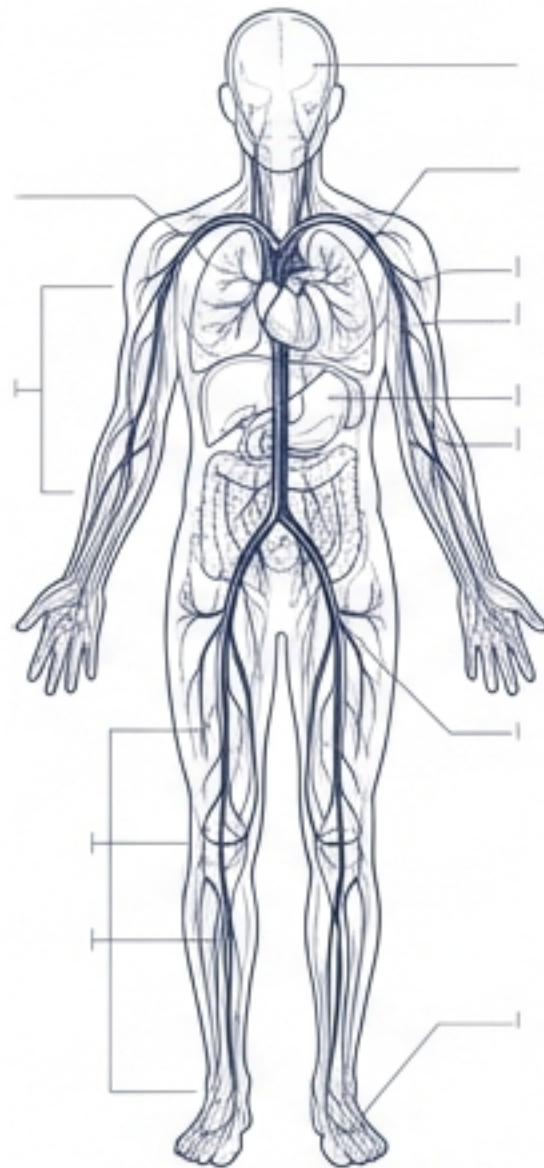


Decades of oncology have traded efficacy for severe toxicity, destroying the quality of life we aim to save.

The Human Cost



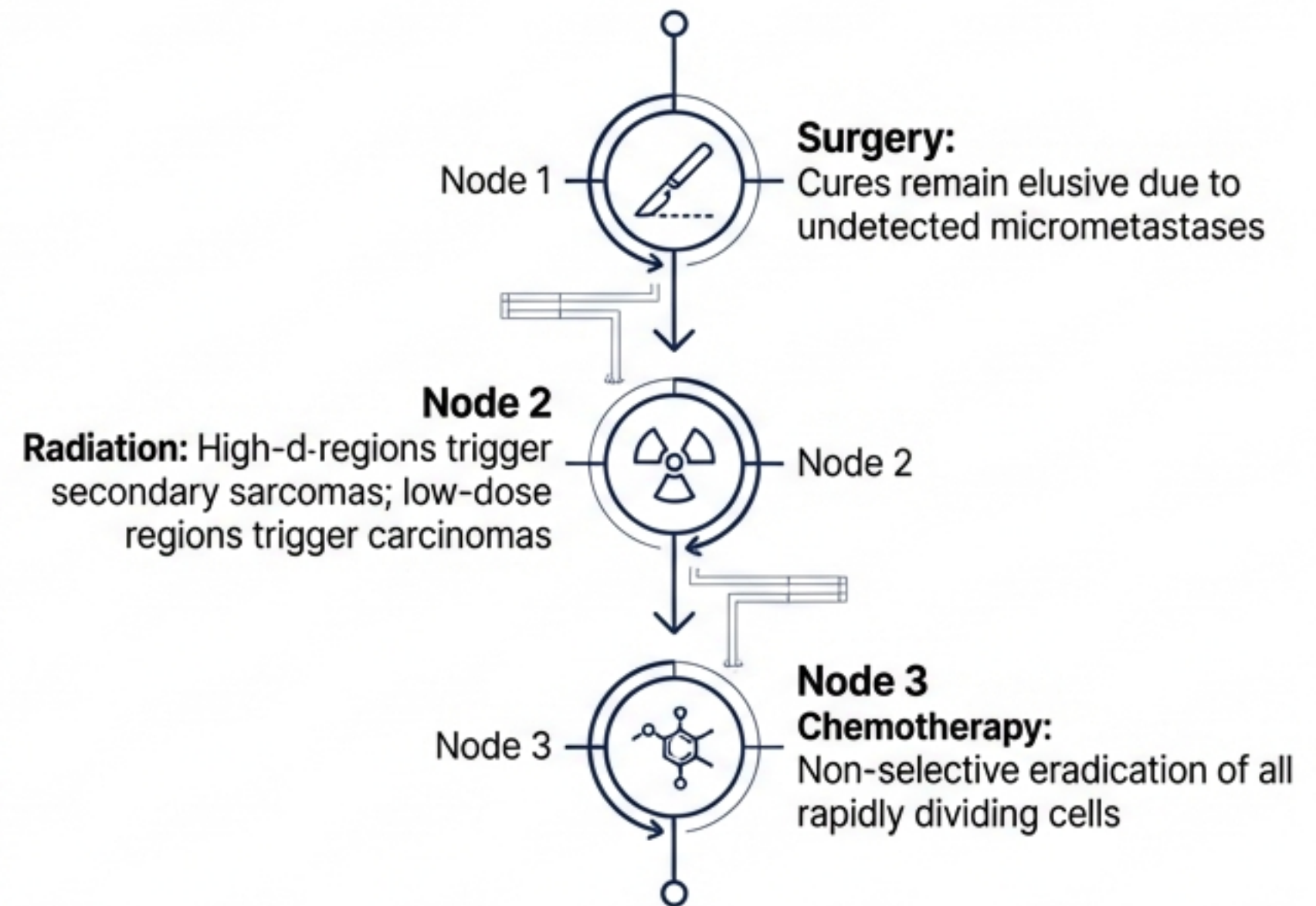
For patients like Lauren—a mother diagnosed with Stage IV Breast Cancer—current therapies offer a devastating ultimatum.

