Advances in myeloma therapy

WHAT'S NEW IN 2025

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Disclosures

• Consulting:

- Abbvie
- BMS
- Takeda Oncology
- GSK
- Johnson & Johnson
- Genentech
- Research support:
 - Active Biotech
 - Takeda Oncology



Topics

- Overview of myeloma and therapy
- Recent advances in myeloma therapy
 - Treatment of smoldering myeloma
 - Immunotherapy (CAR T cells and T cell engagers)
 - Belantamab mafodotin (Blenrep)
- Experimental therapies for relapsed myeloma
- Clinical trials available at Penn





International Myeloma Foundation's 2025 Philadelphia Miracles for Myeloma Virtual/In-Person 5K Run/Walk

Date: Saturday May 3rd 2025 Time: Race Start: 8:00AM Location: FDR Park, 1500 Pattison Avenue, Philadelphia Register: https://events.myeloma.org

Scan HERE to Join Dr. Dan Vogl's Team- Penn Myeloma Program!



ALSO:

IMF Patient and Family Seminar May 2-3, 2025 DoubleTree by Hilton Philadelphia Center City

Support Civic Health

Our Government Affects Our Health Funding for research Medicare and Medicaid funding **Regulation of drugs and devices Regulation of vaccines** Regulation of private insurance Telemedicine

What You Can Do Contact your elected representatives Vote To register and request a mail-in ballot: go to <u>vot-er.org/PENN</u> or text "VOTE PENN" to 34444.



Overview of myeloma and therapy

Myeloma = Cancer of malignant plasma cells





Multiple Myeloma – Clinical Features

- Abnormal protein in blood and/or urine
 - "M-spike" = "Myeloma protein," "M-protein,"
 "monoclonal protein"
 - Free light chains
- Plasma cells in the bone marrow
- CRAB criteria
 - High <u>c</u>alcium levels
 - Kidney (<u>r</u>enal) injury
 - <u>Anemia</u> (low red blood cells)
 - <u>B</u>one destruction ("lytic bone lesions")
- Increased risk of infection
- Neurologic Injury
 - Spinal Cord Compression
 - Peripheral Neuropathy
- Increased blood viscosity



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Management of Disease Symptoms

- Radiation and pain medication for bony pain
- denosumab (Xgeva) or bisphosphonates, such as zoledronate (Zometa), for bone pain or fractures
 - Risk of jaw osteonecrosis (area of dead bone, sometimes requiring surgery)
- Red blood cell growth factors for anemia

- Prevent and Treat Infections
 - Antibiotics
 - Vaccinations
 - Influenza
 - RSV
 - Pneumococcus (Prevnar 20, Capvaxive)
 - Shingrix
 - COVID-19

Kidney Protection

- Hydration (drink plenty of fluids)
- Avoid NSAIDs (ibuprofen, Advil, Alleve, etc.)
- Avoid contrast for x-rays

Treatment should be individualized



Myeloma – Treatment and Progression



1. Adapted from International Myeloma Foundation; 2001. Reprinted with permission. 2. American Cancer Society. Cancer Facts & Figures; 2003. 3. Millennium Pharmaceuticals, Inc., 2003.





Initial therapy paradigm



Triplet therapies for relapsed myeloma

- melphalan/prednisone/thalidomide
- melphalan/prednisone/lenalidomide
- cyclophosphamide/prednisone/thalidomide
- pomalidomide/cyclophosphamide/prednisone
- bortezomib/melphalan/prednisone
- cyclophosphamide/bortezomib/dexamethasone
- cyclophosphamide/carfilzomib/dexamethasone
- PLD/bortezomib/dexamethasone
- bendamustine/bortezomib/dexamethasone
- bortezomib/thalidomide/dexamethasone
- bortezomib/lenalidomide/dexamethasone
- bortezomib/pomalidomide/dexamethasone
- carfilzomib/lenalidomide/dexamethasone
- carfilzomib/pomalidomide/dexamethasone
- ixazomib/lenalidomide/dexamethasone
- ixazomib/pomalidomide/dexamethasone

