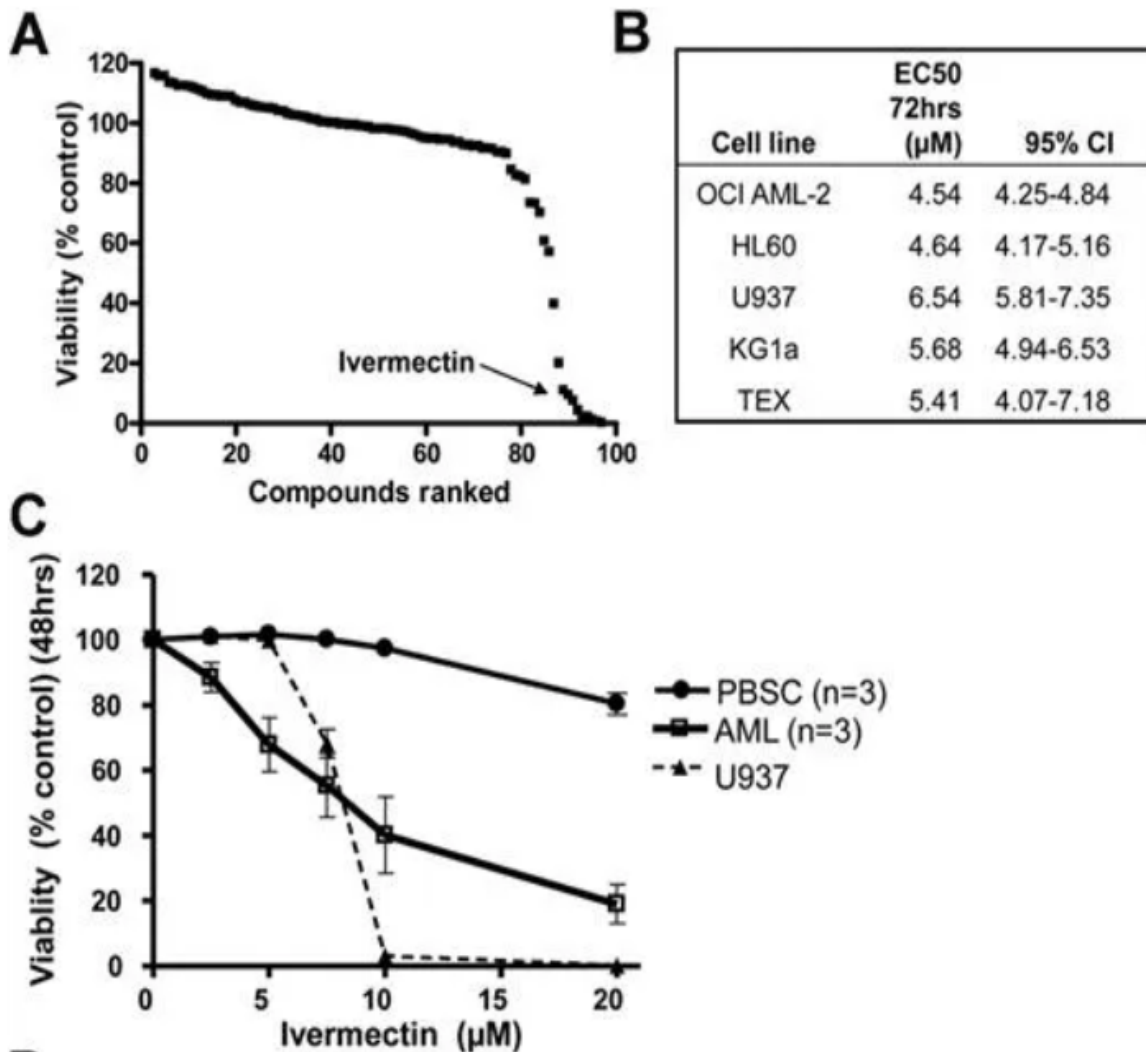
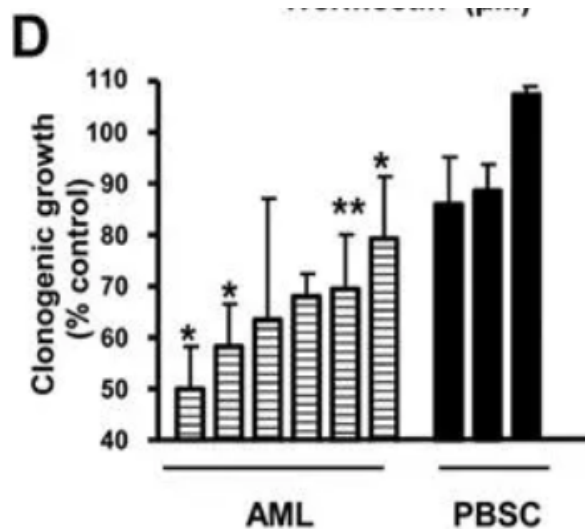