7% **Severe side effects:**
Organ damage, permanent infertility, immune destruction

12% **Paradoxical risk:**
Radiation-induced secondary malignancies (SPMs)

10+ **Decade-delayed toxicity:**
Appearing 10+ years after initial cure

The Collateral Damage Timeline



**The goal of traditional oncology has been to kill the cancer before killing the patient.
We need a biological mechanism that spares the innocent.**

The Evolution of Selectivity in Oncology

	Traditional Therapy (Chemo/Radiation)	Targeted Therapy (Gene/Receptor)	Targeted Osmotic Lysis (TOL)
Selectivity Mechanism	Targets rapid cell division	Targets specific mutant proteins	Targets conserved biophysical vulnerabilities (VGSCs)
Toxicity Profile	High systemic toxicity	Moderate-to-high (autoimmune responses)	Benign (preserves normal cells)
Collateral Damage	Destroys healthy tissue	Resistance bypasses pathways	Zero off-target necrosis
Efficacy on Late-Stage Disease	Diminishing returns in advanced stages	Expensive, individualized, prone to resistance	Highly effective specifically in advanced, metastatic carcinomas

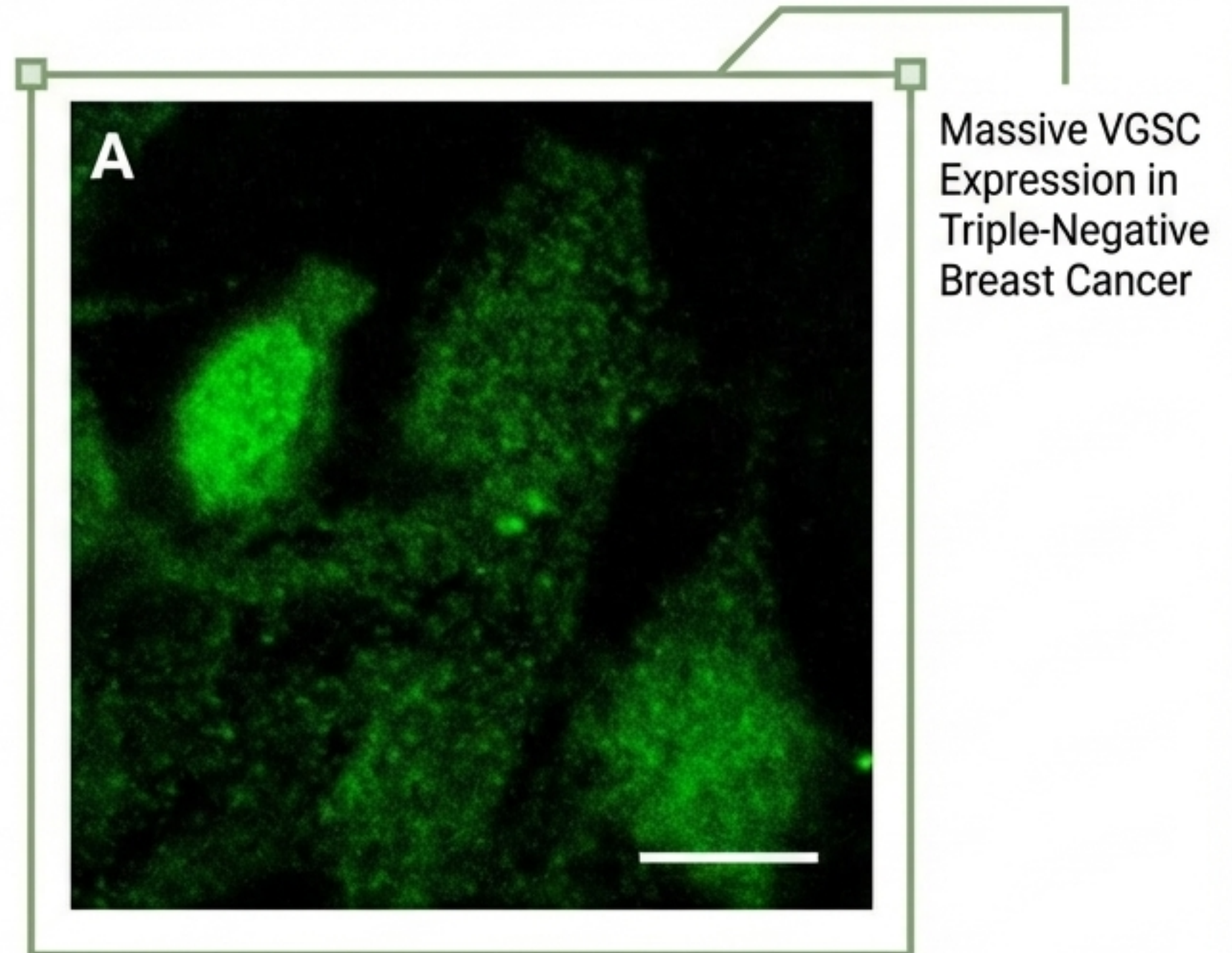
Advanced carcinomas massively over-express Voltage-Gated Sodium Channels to fuel invasion and metastasis.

The Biomarker

As epithelial cancers become more malignant and metastatic, they upregulate Voltage-Gated Sodium Channels (VGSCs) up to 50x more than normal tissue.

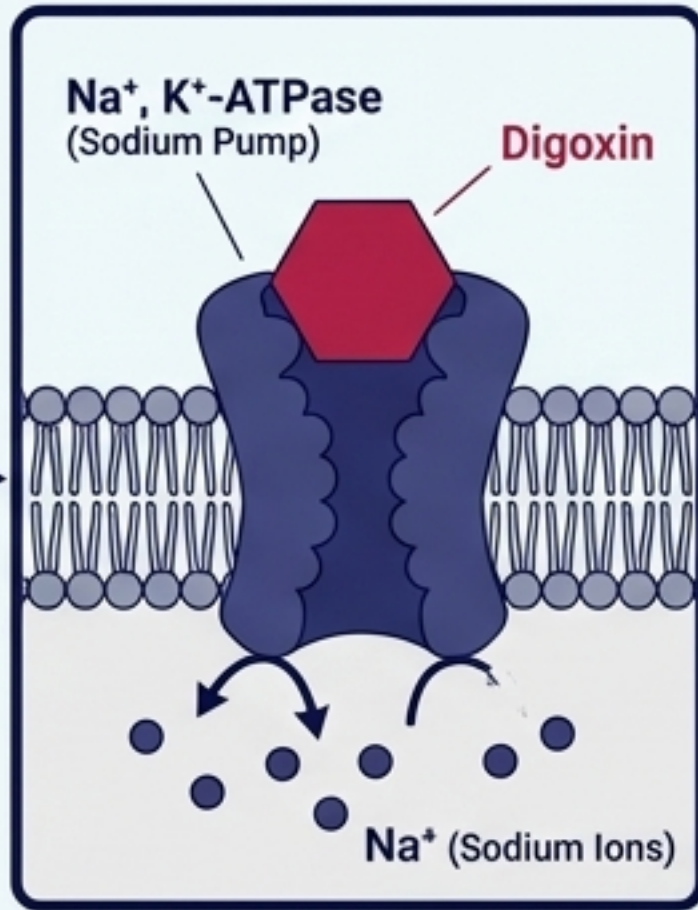


VGSC expression correlates directly with the level of malignancy. **It is the engine of metastasis.**



