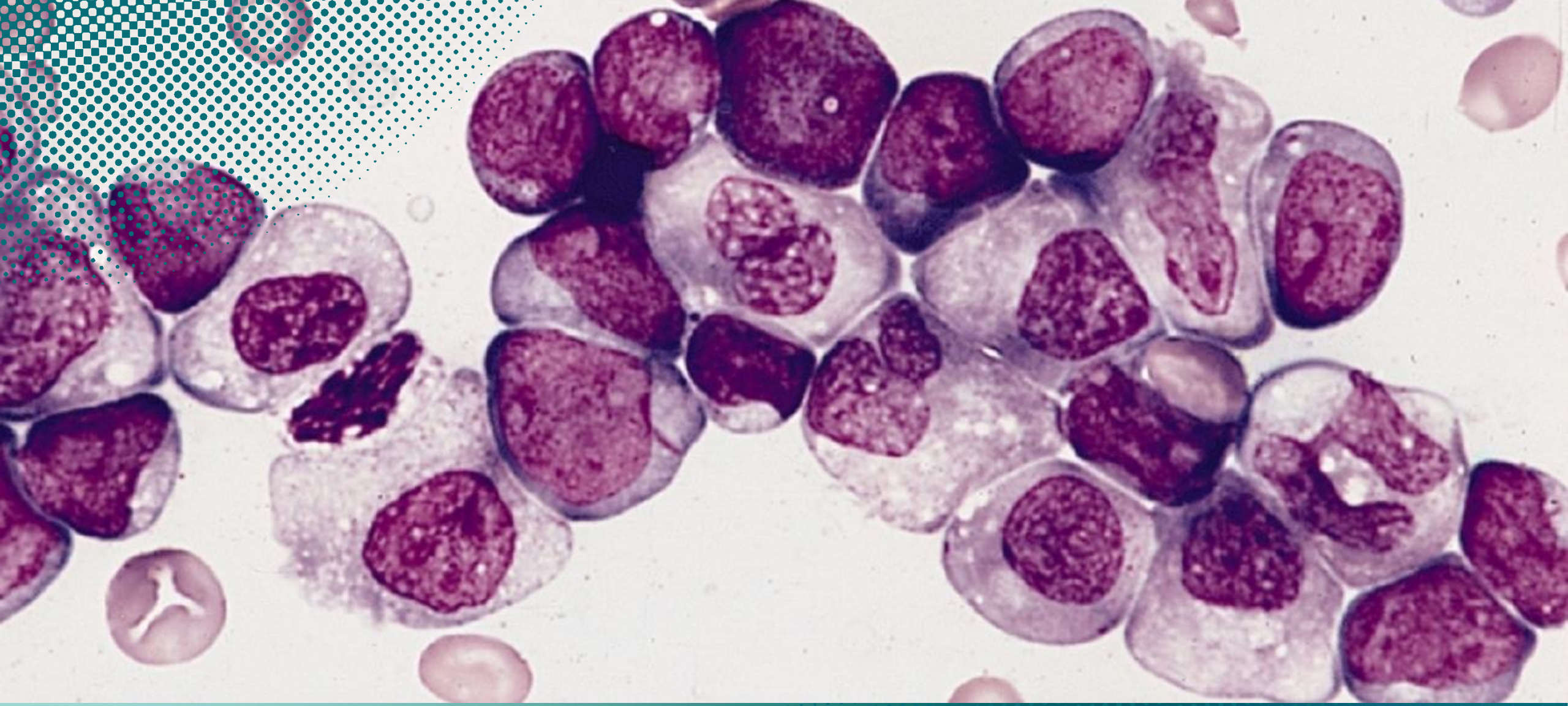

Acute Myeloid Leukemia (AML):
Diagnostic Criteria, Drug Failures, and Trial Improvement Strategies

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Introduction

Acute Myeloid Leukemia (AML) is a life-threatening form of leukemia characterized by the rapid growth of abnormal white blood cells that accumulate in the bone marrow and interfere with the production of normal blood cells.

Acute Myeloid Leukemia is the most common type of acute leukemia in adults, although it also affects children. AML requires immediate medical attention due to its aggressive nature, and its management often involves complex treatment strategies

The understanding of AML has evolved significantly over the last few decades. Initially, treatments were non-specific and primarily palliative. The introduction of chemotherapy in the mid-20th century marked a significant advancement, although survival rates remained low. The classification of AML into subtypes based on the French-American-British (FAB) system in the 1970s further refined diagnostic and treatment strategies by categorizing the disease based on the morphology and maturity of affected cells. Recent years have seen a shift towards more targeted therapies, driven by deeper molecular and genetic insights.

