T cells:Cilta-cel, or Idecel

BCMA Bispecific: Teclistamab, elrantabamab

GPRC5D Bispecific: Talquetamab

**Clinical trial** 

Post-BCMA relapse

**Clinical trials** 

GPRC5D bispecific: Talquetamab (if not already given)

Selinexor based regimens

## CAR T cell therapy

- Two approved BCMA CAR T products
  - Ide cel (Abecma), approved 2021
  - Cilta-cel (Carvykti), approved 2022
- Both are now approved for > 1 LOT (Cilta-cel) and >2 LOT (Ide-cel)
- Efficacy seems to favor cilta-cel over id—cel
- Safety potentially favoring ide-cel over cilta-cel

## **Flow Diagram: Multicenter Retrospective Study Population**

#### Intention to Treat (ITT) Cohort (N=641)

- April 8, 2021-December 31,2022 igodol
- Ide-cel (N=386) or Cilta-cel (N=255)

Out of specification product:

- 23/350 (7%) patients treated with ide-cel
- 43/236 (18%) patients for cilta-cel

Infused Cohort (N=586) Ide-cel (N=350) or Cilta-cel (N=236)

Same Time Period Cohort (N=397) Ide-cel: N=161 or Cilta-cel: N=236

> Same Site Cohort (N=427) Ide-cel: N=314 or Cilta-cel: N=113

**Complete Case (N=371)** Ide-cel: N=266 or Cilta-cel: N=105

#### 55 Patients not infused

- Ide-cel (N=36)
  - 26 due to disease progression or death
  - 10 due to manufacturing failures
- Cilta-cel (N=19)
  - 13 due to disease progression or death
  - 3 due to manufacturing failures
  - 1 due to transition of care at another facility
  - 2 due to developing another cancer

#### **Propensity Score Matching Cohort** (N=380)

Hansen et al. ASH 2024 [Abstract #936]

## **Baseline Characteristics**

Characteristic	lde-cel (N=350)	Cilta-cel (N=236)	Р
Age (years)	65 (36, 90)	64 (30, 84)	0.2
Male sex	203 (58)	134 (57)	0.8
Race/ethnicity		00 (11)	0.4
Non-Hispanic Black Hispanic	55 (16) 32 (9)	26 (11) 19 (8)	
Non-Hispanic White Other	245 (70) 18 (5)	177 (76) 12 (5)	
Extramedullary disease	84 (24)	60 (26)	0.7
Bone marrow plasma cell %	5 (0, 100)	10 (0, 95)	0.14
High-risk cytogenetics	109 (33)	81 (38)	0.2
Prior BCMA therapy	64 (18)	33 (14)	0.2
Penta-class refractory	124 (35)	70 (30)	0.15

Characteristic ECOG PS Lymphodepleting chemotherapy Fludarabine/cyclophos Ferritin (ng/mL) Low Cell Dose Bridging therapy and re No, Ye Yes, Unknown

	lde-cel (N=350)	Cilta-cel (N=236)	Р
			0.03
0	68 (20)	62 (30)	
1	218 (66)	121 (59)	
2	39 (12)	15 (7)	
3	6 (2)	7 (3)	
4	1 (0.3)	1 (0.5)	
			<0.001
phamide	319 (91)	191 (81)	
Others	31 (9)	44 (19)	
	345 (8, 27260)	208 (7, 5316)	<0.001
	5 (1)	9 (4)	0.04
esponse			0.003
, Bridging	88 (28)	51 (24)	
Yes, $\geq$ PR	32 (10)	44 (21)	
s, SD/PD	199 (62)	117 (55)	
response	31	23	

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## **PFS and OS by Therapy Type**

### **Intention to Treat Cohort (ITT)**



### **Infused Cohort**

Hansen et al. ASH 2024 [Abstract #936]

### **<u>Cilta-cel: Superior PFS Across Patient Subgroups (PSM)</u></u>**

#### **PFS by Disease Characteristics**







#### **PFS by Patient and Treatment Characteristics**

Hansen et al. ASH 2024 [Abstract #936]

### Can we improve on BCMA CAR T therapy?

- Use of Gamma secretase inhibitors to increase BCMA density (Cowan et al Lancet) Onc 2023)
- Alternative binding constructs:
  - ddBCMA (anito-cel)
  - Camelid binding domains (Cilta-cel)
- Additional of CELMOD to potentiate T cells (Upcoming ALLIANCE trial with iberdomide post ide-cel)



