

**AN EVENING WITH THE EXPERTS**  
**@ INDY HEMATOLOGY REVIEW 2019**  
**State of the Art 2020: Emerging**  
**Therapies in Blood Cancers and Blood**  
**Disorders**

*Ruemu E. Birhiray, MD*

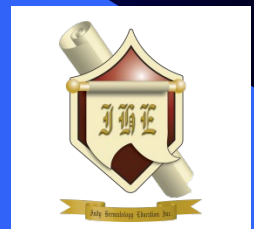
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## Indy Hematology Review

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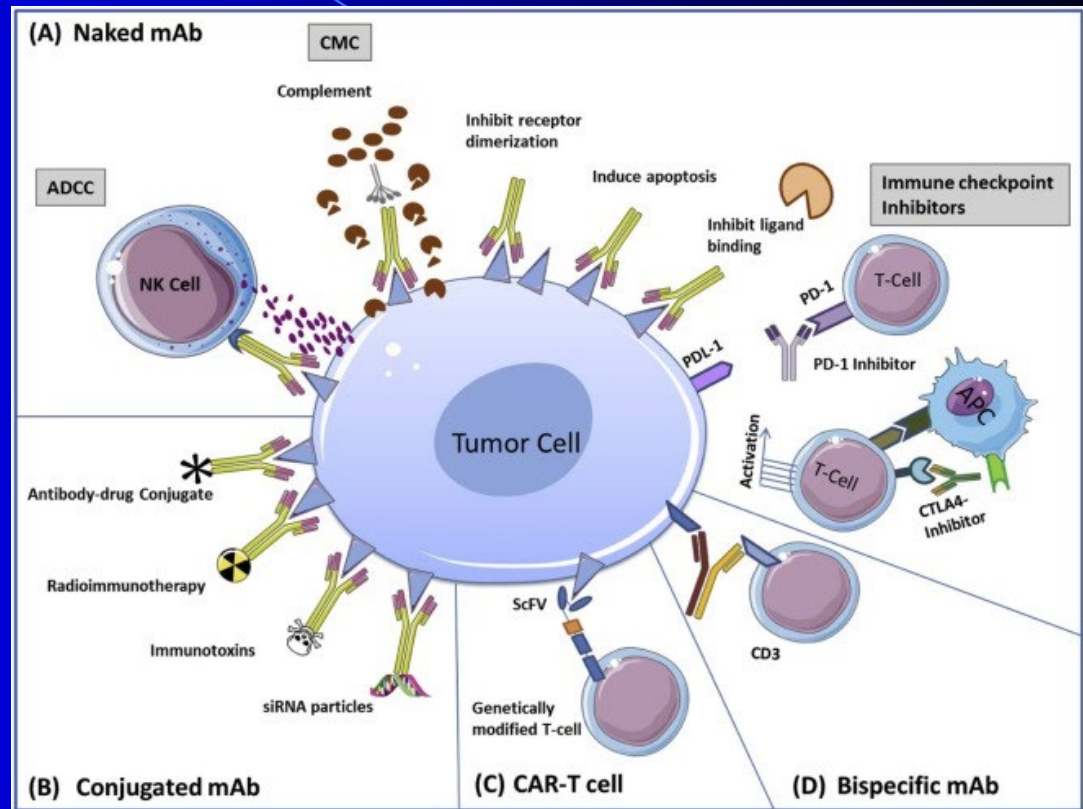
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# Treatment Strategies for Blood Cancers

- **Monoclonal antibodies:**  
Antibody proteins targeting cancer cell surface proteins
- **Antibody Drug Conjugates:** Antibodies linked to chemotherapeutic agents targeting cell surface proteins to improve directed killing of cancer cells
- **BITE antibodies:**
- Antibodies designed to link immune T-cells to target cancer cells
- **CAR-T cells:**
- Individually designed T cells with antibody receptors targeting cancer cells



# Myeloma: Initial Therapy

## ADDING DARATUMAB TO CHEMO:

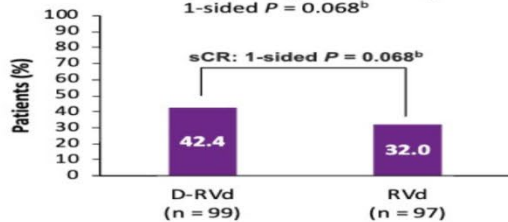
- GRIFFIN TRIAL: Daratumumab + VRd vs VRd Alone for Transplant-Eligible Myeloma: sCR by the end of treatment: 42.4% vs. 32.0%, no effect on stem cell collection