- bortezomib/panobinostat/dexamethasone
- carfilzomib/panobinostat/dexamethasone
- daratumumab/bortezomib/dexamethasone
- daratumumab/lenalidomide/dexamethasone
- daratumumab/pomalidomide/dexamethasone
- elotuzumab/lenalidomide/dexamethasone
- elotuzumab/bortezomib/dexamethasone
- elotuzumab/pomalidomide/dexamethasone



Choosing wisely – triplets for relapsed myeloma

- No data comparing triplets or sequencing
- General principles
 - Most patients should receive triplets
 - Carefully assess treatment history
 - What worked?
 - What caused side effects?
 - Consider pace of progression and symptom burden
 - Include cost and convenience in the decision
- My favorite triplets
 - Any proteasome inhibitor / Imid combination
 - Cyclophosphamide / proteasome inhibitor combinations
 - Daratumumab or isatuximab combinations



Earlier treatment of smoldering myeloma

Smoldering Myeloma



• One of:

- ≥10% Bone Marrow Plasma Cells
- ≥3 g/dL M-spike

Must not meet CRAB Criteria

- Anemia (Hgb <10 g/dL)
- Renal failure (GFR <40)
- Lytic bone lesions
- Corrected Calcium >11 g/dL

Must not meet SLiM Criteria

- ≥60% Bone Marrow Plasma Cells
- sFLC-ratio >100 or <0.01
- Bone marrow lesions on whole body MRI or PET-CT



Risk Stratification – the "2/20/20" Criteria

Risk Factors:

- M-protein >2 g/dL
- Bone marrow plasma cells >20%
- sFLC Ratio >20 or <0.05
- High-Risk Cytogenetics [t(4;14), t(14;16), del17p]



Risk Stratification groups	Number of risk factors	Hazard Ratio (95% CI)	Risk of progression (2 years)	# of patients
Low	0	Reference	6.0%	225 (32.7%)
Low-intermediate	1	4.16 (2.26 - 7.67)	22.8%	224 (32.5%)
Intermediate	2	9.82 (5.46 - 17.7)	45.5%	177 (25.7%)
High	3-4	15.5 (8.23 - 29.0)	63.1%	63 (9.1%)



Daratumumab for High-Risk Smoldering Myeloma

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Daratumumab or Active Monitoring for High-Risk Smoldering Multiple Myeloma

M.A. Dimopoulos, P.M. Voorhees, F. Schjesvold, Y.C. Cohen, V. Hungria, I. Sandhu, J. Lindsay, R.I. Baker, K. Suzuki, H. Kosugi, M.-D. Levin, M. Beksac, K. Stockerl-Goldstein, A. Oriol, G. Mikala, G. Garate, K. Theunissen, I. Spicka, A.K. Mylin, S. Bringhen, K. Uttervall, B. Pula, E. Medvedova, A.J. Cowan, P. Moreau, M.-V. Mateos, H. Goldschmidt, T. Ahmadi, L. Sha, A. Cortoos, E.G. Katz, E. Rousseau, L. Li, R.M. Dennis, R. Carson, and S.V. Rajkumar, for the AQUILA Investigators*

- Compared to observation, daratumumab led to:
 - Response rate 63%
 - Longer time to progression
 - Improved overall survival
 - More infections

BUT:

- Myeloma treatment at progression not standardized
- Some patients may have been progressing already



Immunotherapy for relapsed myeloma (CAR T cells and T cell engagers)

What is a CAR?

Chimeric **A**ntigen **R**eceptor







Chimera

Building CAR T cells

"Living drug"





Courtesy of D. Porter





T cell Toxicities

Cytokine release syndrome (CRS, 70-100%)

- Occurs between 1 hour and 10 days after infusion
- Lasts between 3-5 days
- Symptoms:

Fever, chills, HA, fatigue and malaise Low blood pressure, low oxygen levels

Treatment: tocilizumab

Neurotoxicity (ICANS, 10-30%)

- Occurs between 2 days to ~30 days
- Lasts between 1-14 days
- Symptoms:

Confusion and word finding difficulties Unconsciousness, seizures

Treatment: steroids

Low blood counts

Infections



CAR T Cell



BCMA Teclistamab* Elranatamab* Linvoseltamab ABBV-383

Bispecific Antibody

GPRC5D Talquetamab* Forimtamig

> FCRH5 Cevostamab

*Therapies with marketing authorization Images created with BioRender Courtesy of A Garfall