### Anitocabtagene autoleucel (anito-cel/CART-ddBCMA) Autologous BCMA-directed CAR T-cell therapy using a novel, D-Domain binder<sup>1,2</sup>



<sup>1</sup>Rotte, et al. Immuno-Oncology Insights 2022; 3(1), 13–24; <sup>2</sup>Frigault, et al. Blood Adv. 2023; 7(5):768-777; <sup>3</sup>Cante-Barrett, et al. BMC Res. Notes 2016; 9:13; <sup>4</sup>Buonato, et al. Mol. Cancer Ther. 2022; 21(7):1171-1183; <sup>5</sup>Zhu, et al. Proc. Nat. Acad. Sci. 2003; 100(26): 15486-15491; <sup>6</sup>Qin, et al. Mol. Ther. 2019; 27(7): 1262-1274.



#### **D-Domain Attributes:** Non-Antibody Derived Synthetic Protein<sup>1,2</sup>

Size

Small D-Domain construct facilitates high transduction efficiency and CAR positivity<sup>2-4</sup> resulting in a low total cell dose

#### Structure & Stability

D-Domain CARs are stable and lack tonic signaling<sup>4,6</sup> due to the rapid folding, lack of disulfide bonds, and hydrophobic core<sup>5,6</sup> of the D-Domain

Binding

The D-Domain binder has a fast off-rate<sup>4</sup> and high CAR surface expression<sup>4</sup>. This combination may allow optimal tumor cell killing without prolonged inflammation

### iMMagine-1: Phase 2 Study Design



#### Key Eligibility Criteria

- Prior IMiD, PI, and CD38-targeted therapy
- Received  $\geq$ 3 prior lines of therapy
- Refractory to the last line of therapy
- ECOG PS of 0 or 1
- Evidence of measurable disease

#### Target Dose of 115 x 10<sup>6</sup> CAR+ T cells

#### Primary Endpoint:

ORR, per 2016 IMWG criteria

#### Key Secondary Endpoints:

- sCR/CR rate, per 2016 IMWG criteria
- ORR in patients limited to 3 prior LoT, per 2016 IMWG criteria

Primary and key secondary endpoints to be assessed per Independent Review Committee (IRC); Investigator assessment of response per IMWG also permitted per protocol. CR, complete response; ECOG PS, Eastern Cooperative Oncology Group Performance Status; IMiD, immunomodulatory drug; IMWG, International Myeloma Working Group; LoT, line of therapy; ORR, overall response rate; PI, proteosome inhibitor; sCR, stringent complete response.

### iMMagine-1: Patient and Disease Characteristics

Characteristics	Safety Evaluable (n=98)
Age (yrs), median (min - max) Age $\ge 65$ Age $\ge 70$ Age $\ge 75$	65 (38 – 78) 51 (52%) 30 (31%) 10 (10%)
Gender (male / female)	55 (56%) / 43 (44%)
Race White Black / African American Asian / Other	79 (81%) 9 (9%) 10 (10%)
ECOG PS 0 / 1	45 (46%) / 53 (54%)
Extramedullary disease <sup>a</sup>	16 (16%)
High Risk Cytogenetics <sup>b</sup>	39 (40%)
Refractory to last line of therapy	98 (100%)
Triple refractory	85 (87%)
Penta refractory	41 (42%)
Prior Lines of Therapy, median (min - max) 3 Prior LoT	4 (3 – 8) 45 (46%)
Time since diagnosis (yrs), median (min-max)	7.2 (1 – 23)
Prior ASCT	73 (75%)
Bridging therapy	65 (66%)
Outpatient administration	8 (8%)

a) Presence of a non-bone based plasmacytoma; b) Defined as the presence of Del 17p, t(14;16), or t(4;14). ASCT, autologous stem cell transplant; ECOG PS, Eastern Cooperative Oncology Group Performance Status; LoT, line of therapy

Efficacy Evaluable
(n=86)
65 (38 – 78)
47 (55%)
28 (33%)
10 (12%)
48 (56%) / 38 (44%)
70 (81%)
8 (9%)
8 (9%)
39 (45%) / 47 (55%)
13 (15%)
33 (38%)
86 (100%)
74 (86%)
37 (43%)
4 (3 – 8)
37 (43%)
7.5 (1 – 23)
64 (74%)
61 (71%)
5 (6%)

