MULTIPLE MYELOMA Research Foundation

Myeloma Biomarkers

February 19, 2024

1

Tech Support

1-719-234-7952

2

3

Resources

- Resource tab includes
  - Speaker bios
  - Copy of the slide presentation
  - Exhibit Hall

Submit your questions throughout the program!

4

MMRF Research Initiatives

1. MMRF Myeloma Accelerator Challenge (MAC) Grants
   - Broad, multi-institutional research grants designed to advance clinical trial concepts in the areas of
     - High-risk newly diagnosed multiple myeloma (NDMM)
     - High-risk smoldering myeloma (SMM)
   - Each research network will be funded up to $10M over 3 years
2. MMRF Horizon Adaptive Platform Trials
   - Paired with MAC grants
   - Done in collaboration with 13 MMRC sites
   - Trials in relapsed/refractory myeloma, high-risk NDMM, high-risk SMM

For more information, visit themmrf.org

5

2023 Myeloma Accelerator Challenge Program Grant Recipients

Samir Parekh, MD

Transforming Treatment of High-Risk Myeloma

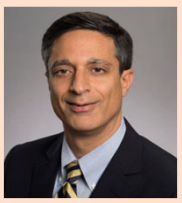
Network includes Tisch Cancer Center at Mt Sinai, Albert Einstein Medical College, Hackensack University Medical Center, Stanford University Medical Center, UCSF, Washington University of Saint Louis

Pieter Sonneveld, MD, PhD

A Systems Biology Approach to High-Risk Myeloma

Network includes Erasmus Medical Center, Rotterdam; Amsterdam University Medical Centers; Julius Maximilian University of Wurzburg; University of Turin; University of Salamanca

Each network will receive $7M over 3 years for a total $21M investment by the MMRF, meant to foster collaboration and advance compelling hypotheses that are ready for rapid testing in clinical trials.



Sagar Lonial, MD

Clinical and Multi-Omics Platforms to Define High-Risk Smoldering Myeloma

Network includes Emory University, Atrium Health Levine Cancer Institute, Icahn School of Medicine at Mt. Sinai, Mass General Hospital, Mayo Clinic, MSKC Institute, Dana-Farber Cancer Institute

6

Speakers

Benjamin T. Diamond, MD
Sylvester Comprehensive Cancer Center
University of Miami, Miller School of Medicine
Miami, Florida

Francesco Maura, MD
Sylvester Comprehensive Cancer Center
University of Miami, Miller School of Medicine
Miami, Florida

7

MULTIPLE MYELOMA Research Foundation

Available Biomarkers for Multiple Myeloma: A "How-To" and Perspective on Common Results

Benjamin T. Diamond, MD
Sylvester Comprehensive Cancer Center
University of Miami, Miller School of Medicine
Miami, Florida

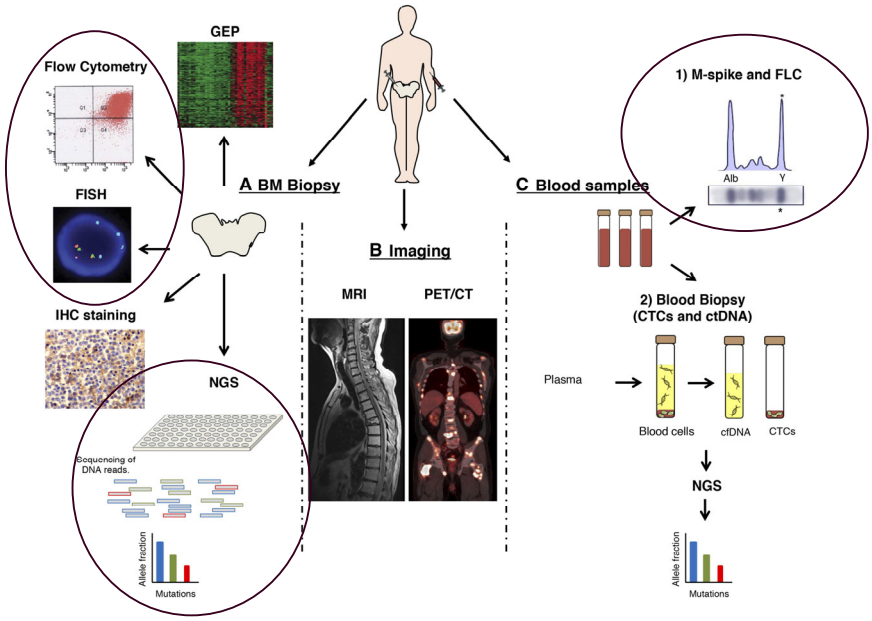
8

What qualifies as a biomarker?

- A characteristic that can be objectively measured and evaluated as an indicator of a biologic process
  - Diagnostic: M protein
  - Prognostic: minimal residual disease (MRD)
  - Predictive: t(11;14)

9

Many Biomarkers Are Clinically Relevant in Myeloma



Bustoros M et al. *Am Soc Clin Oncol Educ Book*. 2017;37:548.

10

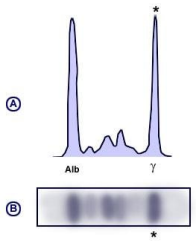
Common Biomarkers in Your Blood Work

B2M: beta-2 microglobulin
LDH: lactate dehydrogenase
Albumin

} R-ISS: Revised International Staging System (with FISH)

Light chains and ratio
SPEP: serum protein electrophoresis
SIFE: serum immunofixation electrophoresis

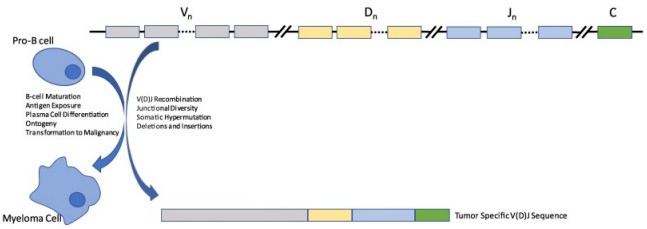
} Paraprotein: surrogate for disease burden



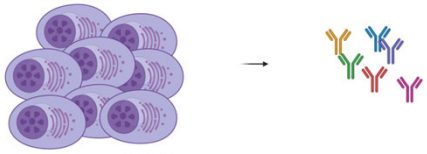
Tuazon. 2023.

11

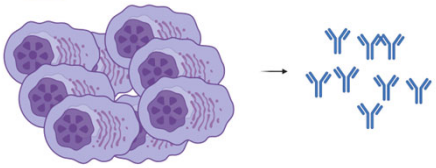
Monoclonal Protein Is a Product of Monoclonal Plasma Cells



Polyclonal



Monoclonal



5 g/dL
50% marrow

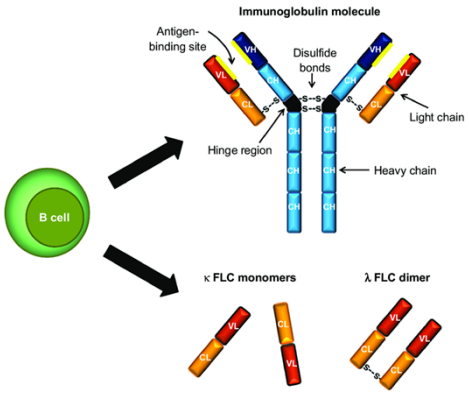
→

1 g/dL
10% marrow

Diamond BT et al. *Blood Reviews*. 2021;46:100732.

12

Tracking and Diagnosing With Free Light Chains Can Be Tricky



Light chain ratio caveats

Sensitive to the denominator

Component Ref range & units	2 mo ago	5 mo ago	7 mo ago	8 mo ago
Free kappa 0.33–1.94 mg/dL	31.87↑	27.18↑	37.43↑	34.21↑
Free lambda 0.57–2.63 mg/dL	0.29↓	0.28↓	0.40↓	0.29↓
Free kappa/lambda ratio 0.26–1.65	109.90↑	97.07↑	93.58↑	117.97↑

Sensitive to kidney function

Hampson JA et al. *Current Biomarker Findings.* 2014;4:139.

13

Paraprotein for Diagnosis, Risk Stratification, and Monitoring

Diagnostics

	MGUS	SMM	MM
Clonal bone marrow plasma cells	<10%	10% to 59% **and/or** either serum ≥30 g/L **or** Urine ≥500 mg/24 hours	≥10% or biopsy proven plasmacytoma
M protein	Serum <30 g/L Urine <500 mg/24 hours		Any level
Myeloma-defining events (CRAB SLiM criteria)*	None	None	Present

Risk stratification

High risk	High risk	Biochemical diagnosis (SLiM)
M protein >1.5 g/dL	M protein ≥2 g/dL	≥60% BM plasma cell
Non-IgG MGUS	≥20% BM plasma cell	FLC ratio ≥100
Abnormal FLC ratio	FLC ratio ≥20	>1 focal lesion on MRI

*C: calcium elevation (>11 mg/dL or >1 mg/dL higher than ULN); R: renal insufficiency (creatinine clearance <40 mL/min or serum creatinine >2 mg/dL); A: anemia (Hb <10 g/dL or 2 g/dL < normal); B: bone disease (≥1 lytic lesions on skeletal radiography, CT, or PET-CT)

FLC, free light chain; MGUS, monoclonal gammopathy of undetermined significance; MM, multiple myeloma; SMM, smoldering multiple myeloma

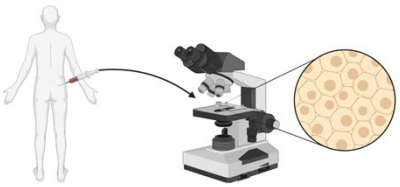
Rajkumar SV et al. *Am J Hematol.* 2022;97:1086.