How we give bispecific antibodies

Step up dosing

- 2-3 lower doses given 48-72 hours apart
- Allows CRS and neurologic toxicity at lower intensity
- Close expert supervision
 - inpatient stay (6-8 nights)
 - outpatient dosing (7-10 visits over 2 weeks)
- Immediate access to tocilizumab

Ongoing dosing

- Weekly, every 2 weeks, sometimes every 4 weeks
- Any oncology infusion center
- Subcutaneous injection, no premedications or observation

Infection prevention:

- Antibiotics (acyclovir or valacyclovir / Bactrim, dapsone, or atovaquone)
- Monthly IVIG infusions

FDA-approved T cell therapies

	Response Rate	Progression- Free Survival	Toxicity
Ide-cel (ABECMA)	73%	11-13 m	 CRS/neurotoxicity (potentially severe) ICANS
Cilta-cel (CARVYKTI)	97%	~34 m	 Others (Parkinsonism, CN palsy) Infections Cytopenias (potentially severe)
Teclistamab (TECVAYLI)	63%	12-24 m	CRS/neurotoxicity (unlikely severe)
Elranatamab (ELREXFIO)	61%	~15 m	 Cytopenias (unlikely severe)
Talquetamab (TALVEY)	~72%	~12m	Oral/taste toxicity (potentially severe)Skin and nail toxicity



Studies of early-line CAR T cells (overall conclusions)

Efficacy

- CAR T cell therapy (cilta-cel) improves overall survival in multiple myeloma
- Cilta-cel continues to appear more effective than ide-cel
- Appears better earlier in treatment, but not transformational or curative

Safety

- CAR T cells appear safer in earlier lines compared to late-line usage
- Infections are comparable to other standard therapies (worse earlier, better later)
- ~10% cilta-cel patients have long-lived and/or life-threatening toxicities

• Our practice at Penn:

 cilta-cel in 3rd line for most patients, 2nd line for high-risk patients (not using much ide-cel)



When do we use bispecific antibodies?

- Patients who need rapid disease control
- Patients who do not want to bear risk of CAR T cell therapy
- Patients who cannot access CAR T cell therapy
- Older/frail patients who may not tolerate CAR T cell therapy
- Patients relapsing after CAR T cell therapy
- Bridging therapy to enable CAR T cell therapy



Belantamab mafodotin (BLENREP)

What is an antibody-drug conjugate (ADC)?



Belantamab mafodotin (BLENREP, GSK2857916)

Antibody-drug conjugate targeting B cell maturation antigen (BCMA)

Approved August 2020 based on response rate of 31-34%

Withdrawn from market 11/2022 after a randomized trial failed to show better outcomes compared to pomalidomide/dexamethasone

Two new randomized trials:

- Belantamab/pomalidomide/dex compared to bortezomib/pomalidomide/dex Better responses, progression-free survival
- Belantamab/bortezomib/dex compared to daratumumab/bortezomib/dex Better responses, progression-free survival, overall survial

Belantamab administration and side effects

Administration

- Intravenously over ~1 hour
- Every 3-12 weeks (or even longer)

Side effects:

- infusion reactions (first dose)
- low platelets
- eye problems
 - Dry, gritty feeling
 - Light sentivitiy
 - Blurry vision
- Patients generally feel well

Dealing with eye toxicity

- Reversible over time
- Mostly annoying, sometimes interferes with daily tasks
- Almost all patients need a dose reduction and regular dose interruptions
- REMS program / enrollment
- Eye exam before every dose
- Preservative-free eye drops
- Hold dose for even moderate toxicity
- Responses tend to continue despite dose holds
- Restart even after recurrent toxicity

DREAMM-7: Belantamab with bortezomib and dexamethasone

Changes in vision Resolved in Patients with Complete Follow Up



Reprinted from Shi C, et al. J Vis. 2020;20(8):29. Copyright © 2020 The Authors.