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Key Characteristics and an Evolving Understanding

Key Characteristics

AML originates in the myeloid line of blood cells, which forms white blood cells (other than lymphocytes), red blood cells, or platelets. Key characteristics include fatigue, fever, bleeding, and increased infection risk due to a lack of normal blood cells. Diagnosis is confirmed through blood tests, bone marrow biopsy, and cytogenetic analysis. AML is known for its heterogeneity, presenting a range of genetic mutations and molecular abnormalities, which influence both prognosis and treatment approaches.

Contributing Factors

- **Biological Factors:** Genetic mutations play a crucial role, with common mutations including FLT3, NPM1, and CEBPA. Familial predisposition is also noted, although less common. Age is a significant risk factor; the incidence of AML increases with age, particularly in individuals over 65.
- **Psychological Factors:** While less directly impactful, the psychological burden of AML diagnosis and treatment can affect patient outcomes. Stress and mental health have indirect effects on immune function and may influence the efficacy of treatment or recovery.
- **Environmental Factors:** Exposure to certain chemicals, such as benzene and some chemotherapy agents, has been linked to increased risk of developing AML. Radiation exposure is another risk factor, notably among survivors of atomic bombings and nuclear reactor accidents.

Evolution Over Time

The understanding of AML's contributing factors has grown with advances in medical technology and research methodologies. Initially viewed as a uniform disease, AML is now recognized as a complex group of disorders, each with distinct genetic and molecular features.

This evolution has led to the development of targeted treatments and personalized medicine approaches, aiming to improve outcomes based on individual patient profiles. The integration of genetic testing into routine diagnostics represents a paradigm shift, allowing for more precise subtype classification and tailored therapeutic strategies. This precision medicine approach continues to evolve, promising new avenues for effective treatment and potential cures.

Diagnostic Evolution and Criteria

ICD-11 Codes for AML

Acute Myeloid Leukemia is classified under the ICD-11 code 2A60. This code encompasses several subtypes based on morphological, immunophenotypic, genetic, and clinical features.

Acute myeloid leukemia is characterized by clonal expansion of myeloid blasts in the peripheral blood and bone marrow. Clinical manifestations are fever, pallor, anemia, hemorrhages and recurrent infections.

Diagnostic Criteria

The diagnosis of AML involves a combination of clinical presentation, laboratory findings, and sophisticated testing. A definitive diagnosis requires the identification of at least 20% blasts in the bone marrow or blood, as per the World Health Organization (WHO) criteria. This criterion helps differentiate AML from other related blood disorders. Diagnostic procedures include complete blood count (CBC), blood smear, bone marrow aspiration and biopsy, cytogenetic analysis, and molecular genetic testing. These tests help in identifying specific genetic mutations and chromosomal abnormalities associated with various subtypes of AML, which can influence both prognosis and treatment choices.

Evolution of Diagnostic Criteria

The initial classifications for AML were based purely on morphological observations of leukemic cells under a microscope. With advancements in technology, the focus has shifted towards a more comprehensive classification based on genetic, molecular, and immunophenotypic characteristics. The introduction of the WHO classification system has integrated all these aspects, significantly enhancing the accuracy of diagnosis and the effectiveness of subsequent treatment protocols.

Impact on Clinical & Research Perspectives

Clinically, the ability to identify specific subtypes of AML allows for more targeted therapies. For instance, the identification of the FLT3 mutation in certain patients can lead to the use of FLT3 inhibitors, which are more effective against cells harboring this mutation.

From a research perspective, the detailed classification and understanding of AML have opened new avenues for exploring targeted treatments and novel therapeutic agents. Researchers are now able to design studies that not only test the efficacy of treatments but also explore which subtypes respond best to specific interventions.

Epidemiological Landscape of AML

Demographic Factors

- **Age:** Primarily a disease of older adults, AML has a median diagnosis age of about 68 years. This factor is not only a risk indicator but also influences prognosis and treatment decisions.
- **Racial and Ethnic Groups:** Studies in the US show that Caucasian people are generally at higher risk compared to African American and Asian American people. These variations can be attributed to genetic differences, lifestyle factors, and possibly differences in exposure to risk factors.
- **Gender:** Men are slightly more likely to develop AML than women. The reasons for this disparity are not fully understood but may relate to genetic differences or exposure to risk factors.