# IVERMECTIN - powerful repurposed agent against Acute Myeloid Leukemia (AML) and other Leukemias.



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**2010 Sharmeen et al - The antiparasitic agent ivermectin induces chloride-dependent membrane hyperpolarization and cell death in leukemia cells**

“To identify known drugs with previously unrecognized anticancer activity, we compiled and screened a library of such compounds to identify agents cytotoxic to leukemia cells. From these screens, we identified IVERMECTIN”

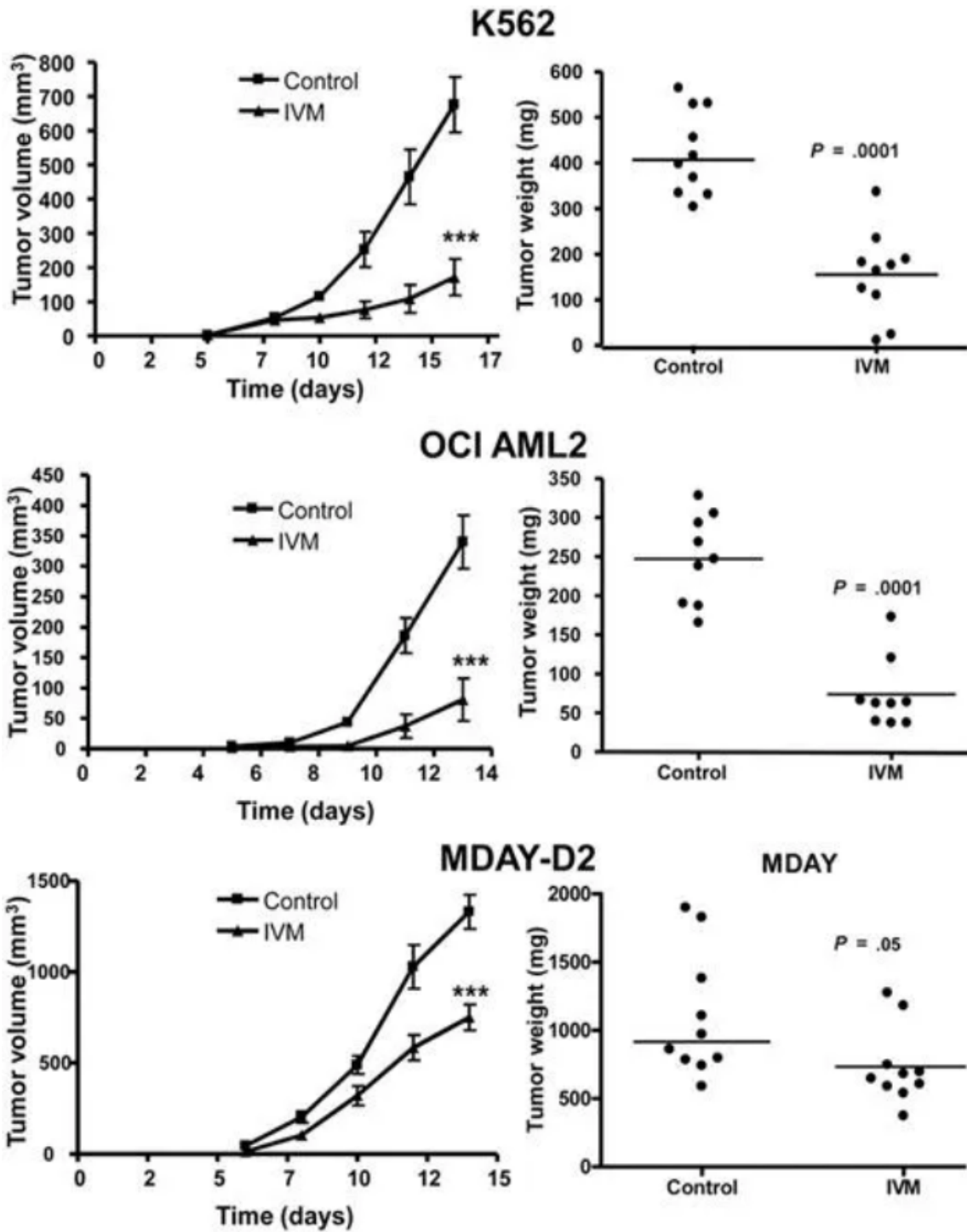
“As a potential antileukemic agent, ivermectin induced cell death at low micromolar concentrations in acute myeloid leukemia cell lines and primary patient samples preferentially over normal hematopoietic cells.”

“Ivermectin also delayed tumor growth in 3 independent mouse models of leukemia at concentrations that appear pharmacologically achievable.”

