New Directions in Acute Leukemia Therapies

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Learning Objectives

• Review the new FDA approvals for acute leukemia
• Discuss some new therapies for acute leukemia
• Discuss evolving standards of care for acute leukemia
• Review select clinical trials
Summer of 2017 = “The Summer of Leukemia”

- **FDA Approvals**
  - 4/28/17 – *Midostaurin* for newly diagnosed FLT3+ AML in combination with 7+3
  - 7/12/17 – *Blinatumomab* regular approval for R/R Ph- B-ALL and new approval Ph+ B-ALL
  - 8/1/17 – *Enasidenib* for R/R AML with an IDH2 mutation
  - 8/3/17 – *Liposome encapsulated daunorubicin and cytarabine* (aka Vyxeos, CPX-351) for newly diagnosed t-AML and AML with MRC
  - 8/17/17 – *Inotuzumab ozogamicin* for R/R B-ALL
  - 8/30/17 – *Tisagenlecleucel* (aka CD19 CAR T-cells) for R/R B-ALL up to age 25
  - 9/1/17 – *Gemtuzumab ozogamicin* for newly diagnosed AML expressing CD33
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- FDA Approvals
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New Therapies for AML
Targets of Various FLT3i

- AC220 (Quizartinib)
- CEP-701 (Lestaurnib)
- MLN-518 (Tandutinib)
- PKC-412 (Midostaurin)
- CGP-52421
- Sorafenib
- Sunitinib

Randomized Mido vs Placebo with Induction and Consolidation, transplant allowed
717 pts (360 M, 357 P), FLT3-ITD and/or TKD+
CR 59% M vs 54% P
OS HR 0.77 (p=0.007)
EFS HR 0.8 (p=0.004)
**Crenolanib**

*Crenolanib* – type I FLT3 inhibitor active against FLT3-ITD and TKD mutations

P1 study of Crenolanib plus Induction, Consolidation, Transplant allowed, Maintenance after transplant

<table>
<thead>
<tr>
<th>Induction Chemotherapy Regimen</th>
<th># Evaluable Patients</th>
<th>CR after 1 Cycle of Induction</th>
<th>CR after Additional Cycle of Chemotherapy*</th>
<th>Overall Complete Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cytarabine + Daunorubicin (n=18)</td>
<td>18</td>
<td>16</td>
<td>1</td>
<td>17/18 (94%)</td>
</tr>
<tr>
<td>Cytarabine + Idarubicin (n=8)</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>7/7 (100%)</td>
</tr>
<tr>
<td><strong>TOTAL (n= 26 pts)</strong></td>
<td><strong>25</strong></td>
<td><strong>22</strong></td>
<td><strong>2</strong></td>
<td><strong>24/25 (96%)</strong></td>
</tr>
</tbody>
</table>

*1 pt re-induced with cytarabine/idarubicin and 1 pt received HiDAC*

**We are opening the Phase 3 study here!**
Targeting Mutated IDH

- Mutation frequency = ~15-20%
- Neomorphic activity
- Cooperates with FLT3, RAS, DNMT3A mutations to drive leukemia
- **AG-120 (IDH1i)**  
  NCT02074839
- **AG-221 (IDH2i)**  
  NCT01915498

**AG-221**: first-in-class, oral, potent, reversible, selective inhibitor of mutant IDH2, triggers blast differentiation

P1 study (NCT01915498) Advanced IDH2 mutant heme malignancies (R140Q and R172K)

<table>
<thead>
<tr>
<th></th>
<th>RR-AML (n = 159)</th>
<th>Untreated AML (n = 24)</th>
<th>MDS (n = 14)</th>
<th>All (N = 209)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Response (CR, CRp, CRi, mCR, PR)</td>
<td>59 (37%)</td>
<td>10 (42%)</td>
<td>7 (50%)</td>
<td>79 (38%)</td>
</tr>
<tr>
<td>CR</td>
<td>29 (18%)</td>
<td>4 (17%)</td>
<td>3 (21%)</td>
<td>37 (18%)</td>
</tr>
<tr>
<td>CRp</td>
<td>1 (1%)</td>
<td>1 (4%)</td>
<td>1 (7%)</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>CRi</td>
<td>3 (2%)</td>
<td>0</td>
<td>0</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>mCR</td>
<td>9 (6%)</td>
<td>1 (4%)</td>
<td>3 (21%)</td>
<td>14 (7%)</td>
</tr>
<tr>
<td>PR</td>
<td>17 (11%)</td>
<td>4 (17%)</td>
<td>0</td>
<td>22 (11%)</td>
</tr>
<tr>
<td>SD</td>
<td>72 (45%)</td>
<td>9 (38%)</td>
<td>6 (43%)</td>
<td>96 (46%)</td>
</tr>
<tr>
<td>PD</td>
<td>10 (6%)</td>
<td>1 (4%)</td>
<td>0</td>
<td>11 (5%)</td>
</tr>
<tr>
<td>Not evaluable</td>
<td>18 (11%)</td>
<td>4 (17%)</td>
<td>1 (7%)</td>
<td>23 (11%)</td>
</tr>
</tbody>
</table>