Genetic Predisposition

- **Genetic Mutations:** Several genetic mutations are known to increase the risk of developing AML. These include mutations in the FLT3, TP53, and NPM1 genes. The presence of these mutations also affects the course of the disease and response to treatment.
- **Familial Risk:** Although most cases of AML are sporadic, having a family history of AML or other hematological malignancies can increase the risk. This suggests a hereditary component to susceptibility, which may involve multiple genes.

Geographic Distribution

AML incidence varies geographically, which can reflect differences in genetic, environmental, and lifestyle factors. Industrialized countries tend to have higher rates of AML, which some researchers speculate may be linked to higher life expectancies and greater exposure to environmental carcinogens. However, data collection and reporting practices also vary widely across regions, which can affect the apparent incidence and prevalence rates.

Environmental and Lifestyle Factors

- **Chemical Exposure:** Exposure to certain chemicals, particularly benzene and certain alkylating chemotherapy agents, is well-documented as a risk factor for AML. This is of particular concern in industrial settings and for patients who have undergone chemotherapy for other cancers.
- **Radiation Exposure:** People exposed to high levels of ionizing radiation, such as survivors of nuclear events and patients treated with radiation therapy for other cancers, are at increased risk of developing AML.
- **Smoking:** Tobacco smoke contains benzene and other known carcinogens that have been linked to AML. Smoking is a modifiable risk factor.

Pivotal Endpoints for AML Clinical Trials

In Acute Myeloid Leukemia clinical trials, the selection and validation of endpoints are crucial for assessing the efficacy and safety of treatments. These endpoints must accurately reflect meaningful clinical outcomes to ensure that the results of trials are both scientifically valid and clinically relevant.

1. Complete Remission:

CR is defined by the absence of visible leukemic cells in the bone marrow (<5% blasts), no evidence of disease in the blood, and recovery of normal hematopoietic function.

2. Overall Survival:

OS is the most definitive endpoint, measuring the length of time from either the date of diagnosis or the start of treatment that patients diagnosed with AML are still alive.

3. Event-Free Survival:

EFS is defined as the time from the start of the treatment until the occurrence of any of the following events: lack of complete remission, relapse, or death from any cause.

4. Relapse-Free Survival:

For patients in complete remission, RFS measures the time until the disease returns or the patient dies from any cause. This is crucial for assessing remission durability post-treatment.

5. Minimal Residual Disease (MRD) Negativity:

MRD negativity is a measure of the number of cancer cells that remain in the patient after treatment and is a strong predictor of relapse and survival.

6. Quality of Life Measures:

Quality of life metrics are crucial, particularly in AML, where treatments can be harsh, and the disease significantly impacts patients' day-to-day living.

7. Time to Hematologic Recovery:

Recovery time for normal blood cell counts post-treatment. It is important for evaluating how quickly patients can recover from the myelosuppressive effects of AML treatment.

8. Time to Next Treatment:

TNT is a measure of how long after initial therapy a patient can go before requiring the next line of treatment, indicating the durability of the initial treatment response.

Challenges in Determining Endpoints in AML Clinical Trials

1. Complete Remission:

The primary challenge in determining CR lies in the variability of blast cell counts in bone marrow assessments, which can be subjective and differ between observers. Additionally, recovery of normal hematopoietic function varies among patients, complicating assessments of remission status.

2. Overall Survival:

OS can be difficult to measure accurately due to loss to follow-up or differing causes of death that may not be directly related to AML. Furthermore, the impact of subsequent therapies post-trial can confound results.

3. Event-Free Survival:

Defining what constitutes an 'event' (e.g., relapse, progression, death) can vary, leading to inconsistencies in EFS measurements. The sensitivity of detecting relapse or progression can also affect EFS accuracy.

4. Relapse-Free Survival:

The main challenge with RFS is the detection of relapse, which depends on the sensitivity of the diagnostic methods used. Subclinical relapses can go undetected, affecting the accuracy.

5. Minimal Residual Disease:

The heterogeneity of AML means that not all patients will have identifiable molecular markers for MRD assessment. Additionally, the sensitivity and specificity of MRD detection methods can vary, potentially leading to under or overestimation of disease burden.