20/200



BVd	Bilateral worsening of BCVA in patients with normal baseline 20/25 or better		
	20/50 or worse ^a	20/200 or worse ^a	
Patients, n/N (%)	84/242 (35)	5/242 (2)	
Time to onset of first event, median (range), days	79 (16-1320)	105 (47-304)	
Time to resolution of first event to baseline, median (range), days ^b	64 (8-908)	87 (22-194)	
Time to improvement of first event, median (range), days [°]	22 (6-257)	19 (8-26)	
First event resolved, n/N (%) ^b	78/84 (93)	4/5 (80)	
First event improved, n/N (%) ^c	81/84 (96)	5/5 (100)	
Follow-up ended with event ongoing, n/N (%)	2/84 (2)	0	

BCVA, best-corrected visual acuity; BVd, belantamab mafodotin, bortezomib, and dexamethasone; CTCAE, Common Terminology Criteria for Adverse Events;

a In patients with normal BCVA (20/25 or better in ≥1 eye) at baseline. Besolution defined as a return to normal BCVA (20/25 or better in ≥1 eye). Improvement was defined as BCVA of better than 20/50 (or 20/200) in at least one eye. Graded using CTCAE version 5.0.

New therapies in clinical trials (whirlwind tour)

Anito-cel (CART-ddBCMA) for rel/ref MM

iMMagine-1 Phase 2 registration study Median 4 lines, 87% triple-class refractory, 0% BCMA tx

Median f/up = 9.5 months



Phase 3 anito-cel vs SOC in 1-3 priors opened late 2024

Freeman et al, ASH 2024, #1031



Phase 1 of arlocabtagene autoleucel (arlo-cel, BMS-986393)

<u>GPRCRD-targeted autologous CAR T cells</u> Median 5 lines, 76% triple-class refractory 49% prior BCMA tx







Bal et al, ASH 2024, #922

Cevostamab (FcRH5 x CD3 bsAb) phase 1 update

At RP2 step-up (n=30):

CRS 63% (0% Gr 3-4)

<u>At RP2D (160mg q3wks IV x 17 cycles)</u> Median 6 lines, 96% triple-class refractory 58% prior BCMA tx





N (%) of patients	n=167
AE of infection	91 (54.5)
Gr 3–5 AE of infection	32 (19.2)
Gr 3	24 (14.4)
Gr 4	2 (1.2)
Gr 5 (fatal)	6 (3.6)
SAE of infection	37 (22.2)
AE of infection leading to treatment discontinuation	10 (6.0)

Penn Medicine 37

Richter et al, ASH 2024, #1021

RedirecTT-1: ph1b of Teclistamab + Talquetamab for RRMM



Y Cohen et al, IMS 2024, #OA-03

Penn Medicine 38

Sonrotoclax (BGB-11417) for t(11;14) myeloma

in vitro
Sonrotoclax + dexamethasone phase 1b/2 study in t(11;14) R/R MM
Median treatment duration: All patients: 5.1 months (range, 1.2-21.1 months) 640 mg: 5.5 months (range, 2.4-15.1 months)

More potent and selective BCL2 inhibition

 The longest DoR was 18.9 months, which was still ongoing at data cutoff





Mezigdomide

- MEZI is a novel, oral CELMoD[™] agent that is a potent inducer of Ikaros and Aiolos degradation, resulting in immune-modulatory effects and enhanced tumoricidal activity in myeloma cells¹⁻³
- In patients with triple-class RRMM, MEZI + DEX had a manageable safety profile and a promising ORR of 41%⁴



BORT, bortezomib; CD, cluster of differentiation; CFZ, carfilzomib; c-Myc, cellular Myc; CRBN, cereblon; CUL4, cullin 4; DC, dendritic cell; DDB1, DNA damage-binding protein 1; DEX, dexamethasone; IFN, interferon; IL, interleukin; IRF4, interferon regulatory factor 4; mAb, monoclonal antibody; MEZI, mezigdomide; MM, multiple myeloma; NK, natural killer; ORR, overall response rate; PI, proteasome inhibitor; ROC1, regulator of cullins-1; RRMM, relapsed/refractory multiple myeloma; Ub, ubiquitin.