14

Biomarkers in Response Criteria: Room for Improvement

Response	IMWG criteria
sCR	CR as defined below plus normal FLC ratio and absence of clonal cells in bone marrow by immunohistochemistry or immunofluorescence
CR	Negative immunofixation on the serum and urine, disappearance of any soft tissue plasmacytomas, and <5% plasma cells in bone marrow
VGPR	Serum and urine M protein detectable by immunofixation but not on electrophoresis or >90% reduction in serum M protein plus urine M protein level <100 mg/24 h
PR	>50% reduction of serum M protein and reduction in 24-hour urinary M protein by >90% or to <200 mg/24 h If the serum and urine M protein are unmeasurable, a >50% decrease in the difference between involved and uninvolved FLC levels is required in place of the M protein criteria If serum and urine M protein are not measurable and serum free light assay is also not measurable, >50% reduction in plasma cells is required in place of M protein, provided baseline bone marrow plasma cell percentage was >30% In addition to the above listed criteria, if present at baseline, a >50% reduction in the size of soft tissue plasmacytomas is also required

sCR, stringent complete response; CR, complete response; VGPR, very good partial response; PR, partial response



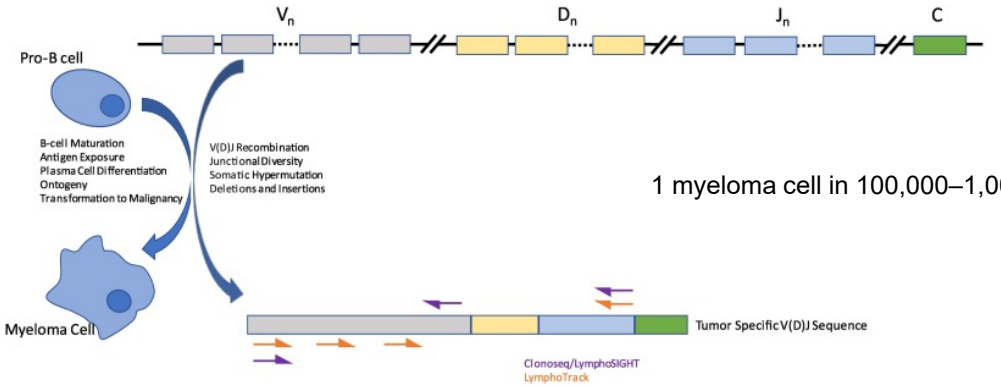
<5% plasma cells (including cancer cells) complete remission

Durie BGM et al. *Leukemia*. 2006;20:1467.

15

Measuring MRD via Next-Generation Sequencing

Next-generation sequencing approach to MRD measurement



1 myeloma cell in 100,000–1,000,000!

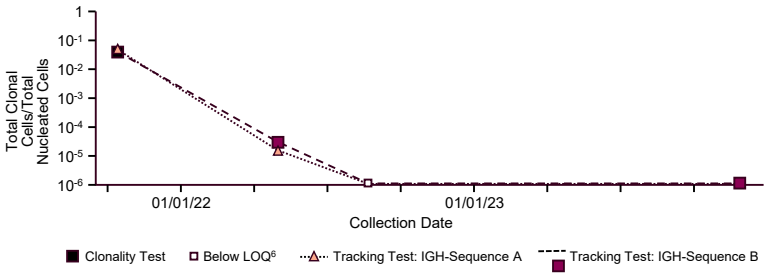
Diamond BT et al. *Blood Reviews*. 2021;46:100732.

16

How do we interpret a NGS MRD test?

No residual sequences detected
Estimated MRD value:

0 residual clonal cells (range: 0–2)§**
Total nucleated cells evaluated from this sample: 881,232



Date	Specimen type	Estimated sequence abundance (residual clonal cells per million nucleated cells)
2-yr	Fresh bone marrow	*Not detected*
1-yr	Fresh bone marrow	<1††
Pre-ASCT	Fresh bone marrow	27
Dx	FFPE slides	40,367

Sample clonality[1]	Total nucleated cells[2]
0.06	881,232

LOCI	Total sequences[3]	Total unique sequences[4]
IGH	149,159	139,144
IGK	189,950	109,267
IGL	54,811	40,589

Supplemental sequence information

Sequence	Limit of detection (per million cells)[5]	Limit of quantitation (per million cells)[6]
IGH – Sequence A	2	3
IGH – Sequence B	2	3

17

How do we interpret a flow cytometry MRD test?

Multiparametric flow cytometry approach to MRD measurement

Single tube
CD117 PC5.5
CD19 PC7
CD138 APC
CD56 APC-R700
CD45 APC-H7
CD81 Pacific Blue
CD38 BV510
CD38 BV510
CD27 BV605
κ FITC
Λ PE

Interpretation:
G. Bone marrow, flow cytometry analysis:

NEGATIVE FOR ABNORMAL PLASMA CELL POPULATION

Comment: Bone marrow elements are present in this specimen. An abnormal plasma cell population is not detected. The detection limit of this assay is 0.001% of leukocytes.

Technical data:
Total analyzed leukocytes: 2,444,000
Limit of detection: 0.001%
    Total plasma cells: 1687
    Mast cell population: 0.06%
Immature B-cell population: 3.1%

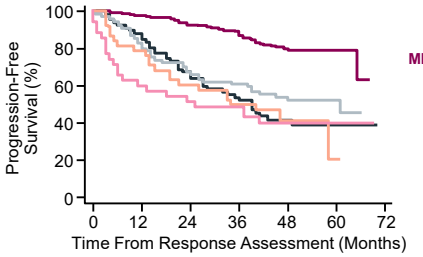
Flow cytometry analysis has been performed using the following CD and non-CD antibodies:

Plasma cell myeloma MRD panel:
CD45, CD138, CD229, CD319, CD38, CD117, CD56, CD27, CD81, CD19, cyKappa, cyLambda

Roshal M et al. *Blood Adv.* 2017;1:728. Diamond BT et al. *Blood Reviews.* 2021;46:100732.

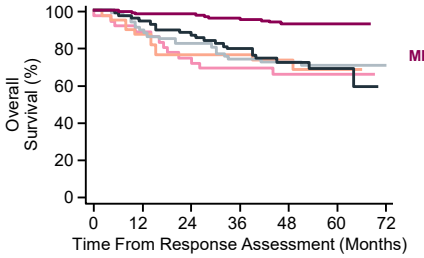
18

Why do we care? MRD has more resolution than standard response criteria.



	5 year PFS (%)
MRDneg	79
sCR	39
CR	21
VGPR	52
PR	40

P<0.001



	5 year OS (%)
MRDneg	93
sCR	68.5
CR	68
VGPR	70.5
PR	65

P<0.001

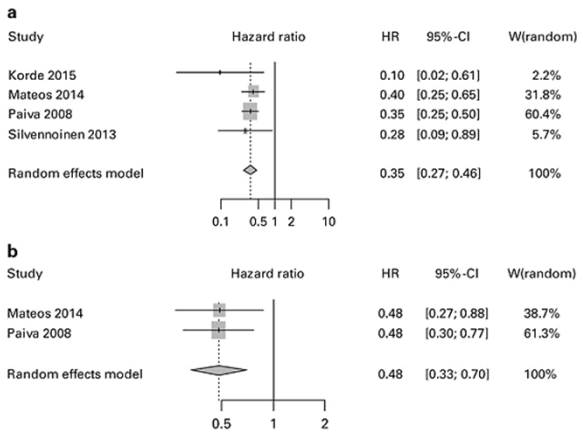
Validation of the International Myeloma Working Group standard response criteria

Jiminez-Ubierto A et al. *Blood*. 2021;138:1901.