6. Quality of Life Assessments:

Quality of Life is inherently subjective and can vary greatly from patient to patient based on personal perceptions, cultural background, and individual patient experiences.

7. Time to Hematologic Recovery:

Recovery times can vary significantly based on individual factors like age, overall health, specific AML characteristics, and treatment type. These are challenging to monitor and frequent monitoring of hematologic recovery requires robust logistics and can be resource-intensive in a clinical trial setting.

8. Time to Next Treatment:

Efficiently tracking when subsequent treatments are initiated can be challenging, especially in multi-center or long-term studies where patients may receive care from different providers.

Five FDA-Approved Drugs for AML

Drug Name	Year of Approval	Sponsor	Mechanism of Action	Therapeutic Effects
Azacitidine	2004 (approved for MDS)	Celgene Corporation	DNA methylation inhibitor	Induces cell differentiation and apoptosis
Decitabine	2006	Eisai Co.(MGI Pharma, Inc)	DNA methylation inhibitor	Promotes cell cycle arrest and apoptosis
Midostaurin	2017	Novartis Pharmaceuticals	FLT3 inhibitor	Inhibits signaling pathways in cancer cells
Cytarabine	1969	Bedford Laboratories	Pyrimidine analog, inhibits DNA synthesis	Induces DNA damage, leading to cell death in leukemic cells
Daunorubicin	1968	Pfizer Inc.	Anthracycline, intercalates DNA and inhibits enzymes	Inhibits DNA and RNA synthesis, causing cell death

Approved Product Analysis of VIDAZA

Myelodysplastic Syndromes (MDS)

Cut off: Adult patients with any of the five FAB subtypes of myelodysplastic syndromes (MDS): refractory anemia (RA), RA with ringed sideroblasts (RARS), RA with excess blasts (RAEB), RAEB in transformation (RAEB-T), and chronic myelomonocytic leukemia (CMMoL).

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients with MDS (FAB subtypes)	Response rate to VIDAZA treatment compared to observation	Complete Response (CR) and Partial Response (PR) as defined: Marrow and Peripheral Blood criteria	Treatment cycles (every 4 weeks, adjusted after 2 cycles if no effect)	N=191 (after excluding 19 with AML)	Response rate as primary endpoint; 55% in observation arm crossed over to VIDAZA

Juvenile Myelomonocytic Leukemia (JMML)

Cut off: Patients with newly diagnosed JMML(diagnosis confirmed in peripheral blood and bone marrow, and one of the following: somatic mutation in PTPN11, KRAS, or NRAS and HbF % > 5 x normal value for age, or clinical diagnosis of neurofibromatosis Type 1 (NF-1).

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Pediatric patients (0.2-6.9 years) with Juvenile Myelomonocytic Leukemia	Efficacy of VIDAZA prior to HSCT	International JMML response criteria	3 months (Cycle 3 Day 28)	N=18	50% (9/18) confirmed clinical response (3 cCR, 6 cPR); median time to response 1.2 months

Approved Product Analysis of DACOGEN

Controlled Trial in Myelodysplastic Syndrome

Cut off: Adult patients with myelodysplastic syndromes (MDS) meeting French-American-British (FAB) classification criteria and International Prognostic Scoring System (IPSS) High-Risk, Intermediate-2 and Intermediate-1 prognostic scores.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients with MDS (FAB and IPSS High-Risk, Intermediate-2, Intermediate-1)	Overall response rate (CR + PR) and time to AML or death	MDS International Working Group (IWG) criteria	Every 6 weeks; assessments at ≥8 weeks	N=170 (83 received DACOGEN, 81 received SC only, after excluding AML cases)	17% overall response in DACOGEN group vs. 0% in SC group

Single-arm Studies in Myelodysplastic Syndrome

Cut off: MDS patients with any of the FAB subtypes.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients with MDS (FAB and IPSS classifications)	Overall response rate (CR + PR) and duration of response	MDS International Working Group criteria	1 cycle = 4 weeks; response assessed periodically	N=99	16% overall response rate; median time to response 162 days; median duration of response 443 days

Approved Product Analysis of RYDAPT

Study 1 – Acute Myeloid Leukemia

Cut off: Patients with newly-diagnosed FLT3-mutated AML.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients (18-60 years) with newly-diagnosed FLT3-mutated AML	Overall survival (OS) and event-free survival (EFS)	Overall survival and event-free survival measured from the date of randomization	Minimum follow-up of 3.5 years after last patient randomized	N=717 (RYDAPT n=360, Placebo n=357)	OS HR 0.77 (95% CI 0.63, 0.95), p=0.016; Median EFS improved to 8.2 months for RYDAPT vs 3.0 months for placebo; exploratory EFS 10.6 months vs 5.6 months