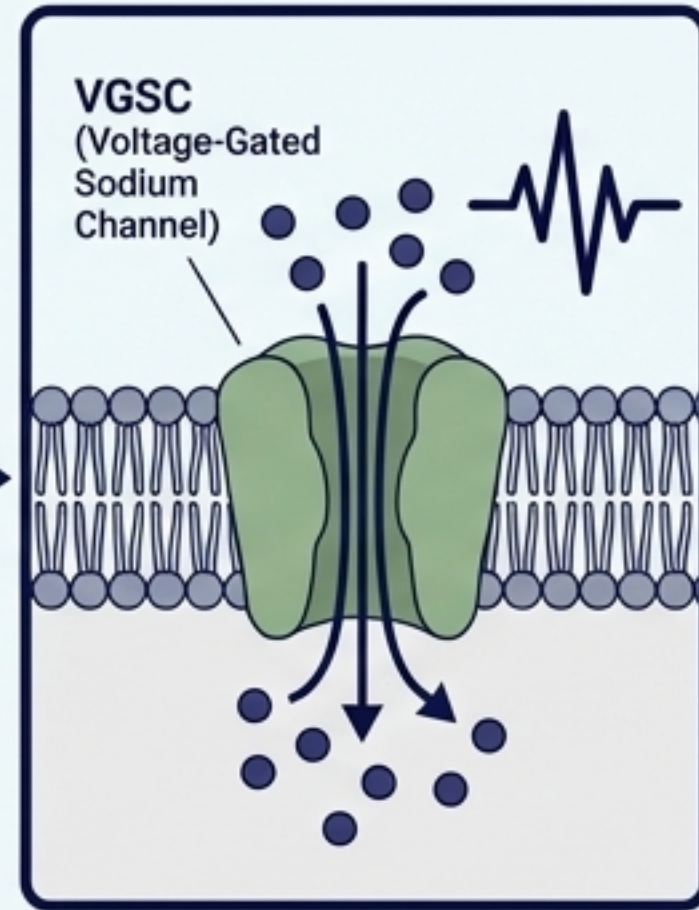
Massive VGSC Expression in Triple-Negative Breast Cancer

The Mechanics of Targeted Osmotic Lysis: Forcing a critical system failure.



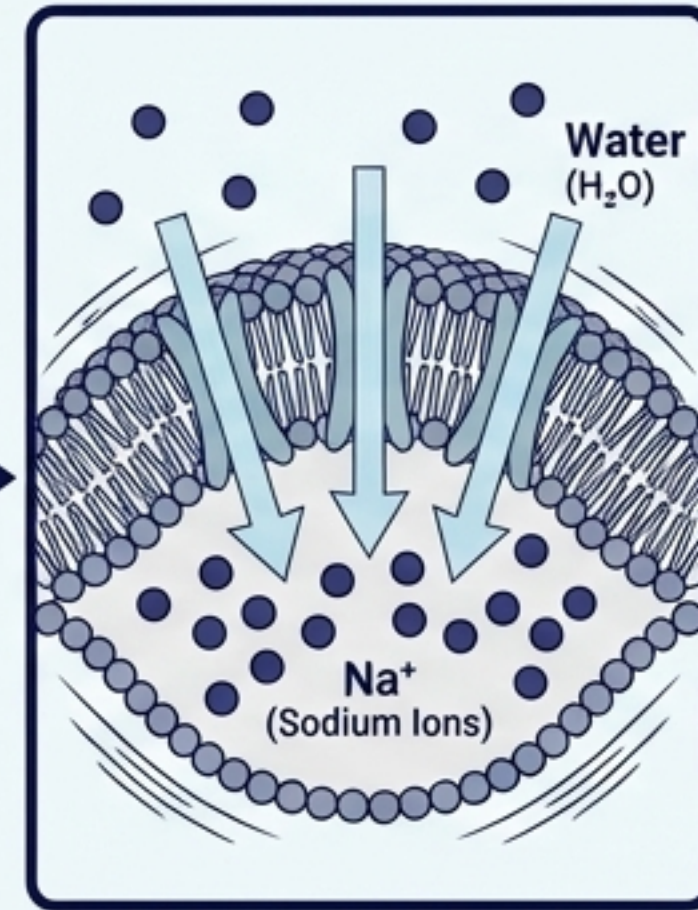
Block the Exhaust

Cardiac glycosides (Digoxin) bind to and block the Na⁺, K⁺-ATPase (sodium pumps) on the cell membrane, preventing sodium from exiting.