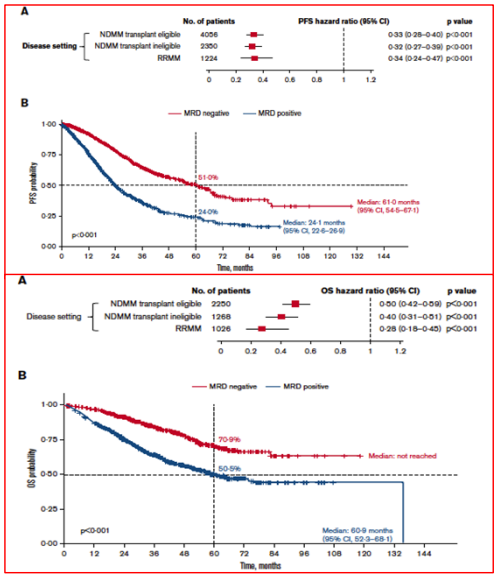
19

Why do we care? MRD is prognostic for outcome.

MRD positivity (compared to MRD negativity)[1]



Association of MRD negativity with outcomes[2]



1. Landgren O et al. *Bone Marrow Transplant.* 2016;51:1565.
2. Munshi NC et al. *Blood Adv.* 2020;4:5988.

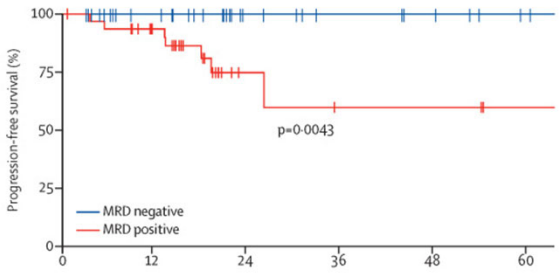
20

Longitudinal MRD Tracking Provides a Window Into Disease Dynamics

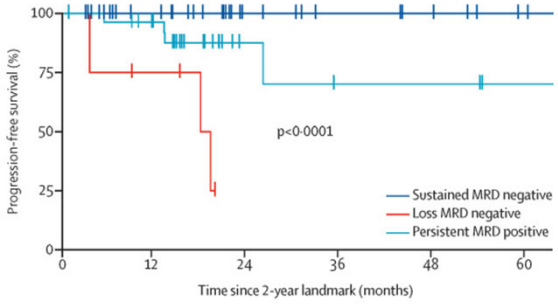
For 108 patients on continuous lenalidomide maintenance:

- Measure MRD status every year
- Patients who sustained MRD negativity for 2 years had no recorded progression at median 19.8 months past the 2-year maintenance landmark

PFS by MRD status from 2-year landmark



PFS by MRD dynamics



Diamond B et al. *Lancet Haematol*;. 2021;8:e422.

21

MRD: Final Notes and Future Directions

Consider:

1) Prognostic at the patient level, but as a regulatory end point?
2) Heterogeneity across institutions

MRD end points in trials

MRD-adapted therapy

- Intensification/de-escalation
- Maintenance combination/duration
- De-escalation/cessation

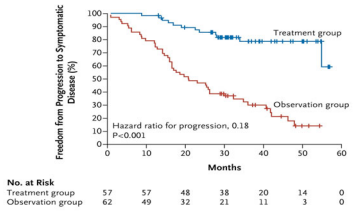
MRD and disease biology

Coffey DG et al. *Nat Comm.* 2023;14:5335. Maura F et al. *Nat Can.* 2023;4:1660.

22

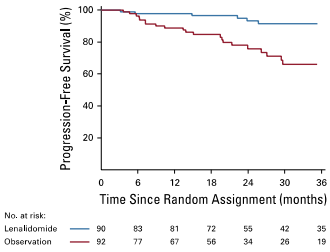
Upcoming: Genomic Biomarkers in Smoldering Myeloma

Lenalidomide (R)/ dex vs observation[1]



- Mayo 2008[3]
- PETHEMA[4]
- RLM[5]
- Mayo 2018 (20/2/20)[6]
- Pangea[7]

R vs observation[2]



Intervention for high-risk SMM (HR-SMM) has produced favorable results.

- Less aggressive, more susceptible?
- Patient fitness?
- Heterogeneous inclusion criteria and biology?

1. Mateos MV et al. *N Engl J Med*. 2013;369:438.
2. Lonial S et al. *J Clin Onc*. 2020;38:1126.
3. Dispenzieri A et al. *Blood*. 2008;111:2490.
4. Perez-Persona E et al. *Blood*. 2007;110:2586.
5. Rajkumar SV et al. *Blood*. 2015;125:2318.
6. Rajkumar SV et al. *Lancet Oncol*. 201415:e538.
7. Cowan A et al. *Lancet Haem*. 2023;10:e203.

23

Genomic Contextualization of Treated HR-SMM

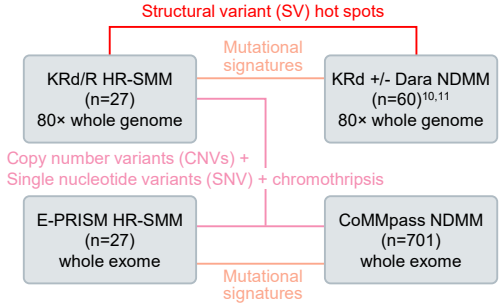
Carfilzomib, Lenalidomide, and Dexamethasone Followed by Lenalidomide Maintenance for Prevention of Symptomatic Multiple Myeloma in Patients With High-risk Smoldering Myeloma

A Phase 2 Nonrandomized Controlled Trial

Dickran Kazandjian, MD[1,2]; Elizabeth Hill, MD[1]; Alexander Dew, DO[1,3]; et al
Author Affiliations | Article Information

JAMA Oncol. 2021;7(11):1678-1685. doi:10.1001/jamaoncol.2021.3971

- 54 patients with HR-SMM[8]
- KRd × 8 cycles → R × 2 yrs
- MRD-negative rate: 70%
- 92.7% PFS rate (MM) at 5 years
  - E Hill et al. Abstract 337



Immune biomarkers of response to immunotherapy in patients with high-risk smoldering myeloma

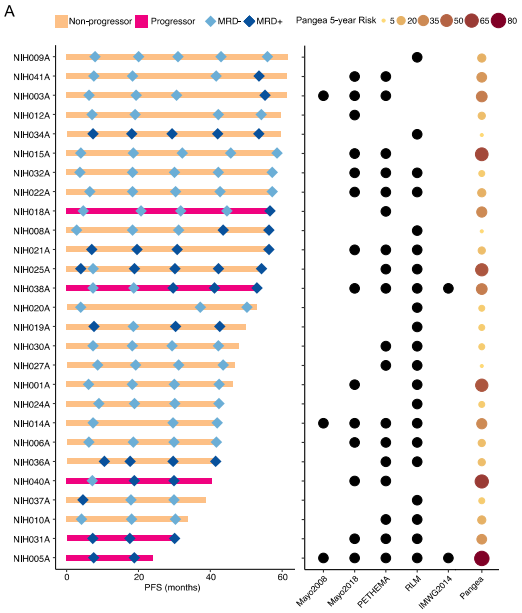
Romanos Sklavenitis-Pistofidis,[1,2,3,4] Michelle P. Aranha,[1,2,4] Robert A. Redd,[5] Joanna Baginska,[1] Nicholas J. Haradhvala,[4,6] Margaret Hallisey,[1] Ankit K. Dutta,[1,2,3,4] Alexandra Savell,[1,3] Shohreh Varmeh,[1,4] Daniel Heilpern-Mallory,[1,4] Sylvia Ujwary,[1,2,3,4] Oksana Zavidij,[1,2,3,4] Francois Aguet,[4] Nang K. Su,[1,2,3,4] Elizabeth D. Lightbody,[1,2,3,4] Mark Bustoros,[1,2,3,4] Sabrin Tahri,[1,2,3,4] Tarek H. Mouhieddine,[1,2,3,4] Ting Wu,[4] Lea Flechon,[7] Shankara Anand,[4] Jacalyn M. Rosenblatt,[8] Jeffrey Zonder,[9] James J. Vredenburgh,[10] Adam Boruchov,[10] Manisha Bhutani,[11] Saad Z. Usmani,[11] Jeffrey Matous,[12] Andrew J. Yee,[13] Andrzej Jakubowiak,[14] Jacob Laubach,[1] Salomon Manier,[7,15] Omar Nadeem,[1,3] Paul Richardson,[1,2,3] Ashraf Z. Badros,[16] Maria-Victoria Mateos,[17] Lorenzo Trippa,[3] Gad Getz,[2,4,15,18,19,*] and Irene M. Ghobrial[1,2,3,4,18,20,*]

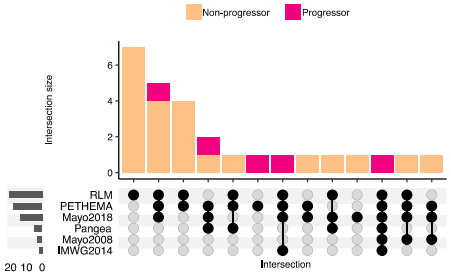
- 51 patients with HR-SMM[9]
- Elotuzumab-R+/-d × 24 cycles

8. Kazandjian D et al. *JAMA Oncol*. 2021;7:1678.
9. Sklavenitis-Pistofidis R et al. *Cancer Cell*. 2022;40:1358.
10. Landgren O et al. *JAMA Oncol*. 2021;7:862.
11. Korde N et al. *JAMA Oncol*. 2015;1:746.