1. Hansen JD, et al. J Med Chem 2020;63:6648-6676. 2. Lu G, et al. Science 2014;343:305-309. 3. John LB, Ward AC. Mol Immunol 2011;48:1272-1278. 4. Richardson PG, et al. N Engl J Med 2023;389:1009-1022. 5. Wong L, et al. Blood 2019;134(suppl 1). Abstract 1815. 6. ClinicalTrials.gov. NCT03989414. 7. Richardson PG, et al. Blood 2021;138(suppl 1). Abstract 2731. 8. Oriol A, et al. Oral presentation at the International Myeloma Society (IMS) Annual Meeting; September 27-30; 2023; Athens, Greece. Abstract 0A-49.



Efficacy of MeziVd and MeziKd

Dose-escalation Cohort A (MeziVd)

	All doses	1.0 mg
ORR, [▶] % (95% CI)	75.0 (55.1-89.3)	60.0 (55.1-89.3)
DOR, median (95% CI), months	10.9 (8.8-18.7)	11.6 (5.3-NA)

Overall median PFS **12.3** months

Dose-expansion Cohort D (MeziVd)

	All doses	1.0 mg
ORR, ^ь % (95% Cl)	85.7 (72.8-94.1)	84.2 (68.7-94.0)
DOR, median (95% CI), months	19.4 (9.7-NA)	19.4 (7.0-NA)

Overall median PFS **17.5** months

Dose-escalation Cohort C (MeziKd)

	All doses	1.0 mg
ORR, ^ь % (95% Cl)	85.2 (66.3-95.8)	77.8 (40.0-97.2)
DOR, median (95% CI), months	11.9 (6.4-35.9)	11.9 (0.2-NA)

Overall median PFS **13.5** months



^aData cutoff: June 28, 2024; ^bORR refractory to LEN and anti-CD38 mAbs (data cutoff: May 9, 2024): Cohort A = 69.2%, Cohort D = 75.0%. CI, confidence interval; DOR, duration of response; NA, not applicable; PFS, progression-free survival.

Inobrodib with pomalidomide and dexamethasone

Inobrodib: First-in-class, oral, potent and specific bromodomain inhibitor of p300/CBP, two transcriptional coactivators with key roles in hematological cancers

Strong scientific rationale for targeting p300/CBP in myeloma

- selective displacement of p300/CBP from 10% of binding sites¹
- inhibition of key oncogenic drivers IRF4 and MYC
- exquisite synergy with IMiDs²

Clinical activity has been observed in patients with relapsed and refractory myeloma when given as a monotherapy (ORR 25%)³

We report on the combination of inobrodib (INO), pomalidamide (POM) and dexamethasone (DEX) in the ongoing Phase I/IIa trial (NCT04068597).





RESEARCH ARTICLE

Transcriptional Heterogeneity Overcomes Super-Enhancer Disrupting Drug Combinations in Multiple Myeloma 🔱

²Welsh et al, Blood Cancer Discovery 2024

3Searle E et al presented at ASH 2023

Searle E, et al. ASH 2024 [Abstract #1023]

InoPd efficacy in relapsed refractory multiple myeloma





Across all cohorts: 49% ORR, mDOR 6.3 months , 63% of pts \geq 6 mo.

Highest dose cohort: 75% ORR, mDOR 9.7 months

Pom-refractory patients (last line): 4/8 pts responded ≥PR, + 1 MR

* Among evaluable patients

Searle E, et al. ASH 2024 [Abstract #1023]

Current clinical trials at Penn

FOR RELAPSED/REFRACTORY MYELOMA

limited-duration teclistamab (LimiTEC)

anti-GPRC5D antibody/drug conjugate, phase 1

MMSET inhibitor for t(4;14) myeloma, phase 1

trispecific BCMAxGPRC5DxCD3 T cell engaging antibody, phase 1

cevostamab consolidation after BCMA-directed CAR T cells, phase 2 (CLOSING SOON)

allogeneic (off-the-shelf) BCMA-directed CAR T cells, phase 1 (OPENING SOON)

inobrodib (p300/CBP inhibitor) with pomalidomide and dexamethasone, phase 2 (OPENING SOON)

EARLIER LINES OF THERAPY

belantamab mafodotin before and after stem cell transplant

teclistamab vs lenalidomide for maintenance after stem cell transplant (OPENING SOON)

Penn Myeloma Program

Physicians

- Edward Stadtmauer, MD
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