- Overall response by IDH mutation type: R140Q 36% / R172K 42%

Sustained plasma 2-HG inhibition (97% in R140Q, 50% in R172K)

**SIMILAR RESPONSE WITH IDH1 inhibitor AG-120**
Targeting Bcl-2

- Apoptosis is dysregulated in AML
- ABT-263 (Navitoclax) is an oral inhibitor of Bcl-2, Bcl-XL and Bcl-w
  - Bcl-xL inhibition leads to thrombocytopenia
- ABT-199 engineered from ABT-263 to be a selective inhibitor of Bcl-2
- Preclinical activity in AML
### Venetoclax plus HMA for Elderly AML

**Table 4. Overall Response in Individual Cohorts in All Patients**

<table>
<thead>
<tr>
<th>Overall response, n (%)</th>
<th>Arm A (VEN + DEC)</th>
<th>Arm B (VEN + AZA)</th>
<th>Total N=45</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cohort 1 Cohorts 2/3 Cohort 4</td>
<td>Cohort 1 Cohorts 2/3 Cohort 4</td>
<td></td>
</tr>
<tr>
<td>VEN 400 mg n=6</td>
<td>VEN 800 mg n=12</td>
<td>VEN 1200 mg n=5</td>
<td>VEN 400 mg n=4</td>
</tr>
<tr>
<td>CR</td>
<td>2 (33)</td>
<td>3 (25)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>CRi</td>
<td>1 (17)</td>
<td>6 (50)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>PR</td>
<td>0 (0)</td>
<td>1 (8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>MLFS&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0 (0)</td>
<td>1 (8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>RD</td>
<td>1 (17)</td>
<td>1 (8)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>Non-evaluable&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2 (33)</td>
<td>0 (0)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>CR+CRi</td>
<td>3 (50)</td>
<td>9 (75)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>ORR (CR+CRi+PR)</td>
<td>3 (50)</td>
<td>10 (83)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>CR+CRi+PR+MLFS</td>
<td>3 (50)</td>
<td>11 (92)</td>
<td>3 (60)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Less than 5% blasts in an aspirate sample but incomplete neutrophil and platelet recovery.

<sup>b</sup>3 patients discontinued prior to end of cycle 1 due to adverse events of infections; 1 patient found to have CNS leukemia on Day 7.

CR, complete remission; CRi, complete remission with incomplete marrow recovery; PR, partial remission; MLFS, Morphologically leukemia free state; RD, resistant disease.

DiNardo et al, ASH 2015 Abstract# 327.
Pollyea et al, ASCO 2016 Abstract# 7009.
CPX-351 P3 Study
ALFA-0701 Trial
New Therapies for ALL
Survival is Poor in Relapsed ALL

MRC UKALL2/ ECOG2993 Study (n=609)

LALA-94 Study (n=421)

Fielding et al, Blood 2007; Tavernier et al, Leukemia 2007
Inotuzumab ozogamicin

CD22-Calicheamicin antibody-drug conjugate
CD22 on 80-90+% of B-ALL
Novel targeted therapies for ALL

Inotuzumab vs SOC for R/R B-ALL (INO-VATE)

1:1 Randomization of Inotuzumab vs SOC (FLAG, Mito-AraC, or HiDAC) for R/R CD22+ B-ALL
Ino 0.5-0.8mg D1, 8 and 15 every 21-28d up to 6 cycles

CR/CRi 80.7% vs 29.4%
MRD <0.01% 78.4% vs 28.1%
All subgroups except t(4;11) favored Ino for CR
Allo-HCT 41% vs 11%

VOD 11% vs 1%
10 of 48 patients undergoing allo-HCT developed VOD
Prio allo-HCT and dual-alkylating conditioning associated with VOD