24

Clinical Risk Scores Are Inconsistent in Smoldering Myeloma



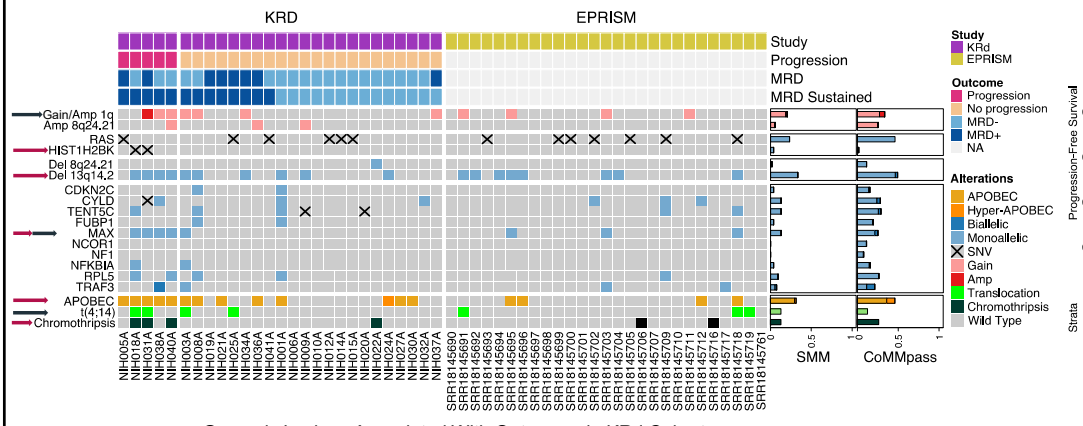


Risk Score Summary

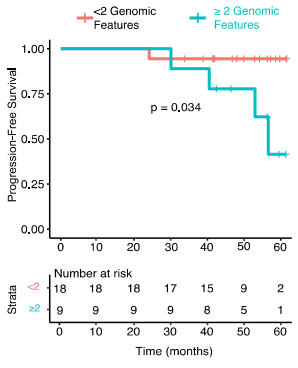
25

Genomic Complexity: A Potential Biomarker Associated With Worse Outcome

- Outcomes
  - Progression (clinical or biochemical)
  - Sustained MRD negativity × 1-year



Genomic Lesions Associated With Outcomes in KRd Cohort



PFS Stratified by Presence of Genomic Features

26

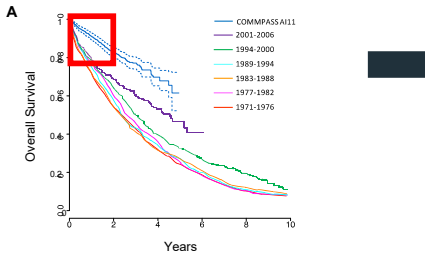
MULTIPLE MYELOMA Research Foundation

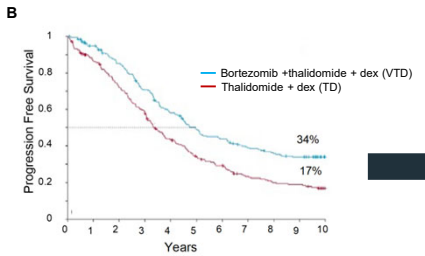
Genomics to Predict Clinical Outcomes

Francesco Maura, MD
Sylvester Comprehensive Cancer Center
University of Miami, Miller School of Medicine
Miami, Florida

27

Clinical Outcomes in Multiple Myeloma





The advent of novel drugs has resulted in improved overall survival in patients with multiple myeloma

However, a subset of patients with multiple myeloma has not benefited from newer therapies, reflected in persisting poor clinical outcomes

Conversely, another subset of patients with multiple has excellent outcomes despite limited therapy

1. Kumar S et al. *Leukemia.* 2014;28:1122. **2.** Tacchetti P et al. *Lancet Hem.* 2020;7:e861.

28

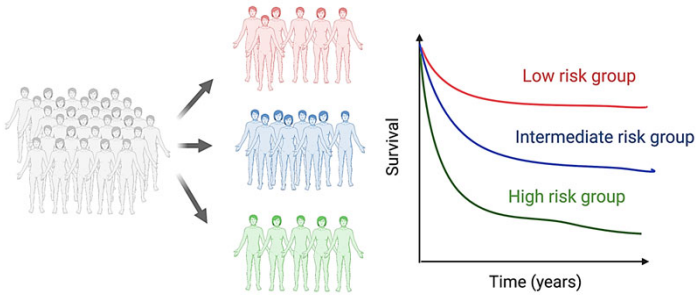
Prognostication and Risk in Multiple Myeloma

ISS
- B2M
- Albumin

R-ISS*
- B2M
- Albumin
- LDH
- t(4;14)
- del17p

R2-ISS†
- B2M
- Albumin
- LDH
- t(4;14)
- del17p
- 1q gain

RELATIVE RISK



No genomic information included

Not useful for developing patient-specific tailored therapeutic decisions

Figure generated using BioRender.

*Palumbo A et al. *J Clin Oncol.* 2015;33:3459.
†D'Agostino M et al. *J Clin Oncol.* 2022;40:3406.

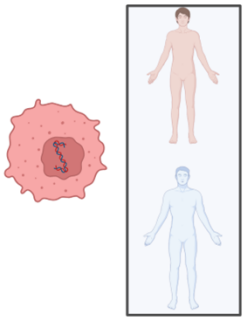
29

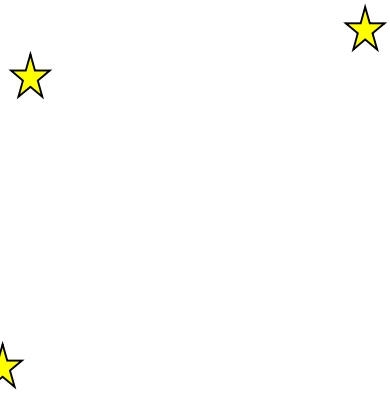
Outline

1. Advantage of using genomics as biomarkers in multiple myeloma
2. WGS to maximize the efficacy of our immunotherapy-based strategies in multiple myeloma
3. Genomics to develop individualized risk and strategies for newly diagnosed multiple myeloma

30

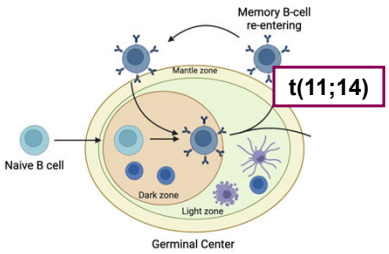
Cancer genomics and clinical outcomes





31

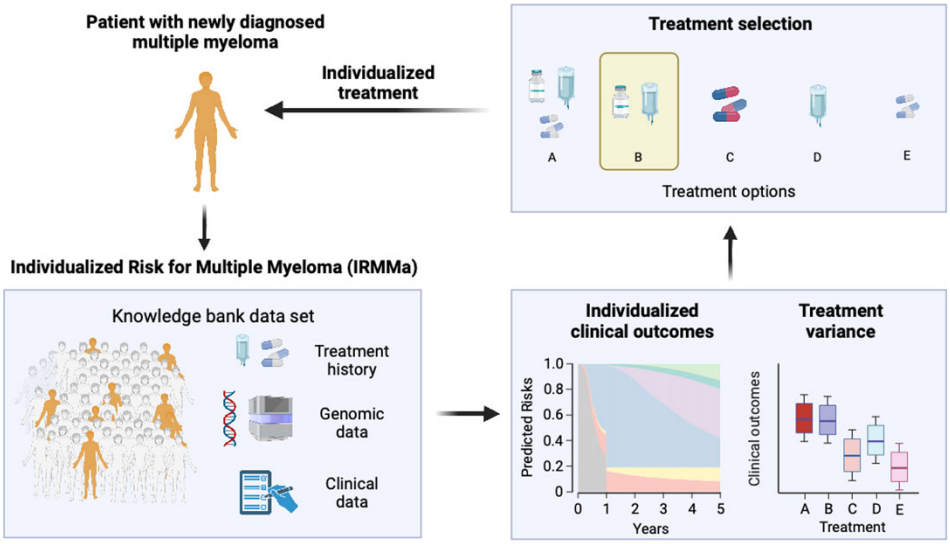
Cancer genomics, pathogenesis, and heterogeneity



t(11;14)