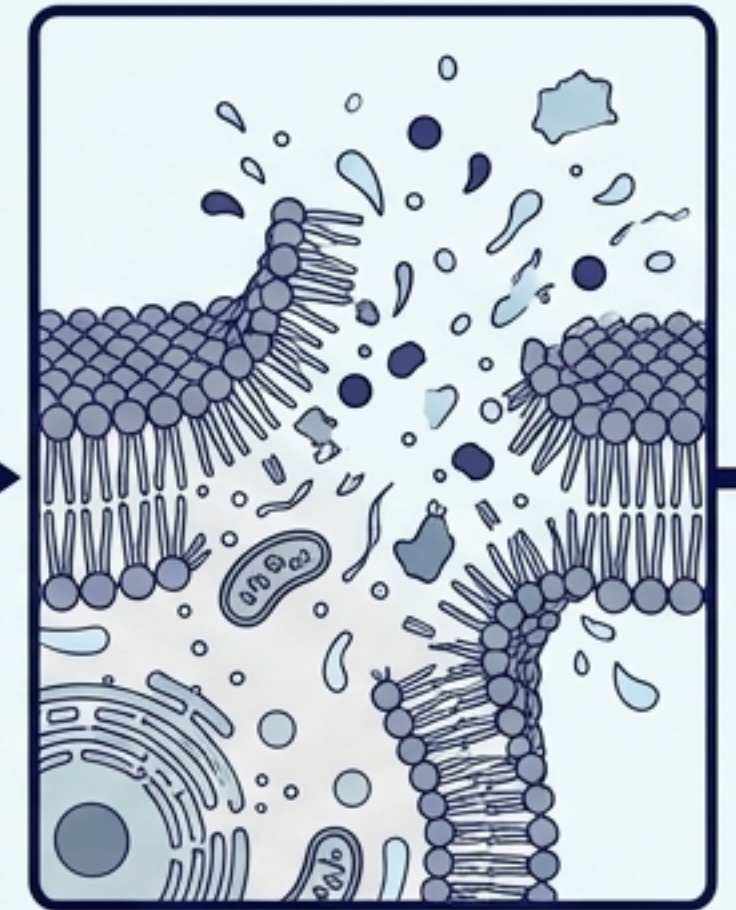
Force Open the Intake

A precise external stimulus forces the over-expressed VGSCs to lock open, flooding the cell with sodium ions.



Osmotic Pressure Builds

Because water passively follows sodium to dilute it, massive amounts of water rush into the cell.