Blinatumomab – A Bispecific T-cell Engager

- α-CD3 monoclonal antibody
- BITE antibody composed of two single chain antibodies
- α-target monoclonal antibody

T-cell activation

Cytotoxic granule
CD3
Cytolytic synapse
Tumor-associated antigen
- CD19
- EpCAM
- Her2/neu
- EGFR
- CEA
- EpHA2
- CD33
- MCSP

Redirected lysis

Target cell

Blinatumomab vs SOC for R/R ALL (TOWER)

2:1 Randomization of Blinatumomab vs SOC (FLAG, HiDAC, HD-MTX, Clof) for R/R B-ALL
Blinatumomab for up to 2 induction cycles, 3 consolidation cycles and 12mo maintenance

- Median Duration of Remission
  - Blin 7.3mo (95% CI, 5.8-9.9mo)
  - SOC 4.6mo (95% CI, 1.8-19mo)
- 24% in each arm underwent allogeneic HCT
Blinatumomab vs SOC for R/R ALL (TOWER)

**A** Prespecified Subgroup Analysis of Overall Survival

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Blinatumomab</th>
<th>Chemotherapy</th>
<th>Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35 yr</td>
<td>123</td>
<td>60</td>
<td>0.70 (0.46–1.06)</td>
</tr>
<tr>
<td>≥35 yr</td>
<td>148</td>
<td>74</td>
<td>0.77 (0.55–1.08)</td>
</tr>
<tr>
<td>BM blasts ≥50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salvage-treatment phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>114</td>
<td>65</td>
<td>0.60 (0.39–0.91)</td>
</tr>
<tr>
<td>Second</td>
<td>91</td>
<td>43</td>
<td>0.59 (0.38–0.91)</td>
</tr>
<tr>
<td>Third or later</td>
<td>66</td>
<td>26</td>
<td>1.13 (0.64–1.99)</td>
</tr>
<tr>
<td>BM blasts ≥50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous allogeneic stem-cell transplantation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>94</td>
<td>46</td>
<td>0.81 (0.51–1.29)</td>
</tr>
<tr>
<td>No</td>
<td>177</td>
<td>88</td>
<td>0.70 (0.51–0.96)</td>
</tr>
<tr>
<td>Bone marrow blasts ≤50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50%</td>
<td>84</td>
<td>38</td>
<td>0.60 (0.35–1.03)</td>
</tr>
<tr>
<td>≥50%</td>
<td>18</td>
<td>96</td>
<td>0.82 (0.61–1.10)</td>
</tr>
<tr>
<td>Overall</td>
<td>271</td>
<td>134</td>
<td>0.71 (0.55–0.93)</td>
</tr>
</tbody>
</table>

**B** Prespecified Subgroup Analysis of Remission Rate

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Blinatumomab</th>
<th>Chemotherapy</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35 yr</td>
<td>53/123 (43.1)</td>
<td>15/60 (25.0)</td>
<td>2.27 (1.15–4.50)</td>
</tr>
<tr>
<td>≥35 yr</td>
<td>66/148 (44.6)</td>
<td>18/74 (24.3)</td>
<td>2.50 (1.34–4.66)</td>
</tr>
<tr>
<td>BM blasts ≤50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salvage-treatment phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>60/114 (52.6)</td>
<td>23/65 (35.4)</td>
<td>2.03 (1.08–3.80)</td>
</tr>
<tr>
<td>Second</td>
<td>36/91 (39.6)</td>
<td>7/43 (16.3)</td>
<td>3.37 (1.35–8.38)</td>
</tr>
<tr>
<td>Third or later</td>
<td>23/66 (34.8)</td>
<td>3/26 (11.5)</td>
<td>4.10 (1.11–15.12)</td>
</tr>
<tr>
<td>Previous allogeneic stem-cell transplantation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>38/94 (40.4)</td>
<td>5/46 (10.9)</td>
<td>5.56 (2.02–15.36)</td>
</tr>
<tr>
<td>No</td>
<td>81/177 (45.8)</td>
<td>28/88 (31.8)</td>
<td>1.81 (1.06–3.09)</td>
</tr>
<tr>
<td>Bone marrow blasts ≤50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50%</td>
<td>55/84 (65.5)</td>
<td>13/38 (34.2)</td>
<td>3.65 (1.63–8.17)</td>
</tr>
<tr>
<td>≥50%</td>
<td>64/186 (34.4)</td>
<td>20/96 (20.8)</td>
<td>1.99 (1.12–3.55)</td>
</tr>
<tr>
<td>Overall</td>
<td>119/271 (43.9)</td>
<td>33/134 (24.6)</td>
<td>2.40 (1.51–3.80)</td>
</tr>
</tbody>
</table>