Study 2 – Systemic Mastocytosis

Cut off: Patients with advanced SM, including aggressive SM, SM with associated hematological neoplasm, and mast cell leukemia.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients with advanced SM (ASM, SM-AHN, MCL)	Efficacy (CR + ICR) and Overall Response Rate	Modified Valent Criteria, Modified IWG-MRT-ECNM Criteria	6 cycles of RYDAPT	Evaluable: N=89 (Total enrolled: N=116)	CR + ICR: 21%; Overall Response: 17%

Study 3 – Systemic Mastocytosis

Cut off: Patients with advanced SM.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adult patients with advanced SM (SM-AHN, MCL)	Efficacy (Major and Partial Responses)	Valent Criteria per investigator assessment	At least 2 cycles of treatment; Response sustained for at least 8 weeks	N=26 (SM-AHN n=17, MCL n=6)	SM-AHN: 59% response rate (1 partial, 9 major); MCL: 33% response rate (1 partial, 1 major)

Approved Product Analysis of DepoCyt®

Study 1 – Solid Tumors, Lymphoma, or Leukemia

Cut off: Patients with Lymphoma.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Lymphoma Patients	Complete Response Rate	Examination of CSF for malignant cells, Neurological progression	4 weeks after treatment initiation	N=33 (17 DepoCyt, 16 cytarabine)	Higher complete response rate in DepoCyt group, Median overall survival: DepoCyt 99.5 days vs. cytarabine 63 days

- Total Patients in Study: N=99 includes all patients with solid tumors, lymphoma, or leukemia who participated in the study.
- Specific Subgroup of Interest: N=33 refers specifically to the lymphoma patients who were directly compared for the complete response rates – 17 patients received DepoCyt and 16 received cytarabine. This subgroup summarizes the efficacy and outcomes related specifically to lymphoma treatment

Study 2 – Lymphoma

Cut off: Patients with either solid tumors or lymphomas.

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Lymphoma Patients with Meningitis	Complete Cytological Response	Examination of CSF for malignant cells	6 induction cycles of 2 weeks each, followed by 4 maintenance cycles of 4 weeks each	N=24 (12 DepoCyt, 12 cytarabine)	Complete cytological response: DepoCyt 4/12 (33%) vs. cytarabine 2/12 (17%)

Approved Product Analysis of VYXEOS

Cut off: Patients aged 60-75 years with newly diagnosed therapy-related AML (t-AML) or AML with myelodysplasia-related changes (AML-MRC).

Population	Endpoint	Scales Used	Time Point	Sample Size	Magnitude of Improvement
Adults 60-75 years with newly-diagnosed t-AML or AML-MRC	Overall Survival (OS) and Complete Response (CR) Rates	Kaplan-Meier method for OS; CR assessment	Randomization to death from any cause	N=309 (VYXEOS n=153, 7+3 n=156)	OS: Median 9.6 months vs. 5.9 months; HR 0.69 (95% CI 0.52, 0.90), p=0.005; CR Rate: 38% vs. 26%, p=0.036

Analysis of Failed AML Drug Candidates Over the Last Decade

Name of Drug	Clinical Trial Identifier	Reason for Termination / Drug Failure	Analysis of Trend Pattern
Sapacitabine	NCT01303796	Lack of efficacy in phase III	Although this trial was completed, the regimen of decitabine administered in alternating cycles with sapacitabine was active but did not significantly improve OS compared with decitabine monotherapy. Increased focus on combination therapies may be beneficial.
Vosaroxin	NCT01191801	Failed to meet primary endpoint of improved survival	Highlights the need for more potent or targeted agents in AML, possibly with better patient stratification.
Volasertib	NCT01721876	Safety concerns and lack of efficacy	Points to the importance of balancing efficacy with tolerable safety profiles, while the overall survival results at the primary analysis showed a negative trend for VOLA+LDAC compared with PBO+LDAC, there was no difference between the treatment arms in the final analysis

Unique Clinical Trial Failure Points in Acute Myeloid Leukemia

Clinical trials for AML encounter specific challenges, which can lead to unique failure points. The complexity arises from the disease's heterogeneity, severity, and varying patient responses to treatment. Identifying and addressing these failure points is essential.