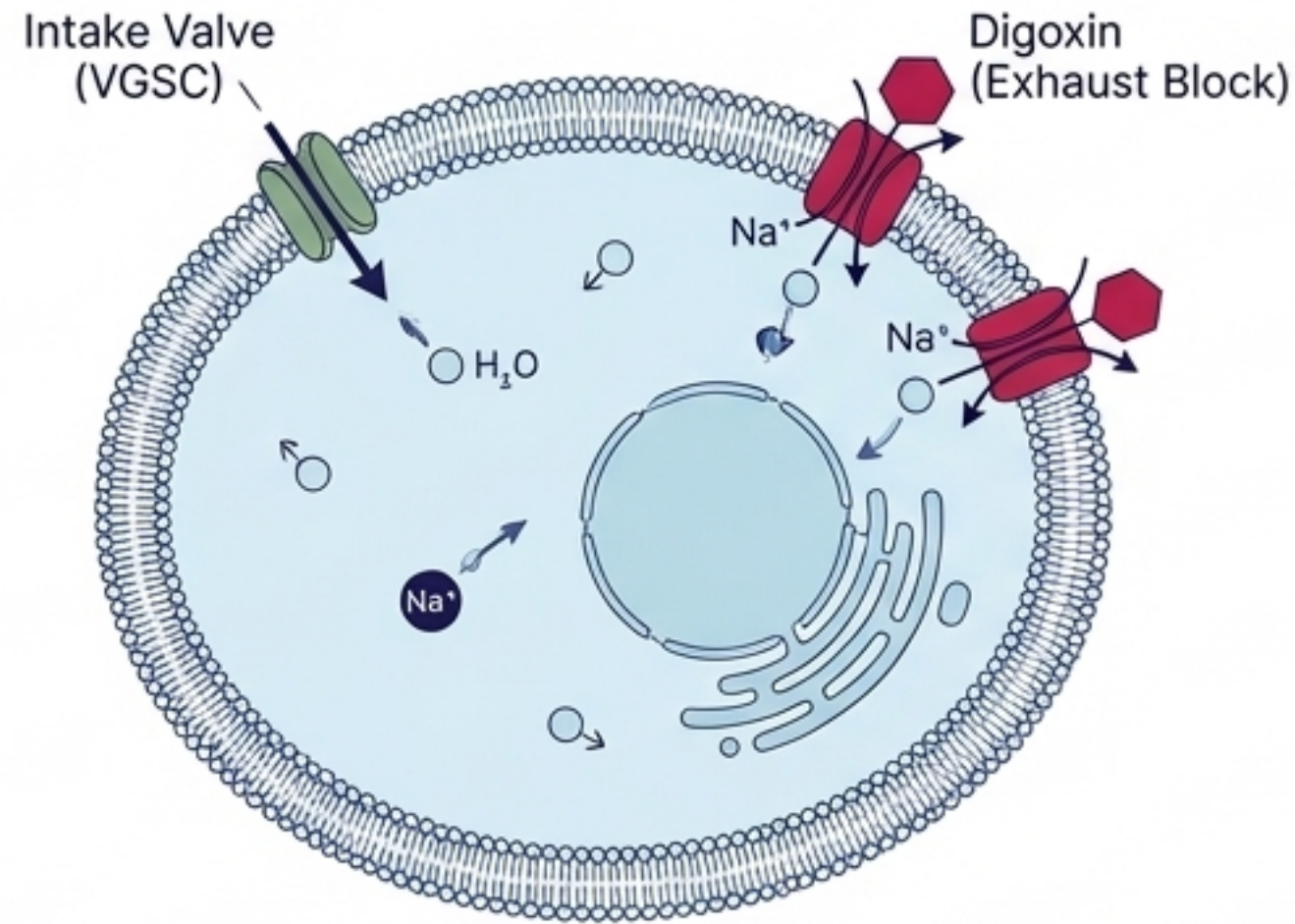


Cytolysis

The intracellular volume exceeds the structural capacity of the plasmalemma. The cancer cell bursts from the inside out.

Normal cells are spared because they lack the biological machinery to self-destruct.