BM blasts ≥50%: 74% Blin vs 78% SOC

ORR (CR/CRi/CRp): 43.9% Blin vs 24.6% SOC

MRD negative: 76% Blin vs 48% SOC

More SAE with Blin vs SOC; less cytopenia

<table>
<thead>
<tr>
<th>Parameter (N = 45)</th>
<th>n/N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary endpoint</strong></td>
<td></td>
</tr>
<tr>
<td>CR/CRh (first 2 cycles)</td>
<td>16/45 (36)</td>
</tr>
<tr>
<td>• T315I mutation</td>
<td>4/10 (40)</td>
</tr>
<tr>
<td>• ≥ 2 prior 2+ generation TKI</td>
<td>11/27 (41)</td>
</tr>
<tr>
<td>• Prior ponatinib treatment</td>
<td>8/23 (35)</td>
</tr>
<tr>
<td><strong>Secondary endpoints</strong></td>
<td></td>
</tr>
<tr>
<td>Best response (first 2 cycles)</td>
<td>14/45 (31)</td>
</tr>
<tr>
<td>• CR</td>
<td>2/45 (4)</td>
</tr>
<tr>
<td>• CRh</td>
<td>2/45 (4)</td>
</tr>
<tr>
<td>• CRi (not including CRh)</td>
<td></td>
</tr>
<tr>
<td><strong>Complete MRD response in pts with CR/CRh</strong></td>
<td>14/16 (88)</td>
</tr>
<tr>
<td>• MRD response in pts with ABL-kinase mutations</td>
<td>6/6 (100)</td>
</tr>
<tr>
<td><strong>Pts in CR/CRh who proceeded to allogeneic HCT</strong></td>
<td>4/16 (25)</td>
</tr>
</tbody>
</table>

Response to therapy was independent of T315I mutation

Martinelli et al. ASH 2015.
Chimeric Antigen Receptor (CAR) T-Cells

~2-4 weeks from apheresis to patient
Capable of *in vivo* proliferation and maintenance

Maude et al, Hematology, 2014.
# CD 19 CAR T-Cells Have Substantial Activity in R/R ALL

<table>
<thead>
<tr>
<th>Ref</th>
<th>T cell Engager</th>
<th>Population</th>
<th>Response</th>
<th>CRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maude et al. NEJM 2014</td>
<td>Anti-CD19 CART 4-1BB</td>
<td>N=30 Peds&amp;Adults</td>
<td>CR=90%</td>
<td>100% CRS 27% Severe</td>
</tr>
<tr>
<td>Davila et al. SciTrMed 2014</td>
<td>Anti-CD19 CART CD28</td>
<td>N=16 Adults</td>
<td>CR=88%</td>
<td>43% Severe</td>
</tr>
<tr>
<td>Lee et al. Lancet 2015</td>
<td>Anti-CD19 CART CD28</td>
<td>N=21 Peds&amp;AYA</td>
<td>CR=67%</td>
<td>76% CRS 28% Severe</td>
</tr>
<tr>
<td>Turtle et al. JCI 2016</td>
<td>Anti-CD19 CART 4-1BB</td>
<td>N=30 Adults</td>
<td>CR=93%</td>
<td>83% CRS</td>
</tr>
</tbody>
</table>

**ELIANA Study (Grupp et al, ASH 2016 Abstract #221):**
Global multicenter CAR T-cell trial
CR/CRi 82%, durable CR, all CR MRD negative
Intent to treat CR lower (~60%) in part due to deaths or other inability to get cells
CD 22 CAR T-Cells for R/R ALL

- CD19- relapses occur after CD19 CAR T-cells (~20%)
- Anti-CD22 CAR P1 dose escalation study

<table>
<thead>
<tr>
<th>Dose Level</th>
<th>Transduced CAR-T cells/kg</th>
<th>n</th>
<th>Complete Remission</th>
<th>Max Grade CRS</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 x 10e5</td>
<td>6</td>
<td>1 (17%)</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1 x 10e6</td>
<td>8</td>
<td>7 (87.5%)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3 x 10e6</td>
<td>2</td>
<td>1 (50%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>1</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