1. Heterogeneity of the Disease:

AML is characterized by a wide variety of genetic mutations and cytogenetic abnormalities. This diversity impacts the disease's progression and response to treatment.

Many trials may not account for this heterogeneity in their design, leading to underpowered studies that fail to detect treatment effects. Trials often use broad inclusion criteria that do not consider specific genetic or molecular profiles.

2. Relapse and Resistance:

Relapse rates are high in AML, and many patients develop resistance to treatments, which can occur during the trial, leading to its failure.

Traditional trial designs may not adequately anticipate or manage the occurrence of resistance, often failing to include secondary treatment strategies or salvage therapies in the protocol.

3. Age and Comorbidity Factors:

AML predominantly affects older adults who often have significant comorbidities, affecting their ability to tolerate aggressive therapies used in clinical trials.

Many AML trials have strict eligibility criteria that exclude older patients or those with comorbid conditions, which can skew results and limit the applicability of trial findings to the general patient population.

4. Endpoints and Outcome Measures:

Selecting appropriate endpoints that meaningfully reflect clinical benefits in AML can be challenging, especially with the disease's rapid progression and potential for sudden changes.

Traditional survival endpoints such as Overall Survival may not fully capture the benefits of new therapies, especially if the trial duration is not aligned with the typical disease progression timeline.

Safety Concerns and Standard of Care Treatment Options for AML

Safety Concerns

- **Myelosuppression:** Nearly all AML treatments can cause profound myelosuppression, where bone marrow activity is significantly reduced, leading to neutropenia, anemia, and thrombocytopenia.
- **Infection:** Due to neutropenia, patients are at a high risk of bacterial, fungal, and viral infections, which can be life-threatening. The use of central venous catheters and the hospital environment contribute to this risk.
- **Organ Toxicity:** Chemotherapy agents and targeted therapies can cause toxicity in various organs. For example, anthracyclines used in AML can lead to cardiotoxicity, while cytarabine can cause cerebellar syndromes and lung toxicity.
- **Graft-versus-Host Disease (GvHD):** In patients undergoing allogeneic stem cell transplantation, GvHD is a significant risk, where the donor immune cells attack the patient's body, leading to severe complications.
- **Treatment-Related Mortality:** The aggressive nature of treatments and the vulnerability of the AML population contribute to a non-negligible treatment-related mortality rate.

Standard of Care Treatments

- **Chemotherapy:** Initial treatment usually involves induction chemotherapy aimed at achieving complete remission. This typically includes a combination of cytarabine with an anthracycline. Post-remission or consolidation therapy is used to eliminate remaining leukemic cells and reduce relapse risk.
- **Targeted Therapy:** For patients with specific genetic mutations, targeted therapies can provide significant benefits. For instance, FLT3 inhibitors like midostaurin are used for patients with FLT3 mutations, and IDH1/2 inhibitors are employed for those with IDH1/2 mutations.
- **Stem Cell Transplantation:** In selected patients, particularly those at high risk of relapse or with relapsed disease, allogeneic stem cell transplantation offers a potential cure. This procedure, however, comes with its risks, including GvHD and a prolonged recovery period.
- **Supportive Care:** Due to the high risk of infection and other complications, supportive care is critical. This includes the use of growth factors, transfusions, antibiotics, antifungals, and antiviral agents, as well as intensive monitoring and supportive measures in intensive care settings when necessary.

Enhancing Clinical Trial Protocols for Acute Myeloid Leukemia

1. Enhancing Trial Design:

- **Patient Stratification:** Incorporate precision medicine strategies by stratifying patients based on genetic, molecular, and phenotypic characteristics.
- **Adaptive Trial Designs:** Utilize adaptive trial designs that permit modifications based on interim analysis results.
- **Inclusion of Novel Endpoints:** Expand the use of novel and more sensitive endpoints, such as Minimal Residual Disease negativity, which may provide early indications of treatment effectiveness.

2. Incorporating Real-World Data:

- **Use of Real-World Evidence:** Leverage real-world data and evidence to inform trial design and to support clinical trial data, particularly in post-marketing studies. This includes data from electronic health records, previous studies, and registries.
- **Comparative Effectiveness Research:** Include arms that compare new treatments with standard-of-care therapies, utilizing real-world effectiveness data to contextualize trial findings within the broader treatment landscape.