### Primary Endpoint: sCR by the End of Consolidation<sup>a</sup>

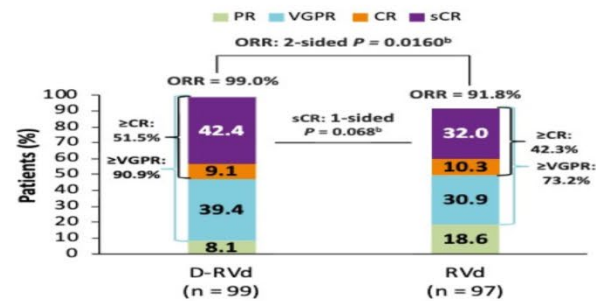
- Primary endpoint met at pre-set 1-sided alpha of 0.1

— sCR by end of consolidation

- 42.4% D-RVd vs 32.0% RVd
- Odds ratio, 1.57; 95% CI, 0.87-2.82; 1-sided  $P = 0.068^b$



### Post-consolidation depth of response<sup>a</sup>



<sup>a</sup>Results from primary analysis cutoff date (median follow-up, 13.5 months). Included patients in response-evaluable population (all randomized patients with confirmed MM diagnoses, measurable disease at baseline, received  $\geq 1$  dose of study treatment, and had  $\geq 1$  post-baseline disease assessment). <sup>b</sup>P values calculated using Cochran-Mantel-Haenszel chi-square test. A 1-sided P value is reported for sCR; for all other responses, 2-sided P values not adjusted for multiplicity are reported.

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- MASTER TRIAL: Daratumumab +KRd in Transplant-Eligible Myeloma: 21% African American, 51% High Risk,
- 39% sCR post induction and 95% at MRD-based consolidation.
- HOVON 143 TRIAL: Non transplant, frail/unfit patients with Myeloma: Ixazomib/daratumumab/low-dose dexamethasone, ORR: 74%; mPFS: 23 mos.

## High-Risk Smoldering Myeloma GEM-CESAR:

KRD, N=90, End of therapy response (Induction/ASCT/Consolidation): 76%  $\geq$  CR, 63% MRD negative.



# TARGETING MYELOMA CELL PROTEINS

## RELAPSED/REFRACTORY MYELOMA

### ANTI-CD38 ANTIBODY DARATUMUMAB

- **CANDOR**: Carfilzomib, Dexamethasone ± Daratumumab in relapsed Myeloma
- ORR 84.3 vs 74.7%, > VGPR 69.2 vs 48.7%, > CR 28.5 vs., 10.4%, MRD negative at 12 mos 17.6 vs. 3.9% (37% reduction in risk of progression /death, MRD-negative CR @12 mos ~10-fold > with KdD vs Kd)

**BCMA**: B-cell maturation antigen: Cell surface protein required for myeloma cell survival/signaling

### CAR T THERAPY:

- **CARTITUDE-1**: JNJ-4528 CAR T-cells targeting domains for increased for improved binding:
  - ORR: 100% with ≥ 69% CR rate, 100% of evaluable patients MRD negative.
- **LEGEND-2**: LCAR-B38M CART-T-cells, ORR 88%, mPFS: 19.9 mos, mOS: 36.1 mos

### BITE ANTIBODY: “Immune Matchmaker”

- **CC93269**: Humanized, IgG1 T-cell engager that binds BCMA and CD3ε on T-cells
  - ORR in 10-mg group: 88.9% (sCR/CR: 44.4% with 100% MRD), CRS: 76.7%, majority grade 1/2.