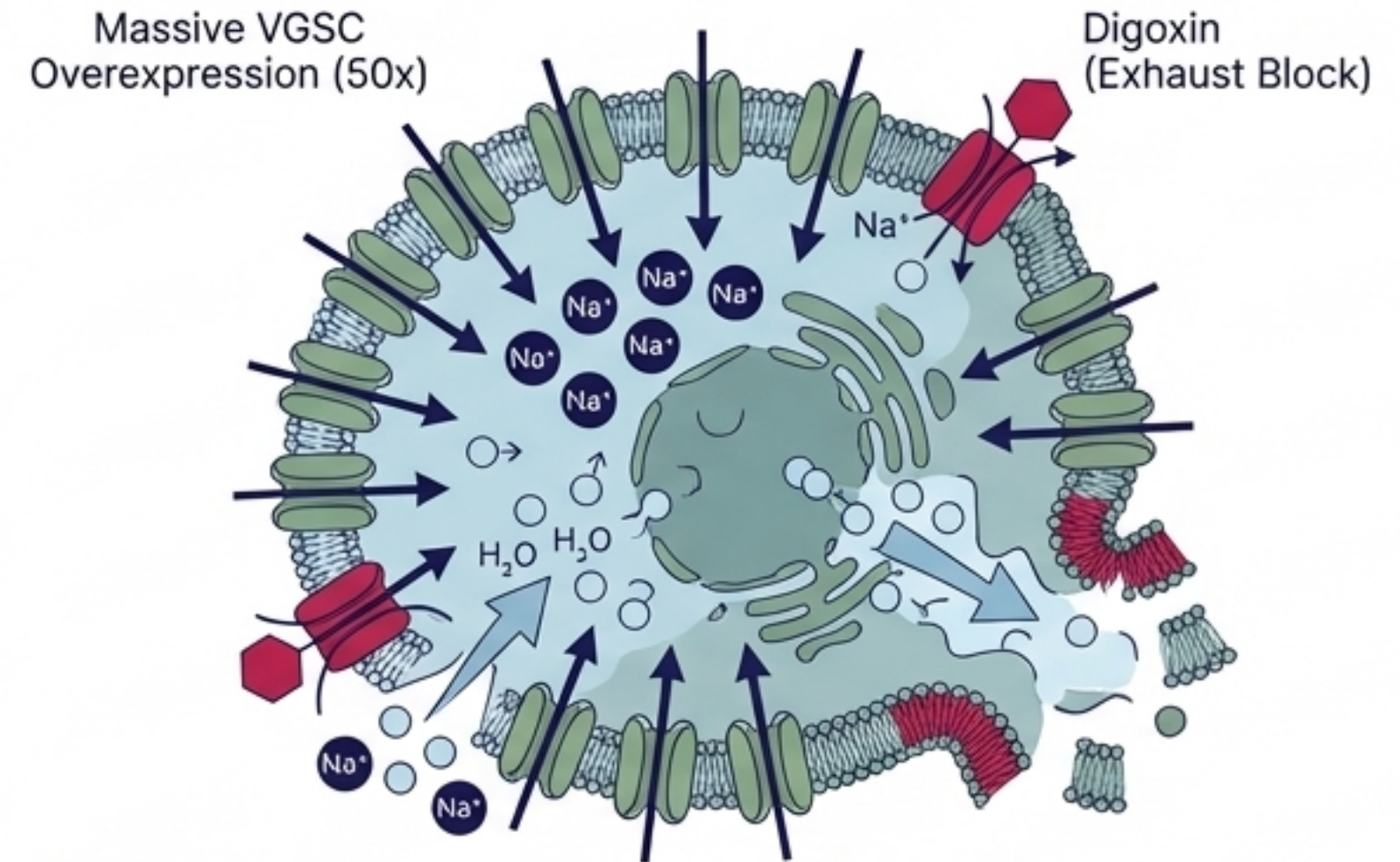
Normal Cell



Mechanism: Under TOL, a small amount of sodium enters. A manageable amount of water follows. The cell swells slightly but remains structurally intact.

Outcome: When the drug clears, the pump reactivates, and the cell returns to normal.

Advanced Carcinoma Cell



Mechanism: Under TOL, massive sodium influx occurs through the over-expressed channels. Extreme water follows. The membrane breaches.

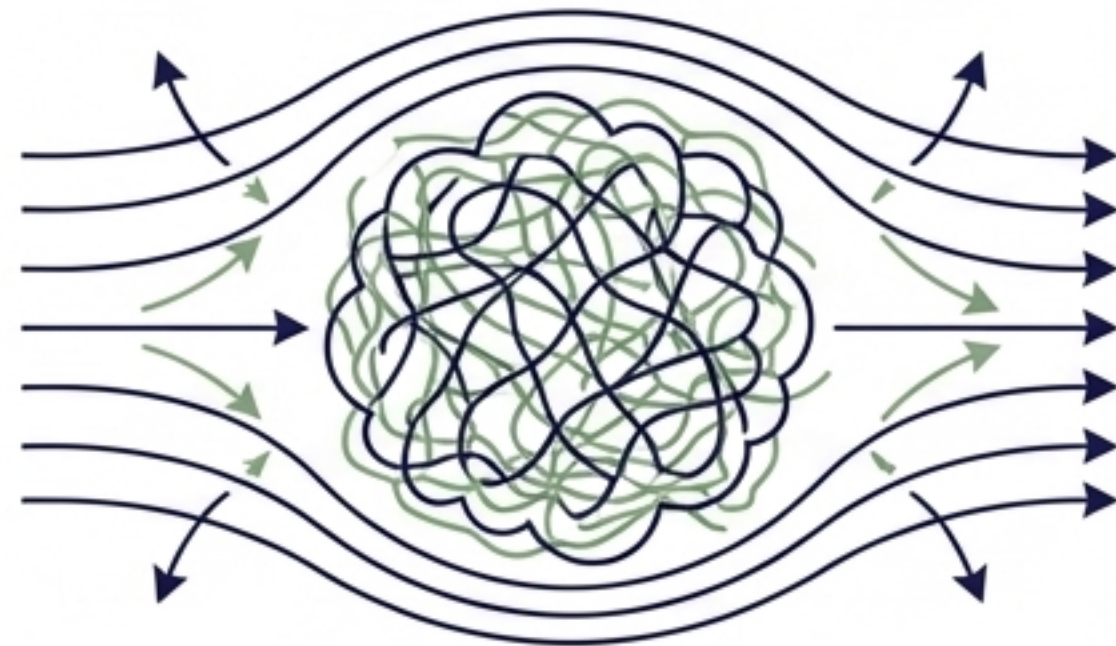
Outcome: Irreversible Cytolysis (Cell death).

The In Vivo Delivery Barrier: Electric current takes the path of least resistance, bypassing solid tumors

The Physical Barrier

Explanation: While electrical Direct Current (DC) works perfectly in a petri dish, solid tumors in live bodies are protected by a highly resistive extracellular matrix (collagen, elastin, fibronectin).