3. Regulatory Compliance and Communication:

- **Early and Ongoing FDA Engagement:** Engage with the FDA from early phases of clinical trial design through frequent presubmission meetings and utilize the FDA's guidance on trial design for AML.
- **Transparency and Documentation:** Maintain rigorous documentation and data integrity standards to ensure that all aspects of the trial are transparent and verifiable, crucial for audits.
- **Patient Safety Monitoring:** Promptly identifying safety issues and adjusting trial parameters to safeguard participants.

4. Innovative Methodologies:

- **Digital Health Technologies:** Integrate digital health tools, such as wearable devices and mobile health applications, to continuously monitor patient health metrics and treatment responses.
- **Simulation and Modeling:** Use pharmacometric modeling and simulation to predict trial outcomes based on preclinical and early clinical data. This approach can optimize dosing regimens and identify potential issues before larger scale trials.

Notable Key Opinion Leaders in AML Research

Name	Specialty	Designation	Location	Brief Bio
Dr. Peter T Tan (MBBS, MPhil, FRACP, FRCPA)	Hematology; Oncology	Consultant hematologist, Western hematology and Oncology Clinics	Western Australia	Dr. Peter T. Tan specializes in hematological oncology and general hematological conditions including obstetric hematology, bleeding, and clotting disorders. Dr. Tan has made significant contributions to the field of hematology, particularly in clinical and translational research in blood cancers. Dr. Tan was involved as a principal investigator in clinical trials at the Perth Blood Institute and has worked on national clinical trials conducted by the Australasian Leukemia and Lymphoma Group (ALLG).
Dr. Draga Barbaric (MD, Mmed)	Pediatric Hematology -Oncology	Pediatric Oncologist, Sydney Children's Hospital Randwick	NSW, Australia	Dr. Draga Barbaric is a distinguished pediatric oncologist specializing in the treatment of childhood cancers. Barbaric holds a Master of Medicine research degree, where her research focused on the molecular pathogenesis of childhood acute leukemia. She has an extensive background in clinical trials, notably serving as the Australian National Coordinator for the international AIEOP-BFM 2009 Treatment Protocol for Children and Adolescents with Acute Lymphoblastic Leukemia. Her research includes focus on children with Down Syndrome affected by leukemia.
Prof. Jayesh Desai (MBBS, FRACP)	Medical Oncology	Associate Professor, Peter MacCallum Cancer Centre	Victoria	Professor Jayesh Desai is a prominent Medical Oncologist. Professor Desai also holds the position of Deputy-Director of the Parkville Cancer Clinical Trials Unit (PCCTU) and leads the Phase 1/Early Drug Development program. Professor Desai was appointed Chairperson of the Cancer Trials Australia Board of Directors in August 2021, reflecting his extensive involvement and leadership in cancer research and clinical trials. His work has significantly impacted Australian cancer research, contributing to advancements and understanding.
Dr. Andrew Nicol (MBBS, PhD, FRACP, FRCPA)	Hematology; Oncology	Clinical Hemato-Oncologist, Greenslopes Private Hospital	Queensland, Australia	Dr. Andrew Nicol is a clinical hematologist and hemato-oncologist currently based at Greenslopes Private Hospital in Queensland, Australia. He has specialized interests in lymphoma, myeloma, and leukemia. Throughout his career, Dr. Nicol has established several key medical programs, including the Brisbane Clinic for Lymphoma, Myeloma and Leukemia, which focuses on providing specialized treatment and facilitating access to new therapies through clinical trials. Dr. Nicol also held positions as the Chairman of hematology and Oncology and Director of Stem Cell Transplantation at Greenslopes Private Hospital.
Dr. Pratyush Giri (MBBS, FRACP, FRCPA)	Hematology; Oncology	Consultant clinical and laboratory hematologist, Royal Adelaide Hospital	South Australia	Dr. Pratyush Giri specializes in hematology and has a notable expertise in lymphoma, being the clinical co-lead of the lymphoma program at these institutions. Dr. Giri has made significant contributions to the field of hematology, particularly through his role in clinical research. He is a principal investigator for several national and international clinical trials focusing on lymphoproliferative disorders and chronic leukemias.

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If you would like further information on how iNGENū CRO can assist you to conduct your clinical trial, please contact Dr Sud Agarwal or Adam Moodie:

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