# TARGETING MYELOMA CELL PROTEINS RELAPSED/REFRACTORY MYELOMA

## ANTIBODY DRUG CONJUGATE (ADC): ANTIBODIES BEARING TOXINS

- DREAMM-2: Belantamab mafodotin, BCMA targeting ADC, Phase II, N=196, ORR 31-34%
- DREAMM-6: Belantamab mafodotin + Vd (ASCO2020): ORR of 78%, VGPR of 50%, and CBR of 83%

## PROMOTING CANCER CELL DEATH

### XPO-1: INHIBITING CANCER CELL SURVIVAL BY PROMOTING RETENTION OF CANCER KILLING PROTEINS IN CELLS

- STOMP: Phase I/II, Selinexor, Pomalidomide/Dexamethasone in R/RMM, N=51, ORR 56%, CBR 78%

## BCL-2: INHIBITING CANCER CELL ANTI-DEATH PROTEINS

- Phase I/II: Venetoclax + Dexamethasone + Daratumumab± Bortezomib in t(11;14) R/R MM (ASH2019): 48% ≥ PR and 35% ≥ VGPR, 12-mo DoR of 61% for 11mos
- BELLINI Phase III, Ven+Bort/Dex in RRMM (ASCO 2020): Improved PFS, ORR, MRD but worse OS except in t(11:14)



# Chronic Leukemia

- **FIRST LINE THERAPY in CLL/SLL**

- **ELEVATE TN**

- Acalabrutinib ± obinutuzumab significantly improved progression/death compared with obinutuzumab + chlorambucil in initial treatment of CLL, ORR: 93.9 vs 85.5 vs 78.5%, fewer deaths in either acalabrutinib treatment arms.

- **Extended Follow-Up of E1912:** Ibrutinib + Rituximab versus FCR in younger patients with CLL: PFS superior for IR over FCR (HR, 0.39; 95%; P <.0001), Improved PFS in IGHV-unmutated patients.

- **Venetoclax + ibrutinib**

- First-line, fixed-duration treatment in high-risk CLL/SLL, ≥ 65 yrs of age, High risk CLL, MRD response of 75%.

- **CAPTIVATE**

- First-line Ibrutinib Plus Venetoclax in CLL/SLL MRD: Blood: 75% and Bone marrow: 72%

- **Acalabrutinib, Venetoclax, and Obinutuzumab (AVO):**

- Treatment-naïve CLL, N=37, 48% undetectable MRD in BM after 8 cycles

- **RELAPSES/REFRACTORY CLL/SLL**

- **LOXO-305:** BRUIN, Next-generation, non-covalent BTK inhibitor: ORR 77%

- **SEQUOIA:** Zanabrutinib, Phase III, Arm C, TN-CLL: N=109, ORR 90%

- **CAR-T THERAPY: TRANSCEND CLL 004:** Lisocabtagene Maraleucel CART-T therapy; ORR: 81.5%, CR 45.5%

- **RELAPSES/REFRACTORY CML (FAILURE AFTER TKI THERAPY)**

- **Asciminib:** Allosteric inhibitor of BCR/abl: Phase I, N=141, MMR 48% (mT315I = 28%)

# Lymphoma

- **Immune Engager BiTE:**
- **GO2971: Mosunetuzumab:** Phase I/Ib Study in Relapsed NHL: Aggressive NHL responses: ORR: 37.1%, CR: 19.4%, Indolent NHL responses: ORR: 62.7%, CR: 43.3%
- **CART- Cells Immunotherapy:**
- **TRANSCEND NHL 001:** Lisocabtagene Maraleucel in R/R LBCL, ORR: 73%, CR 53%, DoR @ 12: 54.7%, CAR+ T-cells at 1 yr in 53%
- **ZUMA-2:** Trial of KTE-X19 CAR T-Cell Therapy in **Relapsed/Refractory Mantle Cell Lymphoma**.
- N=68, ORR of 93%, CR: 67%. 43% of initial cohort in remission with  $\geq 2$  years f/u.
- **TARGETED THERAPY FOR R/R INDOLENT LYPHOMA**
- **BRUIN: LOXO-305,** Non-Covalent BTK Inhibitor in MCL, N=6, ORR 50% (3/6), CR 17% (1/6)
- **GO29834:** R/R FL of **Polatuzumab vedotin**, obinutuzumab and lenalidomide. ORR 83%, CR 61%, 83% PFS @ 12 mo.
- **Tazemetostat:** EZH2 Inhibitor in R/R FL, N=99, ORR (MT): 45%, (WT) 83%
- **FiLo:** Idelalisib plus obinutuzumab in R/R Waldenström macroglobulinemia: ORR 69%
- **TARGETED THERAPY FOR T-CELL LYMPHOMA**
- **Cerdulatinib with R/R PTCL and CTCL:** Dual inhibition of SYK and JAK, ORR: 35%
- **IMMUNOTHERAPY FOR HODGKINS LYMPHOMA**
- **Brentuximab Vedotin Plus Nivolumab in Hodgkin Lymphoma**
- **First line Therapy:** Older patients, N=18, ORR 100%, CR 77%, mDoR NR
- **Relapsed/Refractory HD:** N=91, ORR 85%, CR 67%.