### iMMagine-1: Overall Response Rate and MRD Negativity

#### Efficacy Evaluable Patients (N=86)



Responses are investigator assessed per IMWG criteria, ORR defined as partial response or better; MRD evaluable patients had an identifiable malignant clone in the baseline bone marrow sample and had a post-treatment bone marrow sample sufficient to assess MRD negativity CR, complete response; MRD, minimal residual disease; ORR, overall response rate; PR, partial response; sCR, stringent complete response; VGPR, very good partial response

	Evaluable Patients	Months (min - max)
	83	1.0 (0.9 - 7.3)
of ≤10 <sup>-5</sup>	54	1.0 (0.9 - 6.4)

### iMMagine-1: PFS and OS Rates Estimated by Kaplan-Meier

#### Efficacy Evaluable Patients (N=86)

	PFS Rate (%) (95% Cl)
6-Month	93.3% (84.4%, 97.2%)
12-Month	78.5% (63.5%, 87.9%)

Median follow-up of 9.5 months (range 2 to 23 months) PFS, progression-free survival; OS, overall survival

#### OS Rate (%) (95% CI)

96.5% (89.6%, 98.9%)

96.5% (89.6%, 98.9%)

### iMMagine-1: Cytokine Release Syndrome



- 83% (81/98) of patients had CRS of any Grade; the median onset was 4 days
- 86% (84/98) of patients had CRS Grade 1 or less, including 17% (17/98) with no CRS
- of patients with either no CRS or CRS that resolved by:
  - ≤7 days of anito-cel infusion: 63% (62/98)
  - ≤10 days of anito-cel infusion: 92% (90/98)
  - ≤14 days of anito-cel infusion: 98% (96/98)

ASTCT, American Society for Transplantation and Cellular Therapy

ine Release Syndrome (CRS) STCT criteria	Safety Evaluable Patients N=98
edian onset (min-max)	4 days (1-17 days)
edian duration (min-max)	3 days (1-9 days)
ortive Measures	
Tocilizumab	72% (71/98)
Dexamethasone	65% (64/98)
Anakinra	<mark>8% (</mark> 8/98)
Siltuximab	<mark>4% (4</mark> /98)
Vasopressor used	<mark>1% (1</mark> /98)
Intubation/mechanical ventilation	1% (1/98)

CRS management per protocol was in line with standard medical practice with no prophylactic administration of tocilizumab or dexamethasone

 For CRS onset in the first 48 hours, tocilizumab and dexamethasone were protocol recommended

 For CRS onset after the first 48 hours, if tocilizumab was administered at investigator discretion, dexamethasone was also recommended

 Grade 5 CRS occurred in a 76-year-old patient who had rapidly progressive disease between screening and baseline and did not receive bridging therapy

### iMMagine-1: Immune-effector Cell-associated Neurotoxicity Syndrome (ICANS)

Maximum ICANS Grade (N=98)



- 9% (9/98) of patients had ICANS of any grade; all cases resolved
- No delayed or non-ICANS neurotoxicities were observed, including no incidence of Parkinsonism, no cranial nerve palsies, and no Guillain-Barré syndrome (n=98)
- Similarly, no delayed or non-ICANS neurotoxicities have been observed in the Phase 1 study<sup>1</sup> (n=38, median follow-up of 38.1 months with minimum follow-up of 25 months)

1. Bishop, et al. Blood 2024; ASH Annual Meeting, Poster #4825. ASTCT, American Society for Transplantation and Cellular Therapy

ICANS Per ASTCT criteria	Safety Evaluable Patients N=98	
Median onset (min-max <sup>a</sup> )	7 days (2 - 10ª days)	
Median duration (min-max <sup>b</sup> )	4 days (1 - 10 <sup>b</sup> days)	
Supportive Measures		
Tocilizumab	3% (3/98)	
Dexamethasone	6% (6/98)	
Anakinra	1% (1/98)	
Siltuximab	1% (1/98)	
<sup>a</sup> With the exception of n=1 Grade 1 ICANS (confusion) on day 34 post infusion		

that rapidly resolved

With the exception of n=1 max Grade 2 ICANS with 29-day duration to resolution

# Common strategies for the patient awaiting leukapheresis ("holding" therapy)

- PACE or HyperCVAD based regimens
- Cytoxan based regimens, or high-dose Cy
- Selinexor based regimens
- If t(11;14) Venetoclax regimens
- Talquetamab GPRC5DxCD3 bispecific
- What to avoid?
  - Bendamustine
  - BCMA Targeted therapies