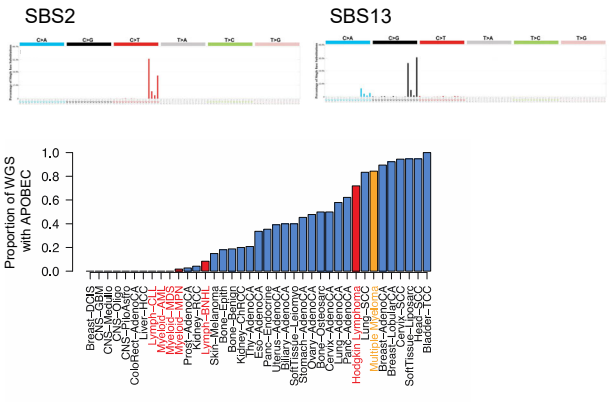
32

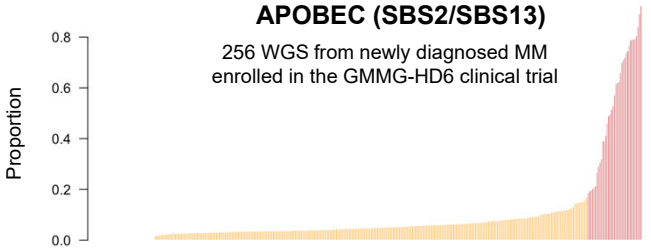
Aims of translational and genomic research



33

APOBEC





APOBEC is associated with:
- Immunosuppressed immune microenvironment
- Aggressive disease
- Loss of HLA
- Metastasis

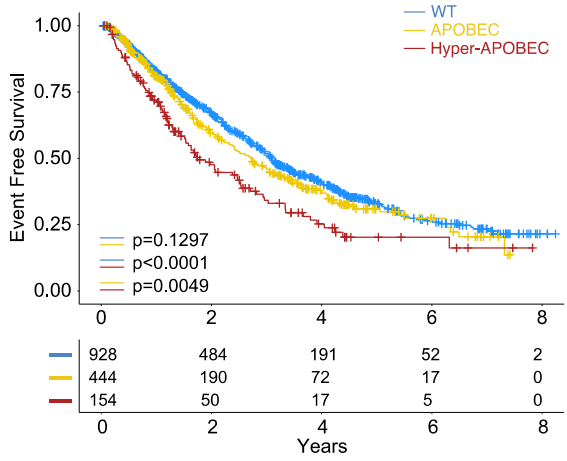
~90% of patients with MM have evidence of APOBEC mutagenesis

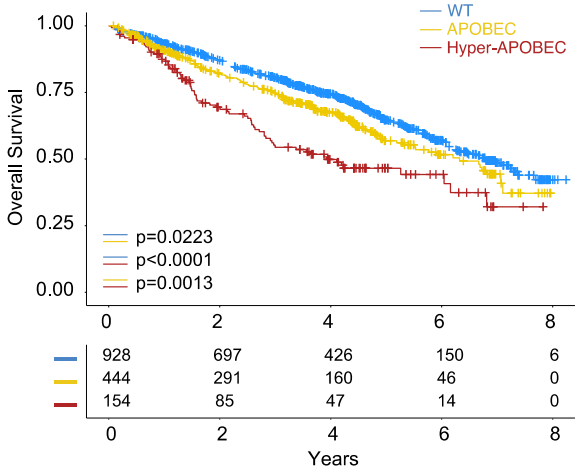
MAF/MAFB:IGH translocations

Walker B et al. *Nat Commun.* 2015;6:6997. Maura F et al. *Leukemia.* 2017;32:1044. McGranahan N et al. *Cell.* 2017;171(6):1259-1271. Litchfield K et al. *Cell.* 2021;184:596. Maura F et al. *Blood Cancer Discov.* 2023;4:208. Maura F et al. *J Clin Oncol.* 2024 Jan 9:JCO2301277.

34

APOBEC and Clinical Outcomes in Newly Diagnosed Multiple Myeloma



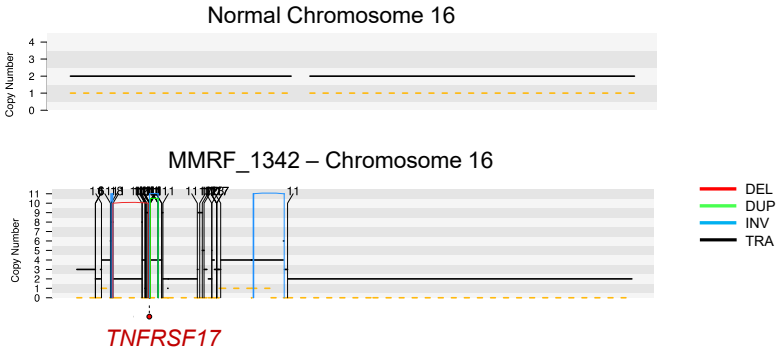


Maura F et al. *J Clin Oncol.* 2024 Jan 9:JCO2301277.

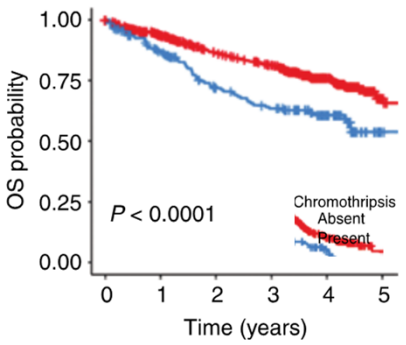
35

Chromothripsis in Multiple Myeloma

Chromothripsis is when one or more chromosomes are shattered and reassembled in the wrong way



Chromothripsis can involved key driver genes with impact on our treatment efficacy



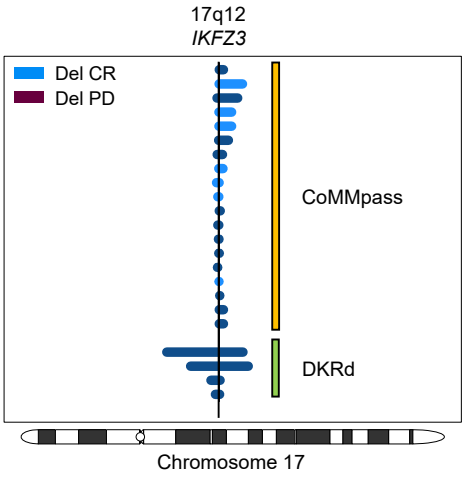
MMRF CoMMpass (752 low coverage long insert WGS from MMRF): 24% of patients have chromothripsis

Maura F et al. *Nat Commun.* 2019;10, 3835. Rustad E et al. *Blood Cancer Discov.* 2020;1:258. Lee H et al. *in preparation.*

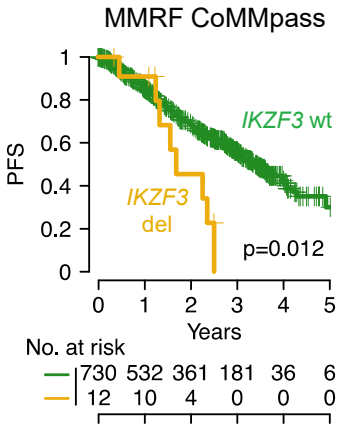
36

IKFZ3 Focal Loss and Response to IMIDs

Lenalidomide causes selective degradation of IKZF1 and IKZF3 in multiple myeloma cells.
In a cell with less IKZF3, lenalidomide will have less activity.



Only detectable by whole-genome sequencing



Krönke J et al. *Science*. 2014;343:301. Maura F et al. *Nat Cancer*. 2023;4:1660.

37

Outline

1. Advantage of WGS: impact of mutational signatures and structural variants in multiple myeloma
2. WGS to maximize the efficacy of our immunotherapy-based strategies in multiple myeloma
3. Genomics to develop individualized risk and strategies for newly diagnosed multiple myeloma

38

What affects the response to immunotherapy?