# Acute Leukemia

## ACUTE MYELOGENOUS LEUKEMIA

### MAINTENANCE THERAPY

- **QUAZAR AML-001:** Phase III, N=472, **CC-486 maintenance** vs. placebo, after First CR in ND AML
- Significant improvement in OS and RFS mOS extended 9.9 mos, and mRFS extended 5.3 mos.
- **ECOG-ACRIN E2906:** Phase II, **1 yr maintenance Decitabine** (3 days/cycle) after CR/Cri after 7+3 (or Clofarabine) induction Older AML Patients. N=120, 87.5% FLT3-ITD<sup>neg</sup> Superior OS (P = .06), trend to improved DFS (P = .12) compared to observation alone

### TARGETED THERAPY

- **Enasidenib + Azacitidine vs Azacitidine** in ND AML with IDH2 mutations, Phase II, N=
- Significantly improved ORR (71% vs 42%; P = .0064) and CR (53% vs 12%; P = .0001).
- **FLAG-IDA Plus Venetoclax:** ND AML or in R/R AML, Phase Ib/II Study, N=30,
- CR/Cri in R/R AML 70-75%, ND AML 85%, 3 deaths in CR reported. Dose modified study ongoing.

## ACUTE LYMPHOBLASTIC LEUKEMIA

- **COG AALL1331:** Phase III, Anti-CD19 BITE: **Blinatumomab vs Chemotherapy** maintenance for children and AYA with R/R B-ALL, N=208.
- Superior DFS and OS, higher rates of MRD and bridging to HSCT, lower AEs and toxicity
- **GIMEMA LAL 2116 D-ALBA:** Frontline **Dasatinib + Blinatumomab** in ND Ph+ ALL, Phase II, N=63, 60.4% CMR/PNQ status after 2 cycles, OS and DFS: 95.2% and 89.7%, @ mF/u 14mos.
- **M16-106: Venetoclax Plus Navitoclax** in R/R ALL and Lymphoblastic Lymphoma, Phase I, N=45
- CR/CRi/CRp: 49%, MRD negative CR: 29%, mDoR: 9.1 mos

# Myelodysplastic Syndromes and Myeloproliferative Neoplasms

## MPN

- **Luspatercept (Inflammatory protein trap) in Myelofibrosis**: Phase II, N=76, Hg response in all patients independent of RBC transfusion dependence.
  - Effects more profound in patients who also received ruxolitinib.
- **MANIFEST, CPI-0610**, N=54, Phase II
- Bromodomain and Extraterminal Domain Inhibitor (BETi), onotherapy or “Add-on” to Ruxolitinib, in Refractory or Intolerant Advanced Myelofibrosis.
- N=54, 24.9% reduction in SV @ 24 weeks and a 58.8% improvement in TSS for TD myelofibrosis.
- 43% converted from TD to TI following treatment with the combination

## MDS

- **GFM : APR-246 Plus Azacitidine** in TP53-mutated MDS and AML, Phase II, N=53
- CR in 49% (MDS: 66%, AML: 44%), MRD (Negative TP53 by NGS): 39%, 100% in CR
- **Venetoclax ± Azacitidine** in MDS: Phase Ib, N=64,
- ORR: 40% ORR vs 8% with venetoclax only, 12-mo OS with venetoclax + azacitidine was 65%
- **MEDALIST** Long-term analysis: N=229, RBC-TI  $\geq$  8 Wks
- Luspatercept-treated patients attained RBC-TI compared with placebo (47.7% vs 15.8%)