### Bridging after leukapheresis

- Reduction in disease burden = goal; ICANS and delayed MNT associated with high disease burden with Carvykti
- A few that we have used recently at FHCC:
  - Talquetamab
  - PACE or HyperCVAD with aggressive disease relapse
  - High dose Cytoxan
  - Continuation of last line of therapy if stable disease or better



## Maintaining disease control while awaiting CAR-T manufacturing is challenging

## Clinical trials: 10-15%

Do not receive CAR-T due to progression/death while awaiting manufacturing

### **Real World: 25%**

Do not receive CAR-T due to progression/death while awaiting manufacturing

#### <u>75% of patients need bridging therapy</u>

associated with

- decreased CAR-T efficacy,
- increased immune-mediated toxicity

### There is an urgent need for an effective bridging strategy in these patients



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Manufacturing time for CAR-T: **6-8 weeks** 

Increased disease burden prior to lymphodepletion is

Berdeja et al. Lancet 2021. San Miguel J, Dhakal B; et al. NEJM 2023 Hadidi et al. Bone Marrow Transplant (2023)

## Talquetamab as a bridge to BCMA CAR

- Talquetamab (Talq), a GPRC5D bispecific antibody, is approved in patients with 4 LOT based on a pivotal study showing ORR 70% and median DOR 10 months (Monumental -1).
- Talq is associated with dysgeusia (60%) and weight loss (30%) and skin changes (70%) complicating its long-term use.
- Talq can achieve significant disease debulking with no impact on BCMA antigen target (non-overlapping) antigen).

Smith E et.al Sci Translational Medicine 2019; Chari et. al NEJM 2022

American Society of Hematology

rphan GPCR of unknown function with limited ression in healthy human tissue; primarily plasma ed in myeloma cells and associated with ostic features in myelom io known extracellular shedd









## Study Design and Methods



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Dhakal B et al ASH 2024

Talquetamab peri-apheresis period

CAR-T not infused due to disease progression or manufacturing failures

## Best overall response to Talq and to CAR-T



#### Summary of Best Response from CAR-T Infusion by Treatment Group

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## Flow of patient response from Talq to CAR-T

Sankey Plot of Treatment Response following Talquetamab and CAR-T Treatment



CR = Complete Response, VGPR = Very Good Partial Response, PR = Partial Response, SD = Stable Disease, PD = Progressive Disease, NRM = Non-Relapse Mortality

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2.9%)	
5.6%)	
0.8%)	
.6%)	
5.6%)	
.6%)	

## Talq bridging: PFS and OS



Median follow up from <u>CAR-T infusion</u> 149 days (IQR 109-209)

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## Etentamig (ABBV-383), a BCMA x CD3 bispecific antibody with a unique design

- Etentamig targets BCMA and CD3 on the surface of MM cells and T cells, respectively, resulting in T-cell activation and selective destruction of BCMA-positive MM cells
- Etentamig monotherapy showed promising results in heavily pretreated patients with RRMM in a phase 1 first-in-human dose-escalation study (NCT03933735)<sup>1,2</sup>
  - ORR of 65% (median follow-up of 12 months)
- Daratumumab may have the potential to eliminate immunosuppressor cells and reduce T-cell exhaustion<sup>3</sup>

#### **Etentamig Design and Mechanism of Action**



#### Here, we evaluate the safety and efficacy of combining etentamig with daratumumab and dexamethasone in patients with RRMM

BCMA, B-cell maturation antigen; CRS, cytokine release syndrome; MM, multiple myeloma; ORR, overall response rate; Q4W, every 4 weeks; RRMM, relapsed/refractory multiple myeloma; VGPR, very good partial response.

1. Rodriguez Valdes C, et al. J Clin Oncol. 2024;42:7531. 2. Weisel K, et al. HemaSphere. 2024;8. Abstract 211. doi:10.1002/hem3.104. 3. Krejcik J, et al. Blood. 2016;128:384-394.

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Rodriguez C et al ASH 2024

A: Bivalent BCMA binding

Designed for high avidity to target cell-surface BCMA

#### **B: Low-affinity CD3 binding**

Binding domain designed to reduce cytokine release, with potential for minimal T-cell exhaustion

C: Silenced-Fc tail, Q4W dosing

Allowing for extended half-life and simplified, convenient dosing (Q4W)

### Arm C Kilimanjaro: etentamig + daratumumab-dexamethasone

#### **Dosing Schema**



C, cycle; DLT, dose-limiting toxicity; IV, intravenous; Q4W, every 4 weeks.