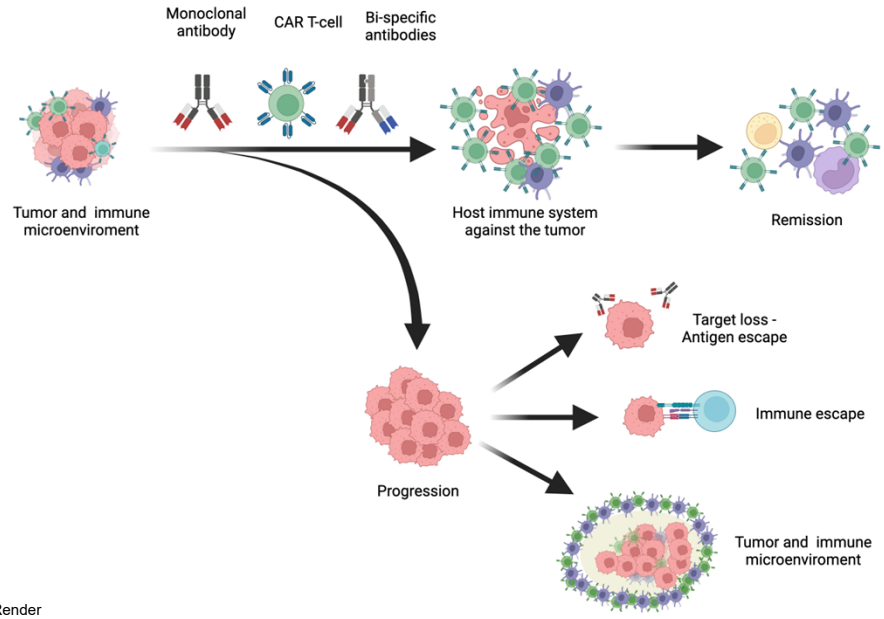
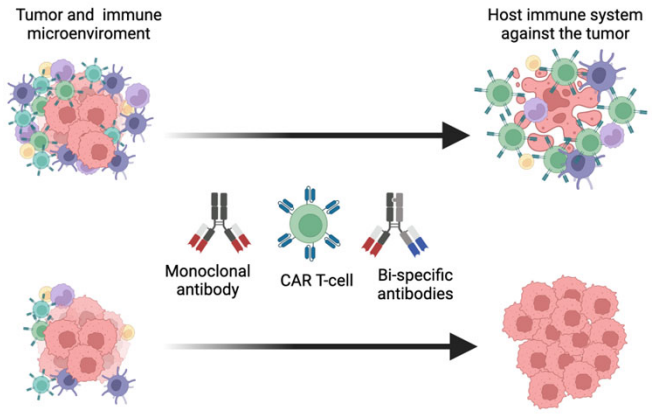


Figure generated with BioRender

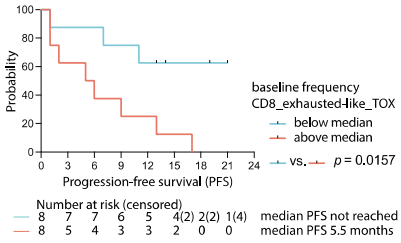
39

Immune Environment and CAR T/TCE Resistance

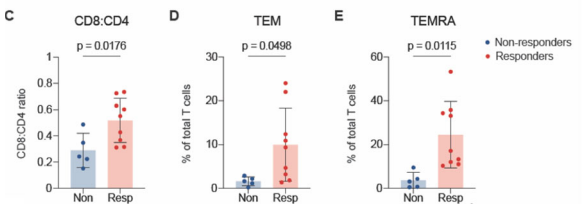
To be effective, immunotherapy needs a functional immune system



Friedrich MJ et al. *Cancer Cell.* 2023.



Firestone RS et al. *Blood Adv.* 2023.



40

Resistance to Anti-GPRC5D CAR T/TCE

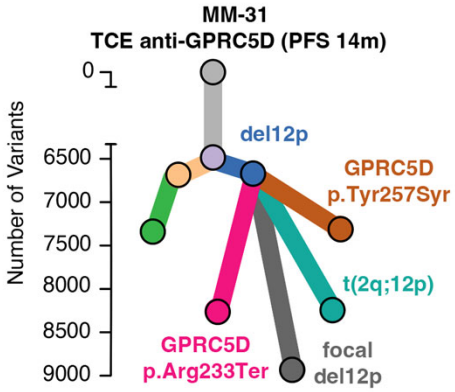
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

GPRC5D-Targeted CAR T Cells for Myeloma

Sham Mailankody, M.B., B.S., Sean M. Devlin, Ph.D., Jonathan Landa, D.O., Karthik Nath, M.B., B.S., Ph.D., Claudia Diamonte, B.S.N., R.N., O.C.N., Elizabeth J. Carstens, M.D., Douglas Russo, M.S., Romany Auclair, M.D., Lisa Fitzgerald, M.S.N., Briana Cadzin, B.S.N., R.N., Xiuyan Wang, Ph.D., Devanjan Sikder, Ph.D., Brigitte Senechal, Ph.D., Vladimir P. Bermudez, Ph.D., Terence J. Purdon, M.S., Kinga Hosszu, Ph.D., Devin P. McAvoy, B.S., Tasmin Farzana, M.P.H., Elena Mead, M.D., Jessica A. Wilcox, M.D., Bianca D. Santomasso, M.D., Ph.D., Gunjan L. Shah, M.D., Urvi A. Shah, M.D., Neha Korde, M.D., Alexander Lesokhin, M.D., Carlyn R. Tan, M.D., Malin Hultcrantz, M.D., Ph.D., Hani Hassoun, M.D., Mikhail Roshal, M.D., Filiz Sen, M.D., Ahmet Dogan, M.D., Ph.D., Ola Landgren, M.D., Ph.D., Sergio A. Giralt, M.D., Jae H. Park, M.D., Saad Z. Usmani, M.D., Isabelle Rivière, Ph.D., Renier J. Brentjens, M.D., Ph.D., and Eric L. Smith, M.D., Ph.D.

Six patients had progression after an initial response, of whom 4 (67%) had no GPRC5D expression at the time of progression and 2 (33%) had decreased expression

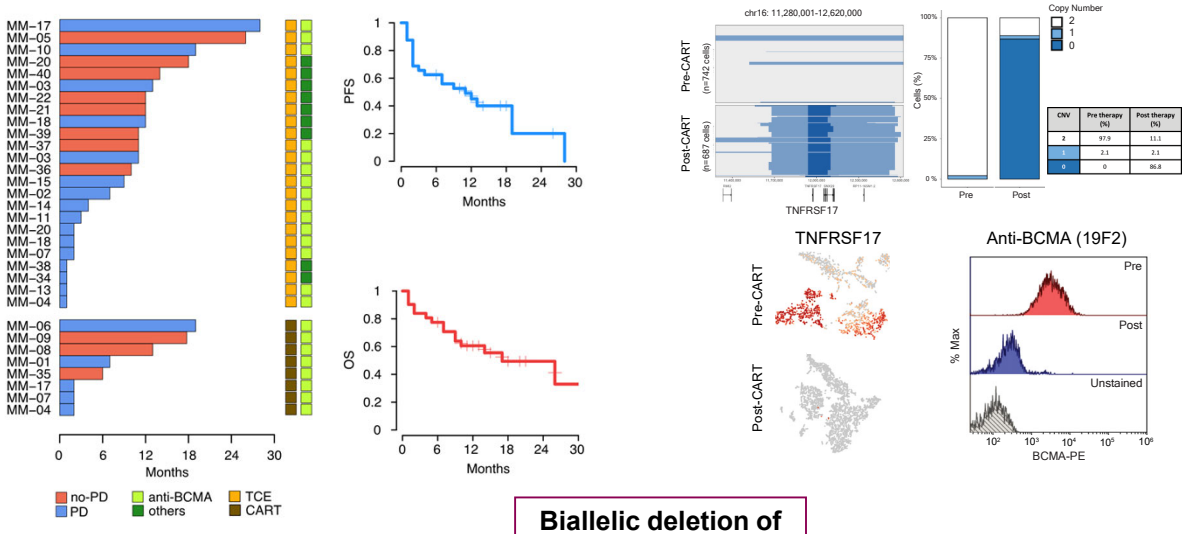


Antigen loss is the main mechanism of resistance to anti-GPRC5D CART/TCE

Lee H et al. *Nat Med*. 2023;29:2295. Darrien J et al. *Nat Cancer*. 2023;4:1536. Mi X et al. *N Engl J Med*. 2023;389:1435. Papadimitriou MA et al. *In preparation*.

41

Resistance to Anti-BCMA CAR T/TCE

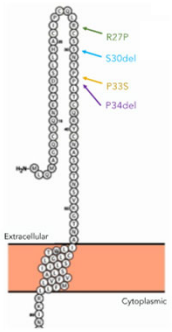


Biallelic deletion of BCMA (<5%)

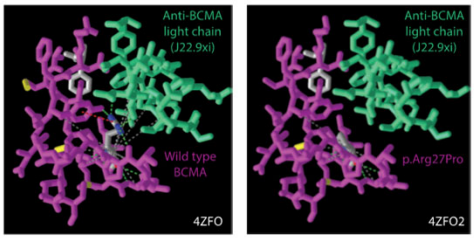
Lee H et al. *Nat Med*. 2023;29:2295. Lee H et al. *In preparation*.
Papadimitriou MA et al. *In preparation*.

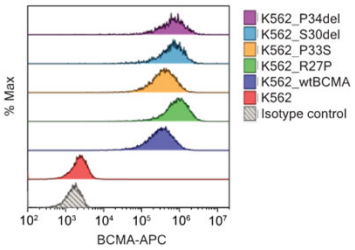
42

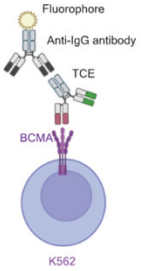
TNFRSF17 Mutations and Resistance to CAR T/TCE

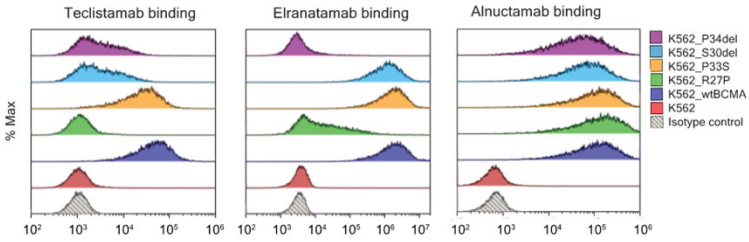


In 6/12 (50%) patients with WGS at relapse, the progression after anti-BCMA CART/**TCE** was driven by antigen escape mechanisms









Lee H et al. *Nat Med*. 2023;29:2295.