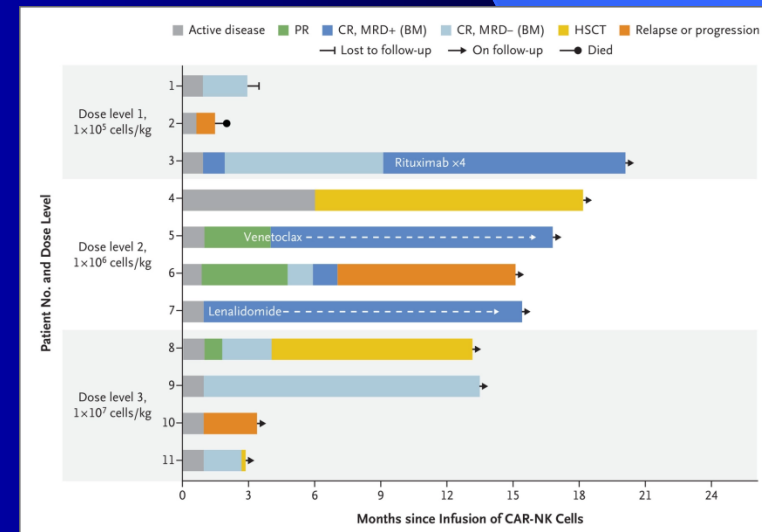
# Malignant/Non Malignant Hematology

- Updated Phase III Study of Avatrombopag: N=49
- Median cumulative duration of PLT  $\geq 50,000/\mu\text{L}$  (primary endpoint): 12.4 wks with avatrombopag vs 0 wks with placebo (P < .0001)
- Novel BTKi PRN1008: R/R Primary or Secondary ITP, Phase I, N=31
- ORR: 39%, Response rate increased to 54% with PRN1008 BID dosing for  $\geq 12$  wks
- Phase III Northstar-3 (HGB-212) Gene Therapy: Betibeglogene Autotemcel in Severe Transfusion-Dependent  $\beta$ -Thalassemia, Interim results: N=17, 9/11 patients with  $\geq 6$  mos of follow-up off transfusions for  $\geq 3$  mos
- 70.8% Transfusion Independence from wks 5-26, markedly increased Hb, controlled hemolysis.
- BCL11A Targeted Gene Therapy in Sickle Cell Disease: N=15, Pilot Study, HSC transduction efficiency  $\geq 93\%$ , Effective HbF induction, significantly decreased clinical sickling signs/symptoms
- Adjuvant Oral Arginine in Pediatric SCD, in Severe vaso-occlusive pain episodes (VOE) versus placebo, N=68, Statistically significant decrease in mean total opioid dose use, a shorter time-to-crisis resolution, and shorter length of hospital stay, without serious AEs.
- CARDINAL: Sutimlimab, first-in-class inhibitor of classical CP, Phase III, in transfusion dependent Cold Agglutinin Disease, N=24
- Bevacizumab Highly Effective for Chronic Bleeding in Hereditary Hemorrhagic Telangiectasia
- N= 140, RBC transfusions and iron infusions decreased by 86% and 66%, with bevacizumab therapy.
- SOAR: Fostamatinib, SYK Inhibitor, for Warm Antibody Autoimmune Hemolytic Anemia (wAIHA)
- N=25, ORR 48% (Hgb >10 without transfusion)



# Hematopoietic Stem Cell Transplantation and Cellular Therapy

- “Breaking the Glass Ceiling of Age in Transplant in Multiple Myeloma,”
- Autologous Hematopoietic Cell Transplantation in Older patients with Multiple myeloma.
- N=16,000, CIBMTR database. ASCT is safe and effective in patients >70 years, with improved outcomes with 200 mg/m<sup>2</sup>, compared to 140 mg/M<sup>2</sup>.
- Reduced dose Melphalan results in significantly worse outcomes and survival: NRM at 100 days (1% vs 0%; P = .003), PFS at 2 years (64% vs 69%; P = .003) and OS at 2 years (85% vs 89%, P = .01).
- African Americans are twice as likely to have myeloma than Caucasians, but have significantly lower autologous hematopoietic cell transplantation.
- STaMINA Long-term Follow-up (ASCO2020): PFS benefit for ASCT/ASCT cohort (in high risk group), No OS difference
- CAR-Transduced Natural Killer Cells in CD19-Positive R/R Lymphoid Malignancies
- Phase I/II, N=17
- HLA-mismatched anti-CD19 CAR-NK cells derived from cord blood (Potential “OFF THE SHELF” THERAPY).
- Retroviral vector: Encodes anti-CD19 CAR, interleukin-15, and inducible caspase 9.
- ORR 73%, 7/17 CR (3 CLL, 4 NHL)
- No CRS, neurotoxicity, or GVHD, or increased inflammatory cytokines, including interleukin-6