N=16: Age 1-30
9 CRs:
8 in DL 2&3
5 CD19-
1 Ref to CART19

Safety:
Controllable CRS
No severe neuro AE
ASH 2016 Abstract #586 – early use of Tocilizumab (anti-IL6 Ab) and Dexamethasone did not affect CR rate and decreased severe CRS
Evolving Standards of Care
Standard treatments for AML

- Newly Diagnosed
  - Age 18-60
    - 7+3 (confirmed by the S1203 trial)
    - CD33+: 7+3 plus Gemtuzumab ozogamicin (age 50-70)
    - FLT3 mutated: 7+3 plus Midostaurin
  - Age 60+
    - Fit:
      - 7+3
      - CD33+: 7+3 plus Gemtuzumab ozogamicin (age 50-70)
      - t-AML or AML with MRC: Liposome encapsulated daunorubucin and cytarabine (age 60-75)
    - Unfit:
      - Low-intensity therapy
Standard treatments for AML

• Relapsed/Refractory
  – High Intensity:
    • FLAG -/+ Ida
    • G-CLAC
    • MEC
    • HiDAC
    • CLAG
  – Low intensity:
    • IDH2 mutation: Enasidenib
    • HMA
    • LDAC
  – Allotransplant
Standard treatments for ALL

• Newly diagnosed
  – AYA (age 15-39)
    • Ph-: Pediatric-inspired multiagent chemotherapy regimen
    • Ph+: Multiagent chemotherapy regimen plus TKI
  – Adult (age 40+)
    • Ph-: Multiagent chemotherapy regimen
    • Ph+: Multiagent chemotherapy regimen plus TKI
• Relapsed/Refractory
  – Blinatumomab
  – Inotuzumab ozogamicin
  – CD19 CAR T-cells (up to age 25)
  – Vincristine sulfate liposome injection
  – Nelarabine (T-ALL)
  – TKI
  – Multiagent chemo -/+ TKI
  – Allotransplant
Clinical Trials for AML and ALL
UCDCCC Acute Myeloid Leukemia Program

New AML Dx

Age < 60

Age ≥ 60 (fit)

Age ≥ 65 (unfit)

Refractory AML

Relapsed or Refractory AML

No Allo-HCT in CR1

NCI#10075 [P1 AMG-232 (MDM2i) plus 10d Decitabine] (P)

INCB053914 [P1/2 INCB053914 (PIM inhibitor) multiple heme histologies] (P)

GMI-1271-201 [P1/2 GMI-1271 (E-Selectin Inhibitor) plus 7+3]

M15-656 (P3 Venetoclax+Azacitidine vs Placebo+Aza)

UCDCC#230 (P2 10d Decitabine plus Bortezomib plus Doxil)

AC220-007 (P3 Quizartinib vs salvage chemo for FLT3-ITD+ only)

ARO-013 (P3 Crenolanib plus chemo vs chemo for FLT3+ AML) (P)

GH29914 (P1b/2 Venetoclax plus MDM2i or Venetoclax plus MEKi)

M14-546 [P1 ABBV-075 (BET inhibitor) plus Venetoclax]

PHI-95 (P1 Ipilimumab plus Decitabine)

GMI-1271-201 [P1/2 GMI-1271 (E-Selectin Inhibitor) plus MEC]

INCB053914 [P1/2 INCB053914 (PIM inhibitor) multiple heme histologies] (P)

V9-2017

Age < 60

Age ≥ 60 (fit)

Age ≥ 65 (unfit)

NL A101 (P2 Cellul ar Therapy to Prevent CIN) (P)

ARO-021 (P3 7+3 plus Crenolanib vs Midostaurin for FLT3+) (P)

PHII-134 (P2 Nivolumab Maintenance vs Surveillance)
UCDCCC Acute Lymphoblastic Leukemia Program

New ALL Dx

Age < 60

- UCDCC#246 (P1 Hyper-CVAD plus Carfilzomib, age 18-65, Ph- B-ALL only)
- UCHMC1401 (P2 multiagent chemotherapy, age 18-60)

Age ≥ 60

Concept in development

Relapsed or Refractory ALL

- UCDCC#266 (P2 Blinatumomab plus Ibrutinib, B-ALL only)
- KTE-C19-103 (P1/2 CAR T-cells, B-ALL only)
Summary

• Exciting time for new FDA therapy approvals for AML and ALL
  – 4 new AML approvals in 2017
  – 3 new ALL approvals in 2017
• SOC for AML and ALL is rapidly evolving
• Clinical trials continue to advance new treatments
Questions?