43

Outline

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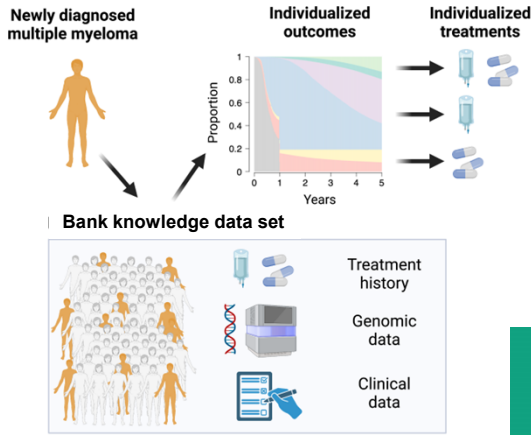
44

Individualized Risk Model for Multiple Myeloma (IRMMa)

- MMRF, N=1062
- Moffitt, N=177
- MPG, N=492
- MSKCC, N=109
- UAMS, N=93

- Clinical
- Demographic
- Ethnic
- Treatment
- Genomics (WES/WGS)

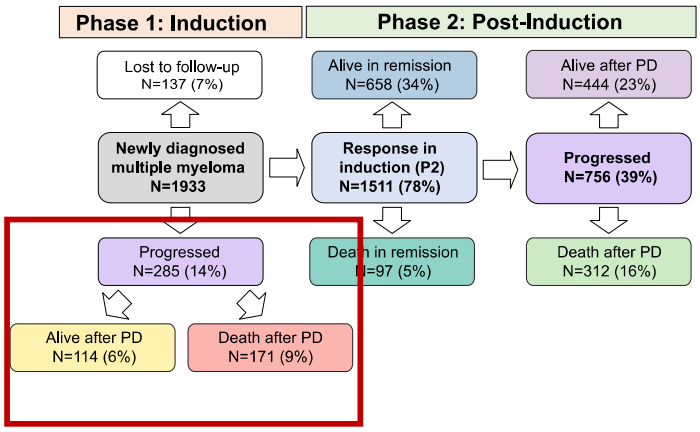


Model is driven by deep neural networks

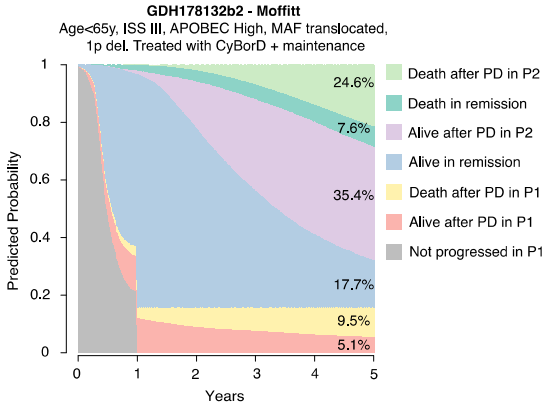
Gerstung M et al. *Nat Genet.* 2017;49:332. Maura F et al. *J Clin Oncol.* 2024 Jan 9:JCO2301277.

45

IRMMa: Multistate Model

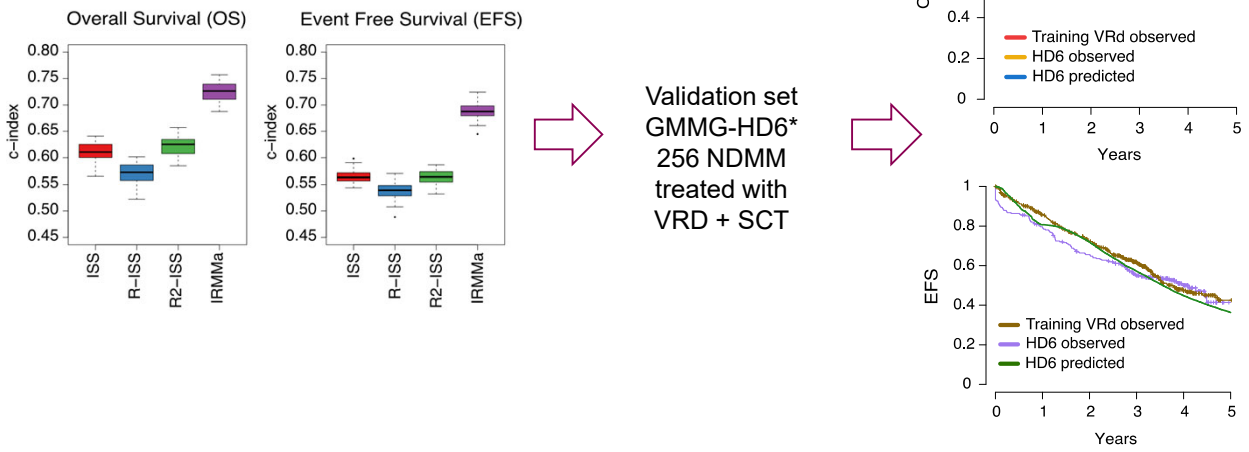


Primary refractory patients represent the "real" high-risk multiple myeloma



46

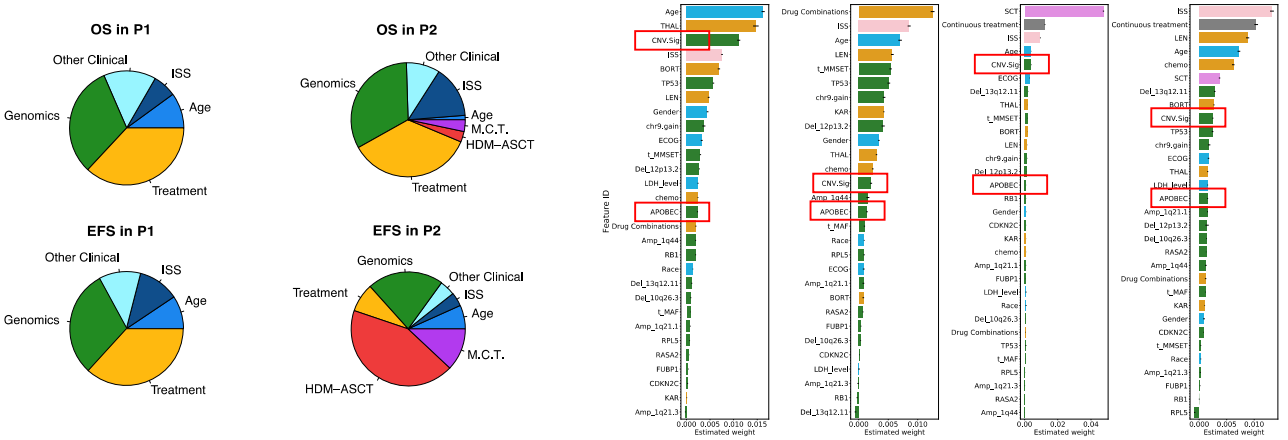
Individualized Risk Model for Multiple Myeloma (IRMMa)



*Goldschmidt H et al. *Blood*. 2021.138;486.

47

Contribution of Genomics in IRMMa Accuracy

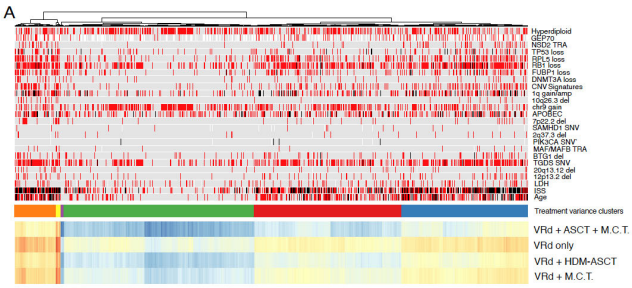


https://github.com/UM-Myeloma-Genomics/GCP_MM: copy number signatures (CNV.Sig) to predict from whole-genome and exome sequencing data
https://github.com/UM-Myeloma-Genomics/mmsig: SBS signatures fitting tools to detect APOBEC from whole-genome and exome sequencing data

Maclachlan K et al. *Nat Comm*. 2021;12:5172. Rustad E et al. *Comm Bio*. 2021;4:424.