# Update from ASCO 2020 and Beyond

- **Epcoritamab CD3 x CD20 Bispecific Antibody**: Phase I/II in R/R B-Cell NHL, q1, then q 4 wks s.c, ORR in evaluable patients: DLBCL @  $\geq 12$  mg, 50.0%; FL @  $\geq 0.76$  mg, 85.7%. Neurotoxicity, 6.9% and CRS, 56.9% (all grade 1/2)
- **ASPEN**: Phase III, in Waldenström's Macroglobulinemia: Zanubrutinib vs. Ibrutinib, CR + VGPR: IRC, 28.4% vs 19.2% ( $P = .0921$ , Primary Endpoint) NS statistically; PFS at 12 mos: 89.7% vs 87.2%; OS at 12 mos: 97.0% vs 93.9%.
- Lower rates of AF/flutter, bleeding, diarrhea, and HTN, higher rate of neutropenia with zanubrutinib.
- **KEYNOTE-204**: Phase III, in R/R cHL, Pembrolizumab significantly improves PFS vs. Brentuximab vedotin, mPFS: 13.2 vs 8.3 mos (HR: 0.65; 95%;  $P = .00271$ ). ORR: 65.6% vs 54.2% ( $P = .0225$ ); mDoR: 20.7 vs 13.8 mos.
- **BOSTON**: Phase III, in RRMM, Selinexor, Bortezomib, and Dexamethasone vs Bortezomib and Dexamethasone: 30% improved PFS, HR 0.70,  $P = .0075$ .
- **L-MIND**: Tafasitamab (anti-CD19) + lenalidomide, Phase II, in RR DLBCL, ORR; 60%, CR; 43% and PR;18%.
- **ENDURANCE**: Phase III: Carfilzomib (20/36mg/M2 TW)/Len/Dex vs Bortezomib/Len/Dex without early ASCT, non high risk NDMM similar PFS.
- **KarMMA**: Idecabtagene Vicleucel, R/R Multiple Myeloma, Phase II, N = 158, ORR: 73%; CR: 33%, mDoR: 10.7mos; mPFS: 8.8mos , mOS 19.4mos (CR/SCR: mPFS: 20.2 mos)

# What does it all mean? My thoughts

- **PRACTICE changing:**

- *Upfront Daratumumab in transplant eligible MM with RVD, and KRd*
- *Belantamab Mafodotin in R/R Myeloma*
- *Upfront Acalabrutinib in CLL, and Ibrutinib + Rituximab in younger patients with CLL*
- *Venetoclax in t(11:14) RRMM (or NDMM)*
- *Blinatumomab maintenance in RR B-ALL*
- *Tafasitamab and Lenalidomide in R/R DLBCL*
- *Tazemetostat: In EZH2 mutated FL*

- **Potentially Practice changing:**

- *Sutimlimab in Cold Agglutinin Disease*
- *Maintenance therapy after induction therapy for AML: Decitabine/CC-486*
- *Enasidenib in IDH2 mutant NDAML,*
- *Upfront Blinatumomab and Dasatinib in ND Ph+ B-ALL*
- *Frontline Brentuximab vedotin plus Nivolumab in HL, Pembrolizumab in RR cNHL*
- *CAR-T Therapy in Myeloma and KTE-X19 CAR-T in RR MCL*
- *Bevacizumab in Hereditary Hemorrhagic Telangiectasia*
- *Upfront therapy for High Risk Asymptomatic Multiple Myeloma with Curative Intent ?*