“given its known toxicology and pharmacology, ivermectin could be rapidly advanced into clinical trial for leukemia.”

(Nice thought, but Big Pharma has no interest in doing that!)

**IN VIVO: Ivermectin delays tumor growth and reduces tumor mass in leukemia mouse xenografts.**



## IVERMECTIN in Human Leukemia Patients

“Although no prior clinical studies have directly evaluated ivermectin as an anticancer agent, a case report suggests that ivermectin may have activity in the treatment of leukemia.”

**2006 Yonekura et al** - Crusted scabies in an adult T-cell leukemia/lymphoma patient successfully treated with oral ivermectin

An adult male with T-cell leukemia/lymphoma presented with a generalized pruritic, erythrodermic rash with areas of hyperkeratosis and was diagnosed with scabies.

He received 200 µg/kg Ivermectin on days 1 and 10 with complete resolution of the rash. While not a focus of the paper, it is possible that a component of the patient's rash may have been due to leukemia and this rash responded to ivermectin. Moreover, the leukemia cells in the peripheral blood were controlled while receiving ivermectin.

## **2020 de Castro - Continuous high-dose ivermectin appears to be safe in patients with acute myelogenous leukemia and could inform clinical repurposing for COVID-19 infection**

“There is no experience in using ivermectin continuously and for a prolonged period of time at higher dose that would be necessary to achieve micromolar plasma concentrations. In this context, we feel that our experience in treating three patients with acute myeloid leukemia (AML) with ivermectin may encourage clinical testing of this widely available drug for COVID-19 repurposing research.”

Case 1 - 11 year old boy diagnosed with AML, relapsed two years after Stem Cell Transplantation, was treated with two different salvage chemo without response.

- we decided to proceed with continuous once daily low dose cytarabine in combination with IVERMECTIN, 1 mg/kg once daily (60 mg/day). No objective marrow response was noted, nonetheless the patient started feeling better and his blasts cleared from the peripheral blood
- “The patient received another line of treatment with bendamustine, without any benefit”
- “we decided at this time to resume Ivermectin 1 mg/kg continuously daily, which the patient received for another six months”
- Ten months after receiving the first dose of ivermectin the patient progressed and died

“he had stable disease for a surprisingly long period of time.”

Case 2 - 13 year old boy with primary refractory AML, failed to respond to two lines of frontline chemotherapy

- We treated this patient with a combination of ivermectin 1 mg/kg/day for 14 days, cytarabine 75 mg/m<sup>2</sup> for 10 days, and G-CSF 300 lg for 10 days. This patient achieved a complete bone marrow remission by morphology after the first cycle of this regimen but relapsed after a third cycle

Case 3 - 5 year old girl with AML received conventional AML induction therapy and relapsed one year later.

- She failed to achieve a second remission despite two lines of salvage chemotherapy.
- At that point, we administered ivermectin (1 mg/ kg/day) for 15 days, without response, but also without side effects related to ivermectin, and the patients died from progressive disease

**Table 1.** Patients characteristics.

Age/gender	Cytogenetics	Molecular findings	Previous chemo lines	Ivermetin schema*	Best response
11 y male	Normal	ND	1 BMT 2 (1) <sup>a</sup>	Ivermectin 14 days + Ara-c 10 days; Ivermectin alone for 6 months	Stable disease for 6 months in an outpatient setting
13 y male	Normal	<i>FLT3</i> neg <i>NPM1</i> neg	2	Ara-c – G-CSF – ivermectin 14 days (3 cycles)	Complete hematologic recovery and morphologic remission after 1 cycle
5 y female	t(8;21) (q22;q22.1),	<i>FLT3</i> neg <i>NPM1</i> neg	2	Ivermectin for 14 days	No response

Legends: y: year old, ND: Not done; BMT: Bone marrow transplantation; Ara-c: Cytarabine; G-CSF: Granulocyte colony-stimulating factor.

\*All ivermectin doses were 1 MG/kg once daily.

<sup>a</sup>After the first ivermectin plus ara-c the patient received bendamustine in a clinical trial.

“These cases, although anecdotal, indicate that high doses of ivermectin can be safely administered for a prolonged period of time, alone or in combination with chemotherapy, in pediatric patients with refractory AML, and suggest that ivermectin should be systematically explored in AML.”

## **My Take...**

Ivermectin is a powerful anti-Leukemia agent.

The 2020 study by deCastro et al showed safe use of High Dose Ivermectin at 1mg/kg/day in children ages 5 to 13 years old, for at least 6 months.

Although the children ultimately died, Ivermectin was able to control the leukemia to a degree, AFTER all other chemotherapies had already FAILED.

That's stunning.

**Ivermectin halted leukemia in situations where no chemotherapy could.**