48

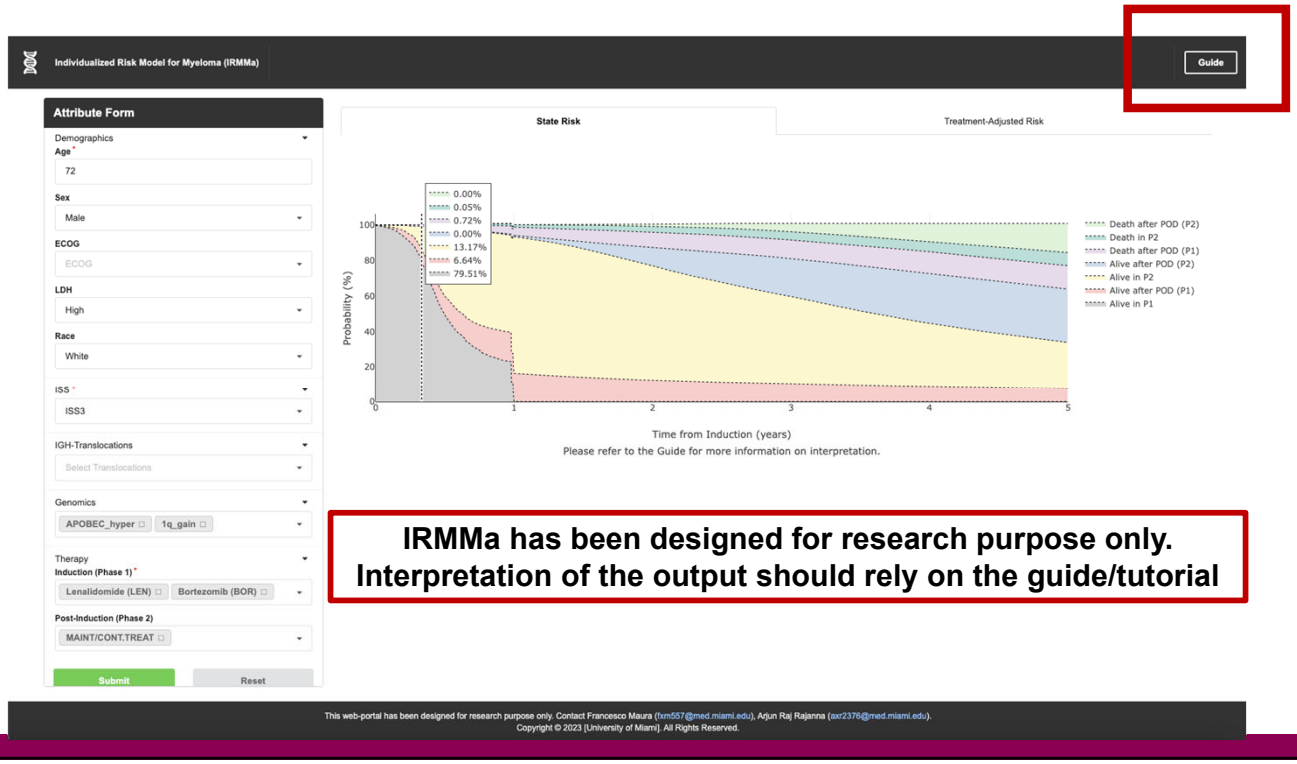
Treatment Variance in Newly Diagnosed Multiple Myeloma



Heat map showing the predicted treatment variance across 1,933 patients in case of treatment with VRd +/- HDM-ASCT +/- continuous treatment (CT)

PFS, progression-free survival (probability to be alive and in remission at 5 years); VRd, bortezomib, lenalidomide, dexamethasone; HDM-ASCT, high-dose melphalan and autologous stem cell transplantation

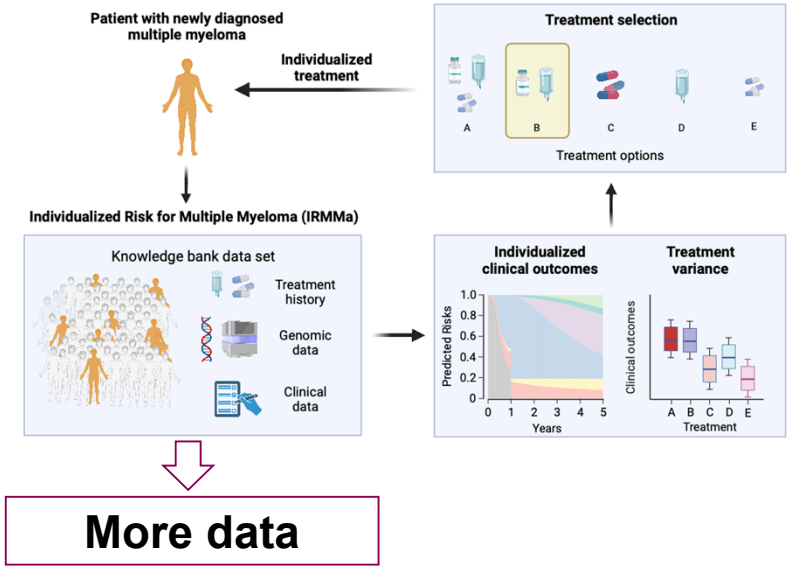
49



IRMMa has been designed for research purpose only. Interpretation of the output should rely on the guide/tutorial

50

Future Directions…



51

Summary

- Genomics can provide useful information to predict clinical outcomes and individualized treatment strategies
- Models like IRMMa (artificial intelligence) can predict individualized risk for each patient, opening a new era for precision medicine
- Genomics is emerging as the most important force in promoting resistance to novel immunotherapies (CART and bispecific T-cell engagers)

52

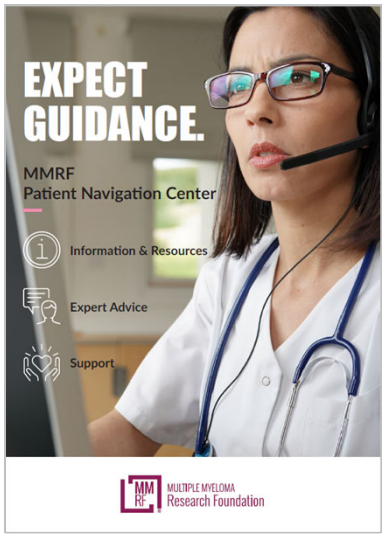
MULTIPLE MYELOMA Research Foundation

Questions & Answers

53

54

MMRF Patient Resources



55

Myeloma Mentors®

Myeloma Mentors® allows patients and caregivers the opportunity to connect with trained mentors. This is a phone-based program offering an opportunity for a patient and/or caregiver to connect one-on-one with a trained patient and/or caregiver mentor to share his or her patient journeys and experiences.

No matter what your disease state—smoldering, newly diagnosed, or relapsed/refractory—our mentors have insights and information that can be beneficial to both patients and their caregivers.

Contact the Patient Navigation Center at 888-841-6673 to be connected to a Myeloma Mentor or to learn more.

56

Join the MMRF Community!

National Walk/Run Program

Atlanta | 10.26.24
Boston | 10.12.24
Chicago | 9.8.24
Dallas | 11.16.24
Houston | 11.23.24
Los Angeles | 8.17.24
National Virtual | 12.14.24
New York City | 10.5.24
Philadelphia | 10.19.24
San Francisco | 8.24.24
Scottsdale | 12.7.24
Southeast Michigan | TBD
Tampa | TBD
Twin Cities | 9.14.24
Washington D.C. | 9.28.24

Other MMRF Event Programs

Moving Mountains for Multiple Myeloma

Half and Full Marathons

Bike/Road to Victories

Create Your Own Fundraiser

57

Upcoming Patient Education Events
Save the Date

Program	Date and Time	Speakers
Bispecific Antibodies *Livestream*	Monday, February 26, 2024 11:00 AM – 12:00 PM (ET) 8:00 AM – 9:00 AM (PT)	Jesus Berdeja, MD Melissa Alsina, MD
Biomarkers *Livestream*	Tuesday, March 5, 2024 1:00 PM – 2:00 PM (ET) 10:00 AM – 11:00 AM (PT)	Joshua Richter, MD Alexander Lesokhin, MD

For more information or to register,
visit **themmrf.org/educational-resources**

58

59

Resources

- Resource tab includes
  - Exhibit Hall
  - Speaker bios
  - Copy of the slide presentation

60

Need help with travel to a clinical study?

- The MMRF has partnered with the Lazarex Cancer Foundation to help provide more equitable access to clinical studies for multiple myeloma patients
- This partnership is one facet of the MMRF's commitment to improve diversity and representation in myeloma clinical studies
- MMRF has provided $100,000 over 2 years to Lazarex to fund travel, lodging, and food for patients (and a travel companion) so that they can participate in clinical studies that are appropriate for them
- Patients are funded according to income guidelines and will be reimbursed for allowed expenses
- For more information on this program and to be connected with Lazarex, call our Patient Navigation Center at 1-888-841-6673

It's About Living
Lazarex
CANCER FOUNDATION

61

MM RF MULTIPLE MYELOMA Research Foundation

Thank you!

62