- **Stay tuned**

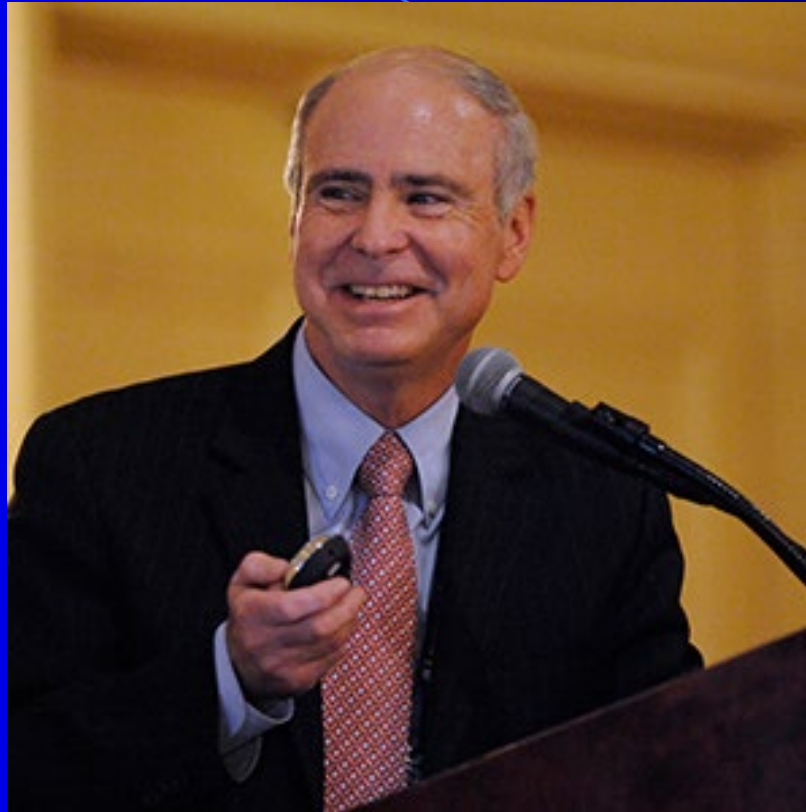
- *Mosunetuzumab in RR lymphoma and Cerdulatinib in RR PTCL/CTCL*
- *Gene Therapy in SCD and Thalassemia and NK Cell – CAR-T Cell*

# Co-Chair Indy Hematology Review



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# Multiple Myeloma



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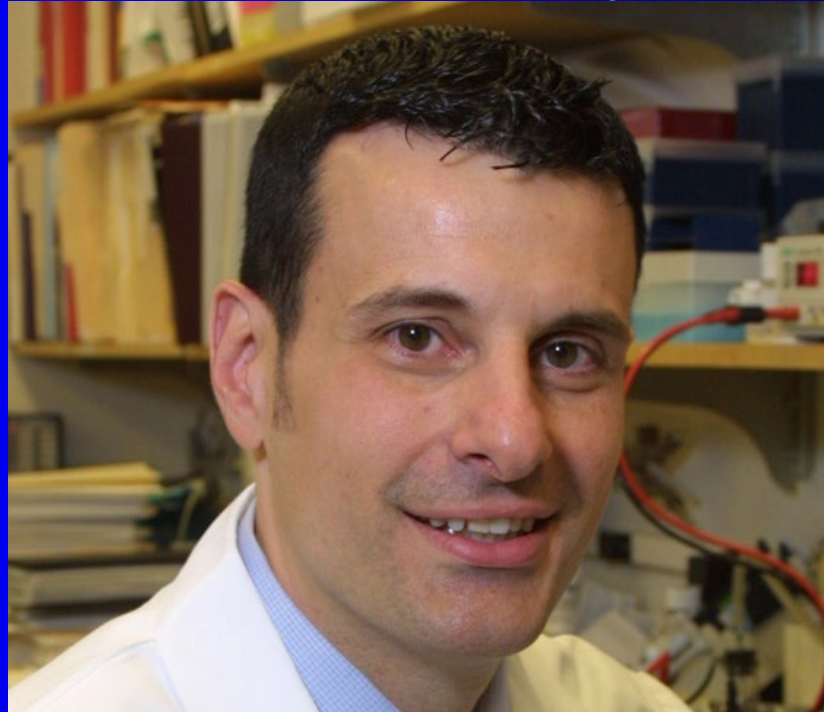
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# Waldenström's Macroglobulinemia



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# Lymphoma



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# Myeloproliferative Neoplasms



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# Hematopoietic Stem Cell Transplantation



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# TREATMENTS AND CURRENT RESEARCH IN LEUKEMIA



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# Surviving Cancer With Art Therapy



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# SAVE THIS DATE !

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And The Winner is ....





# Announcements and Acknowledgments

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