# AML in Jordan: Analysis According to 2017 European LeukemiaNet Risk Stratification

Khalid Halahleh MD, Mohammad Ma'koseh MD, Isra Murad MD, Ayat Taqash BSc, Anas Zayed MD
King Hussein Cancer Center, Amman, Jordan

## Background

- Cytogenetic features are the main stay to define prognosis and treatment in acute myeloid leukemia (AML).
- Gene mutations detected by next generation sequencing (NGS) were adopted by the European Leukemia Network (ELN) 2017 risk stratification and changed the therapeutic approach.

## Objectives

- To report cytogenetic and molecular features of Jordanian AML patients
- To evaluate the impact of adopting ELN 2017 risk stratification on risk stratification, indications for transplant and survival from a single center in Jordan.

## Materials & Methods

- Adult patients with the diagnosis of AML from January 2009 till June 2021 were included.
- Patients were divided into two cohorts: cohort -1 with no available NGS and cohort -2 with NGS. ELN 2010 and ELN 2017 guidelines were used to risk stratify patients in cohort-1 and cohort-2 respectively.
- Survival analyses were performed using Kaplan-Meier method.

## Results

- 265 subjects were included.
- 135 patients were included in cohort-1 and 130 in cohort -2 . Patients characteristics and treatments are detailed in tables (1) and (2).
- Adoption ELN-2017 to cohort-2 resulted in 9% decrease in the intermediate category and 11% increase in the high risk category.
- Allogeneic stem cell transplant (all-SCT) was done for 84 ( 61.7%) patients in cohort -and 61 (47%) patients in cohort-2.
- After a median follow up of 35 months (range: 2.4-129 months), median overall survival (OS) was 23 months and leukemia free survival (LFS) was 37 months, figure (1).
- 2-year OS and LFS were 50% and 58%, respectively.
- There was no significant difference in the 2-year OS between the two cohorts (54% versus 48%; p=0.129).
- Cohort-2 patients had better LFS (63% versus 51%; p=0.03), and a lower 2-year cumulative incidence of relapse (37% versus 49%, p=0.03).

| Variable | Cohort (1) | Cohort (2) | Total |
|---|---|---|---|
| Gender | | | 165(62%) |
| Male | 57(69%) | 108(59%) | 100(38%) |
| Female | 26(31%) | 74(41%) | |
| Median age and range | 39(18-78) | 42 (19-88) | 41 years (range: 17-88 years) |
| De novo | 72(87%) | 158(87%) | 230(87%) |
| Secondary | 11(13%) | 24(13%) | 35(13%) |
| Favorable | 4(5%) | 40(22%) | 44(16%) |
| Intermediate | 57(68%) | 100(55%) | 157(59%) |
| Poor | 15(18%) | 39(21%) | 54(20%) |
| Unknown | 7(9%) | 3(12%) | 10(3%) |
| WBC | | | |
| >100x109/L | 15(18%) | 26(14%) | 41(15%) |
| <100x10E9/L | 68(82%) | 157(86%) | 224(85%) |
| ELN2017 (N-182) | | | |
| Favorable | --- | 37(20.5%) | 37(20.5%) |
| Intermediate | --- | 84(46%) | 84(46%) |
| Poor | --- | 61(33.5%) | 61(33.5%) |

Table (1) : patients characteristics and risk stratification

| Variable | Cohort (1) | Cohort (2) | Total |
|---|---|---|---|
| High intensity Induction | 119 (88%) | 158(87%) | 240(90%) |
| Low intensity induction | zero | 12(7%) | 12(5%) |
| Number of inductions | | | |
| cycles to | 49(59%) | 104(57%) | 153(58%) |
| One course | 17(20%) | 23(12.6%) | 40(15%) |
| 2 courses | 7(8%) | 6(3.4%) | 13(5%) |
| ≥3 courses CR1 | | | |
| Allo-HCT | 60(72%) | 82(45%) | 142(54%) |
| Total relapses | 53(64%) | 45(25%) | 98(37%) |
| Relapses after allo-HCT | 23(28%) | 22(12%) | 45(17%) |
| Alive | 23(28%) | 73(40%) | 96(36%) |
| Dead | 60(72%) | 109(60%) | 169(64%) |

Table (2) : Treatment and outcomes

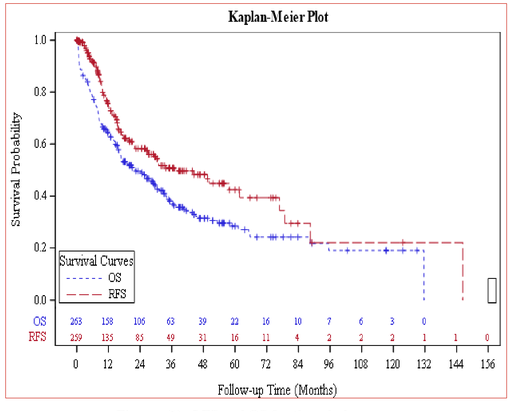



Figure (1) : LFS and OS for the whole group

## Conclusions

Adoption of ELN-2017 risk stratification in Jordanian AML patients markedly increased the percentage of patients in the high risk categories and probably resulted in better selection of patients for consolidation with allogeneic stem cell transplant as well as better leukemia free survival .