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### Kilimanjaro Arm C: Safety Data

	20 mg n=37 <sup>b</sup>		40 mg n=35 <sup>b</sup>		60 mg n=14		Total N=86	
TEAEs, n (%)	Any grade	Grade 3–4	Any grade	Grade 3–4	Any grade	Grade 3–4	Any grade	Grade 3–4
Any TEAE	36 (97)	27 (73)	35 (100)	30 (86)	14 (100)	11 (79)	85 (99)	68 (79)
Hematologica								
Neutropenia	13 (35)	11 (30)	20 (57)	19 (54)	8 (57)	8 (57)	41 (48)	38 (44)
Anemia Thrombocytopenia	10 (27) 10 (27)	7 (19) 4 (11)	12 (34) 11 (31)	7 (20) 7 (20)	5 (36) 6 (43)	4 (29) 5 (36)	27 (31) 27 (31)	18 (21) 16 (19)
Nonhematologica								
CRS	9 (24)	1 (3)	12 (34)	1 (3)	4 (29)	1 (7)	25 (29)	3 (4)
ICANS Fatigue Insomnia Increased AST Diarrhea Cough Upper respiratory infection	1 (3) 9 (24) 10 (27) 2 (5) 4 (11) 3 (8) 10 (27)	0 1 (3) 1 (3) 1 (3) 0 0 0	1 (3) 10 (29) 7 (20) 6 (17) 9 (26) 8 (23) 7 (20)	0 0 2 (6) 0 0 0	1 (7) 3 (21) 2 (14) 4 (29) 2 (14) 2 (14) 2 (14)	1 (7) 0 1 (7) 0 1 (7) 0 0	3 (4) 22 (26) 19 (22) 12 (14) 19 (22) 13 (15) 19 (22)	1 (1) 1 (1) 2 (2) 3 (4) 1 (1) 0 0
Infections	21 (57)	8 (22)	27 (77)	12 (34)	10 (71)	2 (14)	58 (67)	22 (26)

## No new safety signals emerged with etentamig combination therapy when compared to prior monotherapy study, including grade 3/4 infection rates

<sup>a</sup>Cutoff: any grade TEAEs in ≥12.5% of patients. <sup>b</sup>Data combined for dose-escalation and safety expansion cohorts. AST, aspartate aminotransferase; CRS, cytokine release syndrome; ICANS, immune effector cell-associated neurotoxicity syndrome; TEAE, treatment-emergent adverse event.

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#### Preliminary efficacy suggests etentamig + daratumumab-dexamethasone achieves deep responses

<sup>a</sup>Data combined for dose-escalation and safety expansion cohorts. <sup>b</sup>Based on N=86 total patients in the Full Analysis Set. Median follow-up is 16 months (1–17) and 4 months (0–5) for 20-mg doseescalation and -expansion cohorts, respectively, and 13 months (9–13) and 7 months (1–9) for 40-mg dose-escalation and safety expansion cohorts, respectively. ORR, overall response rate; PR, partial response; VGPR, very good partial response, MRD negativity determined by NGS (ClonoSEQ)

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Etentamig + Daratumumab-Dexamethasone							
20 mg	40 mg	60 mg	Total				
n=34ª	n=35ª	n=11	N=80				
4	8	8	7				
(0–17)	(1–13)	(1–10)	(0–17)				
1.1	1.0	1.0	1.0				
(1–6)	(1–4)	(0–1)	(0–6)				
5 (15)	14 (40)	3 (27)	22 (28)				
1/2	12/12	3/3	16/17				
(50)	(100)	(100)	(94)				

Responses expected to deepen with continued follow-up

### Summary

- Exciting data supporting early treatment with daratumumab for high risk SMM **AQUILA** trial
- Continued data supporting quad induction in transplanted and non-transplanted patients
  - MRD dynamics deepening of responses (IMROZ) and progression (MASTER)
  - Frailty adjusted treatment (UK trial)
- Relapsed MM
  - For the first time, maybe a less toxic, efficacious BCMA CAR T(Immagine1) phase 3 will start soon
  - Updates on BCMA BsAb Etentamig
  - Talquetamab bridging US Myeloma Immunotherapy Consortium



# Thank you

Questions? My email: ajcowan@fredhutch.org