Result: Electrons flow around the tumor, not through it.



The Evidence

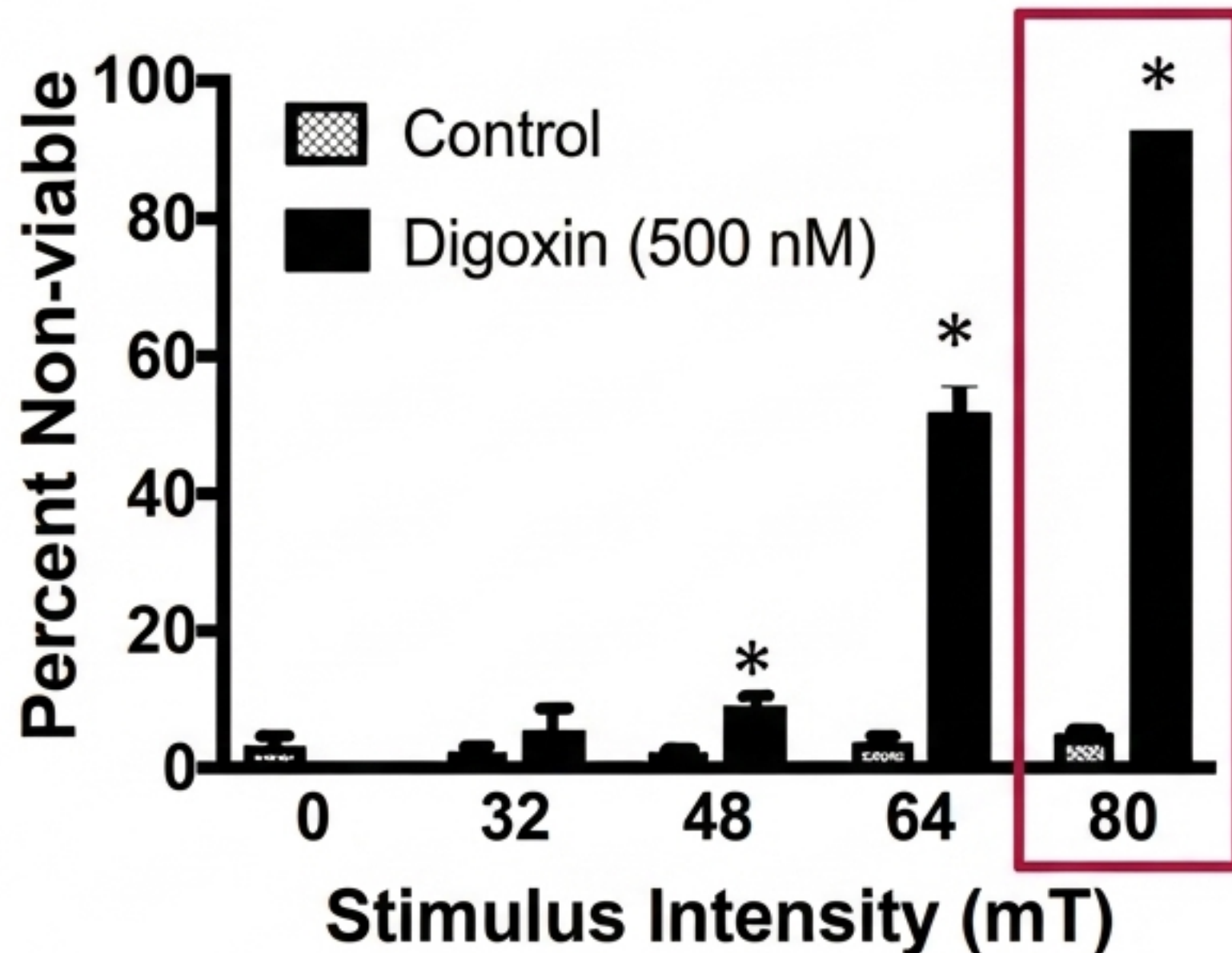
Necrotic zone: Successfully lysed tissue located directly between the electrodes.

Viable tumor tissue: Unharmful cancer mass that the electric current completely bypassed due to tissue resistance.

Overcoming the barrier: Pulsed Magnetic Fields (PMFs) penetrate where electric currents fail.

Dimensions	Direct Current / Electric	Pulsed Magnetic Field / PMF
Tissue Penetration	Shallow / Path of least resistance.	Total and uniform body penetration.
Susceptibility to Resistance	Highly blocked by extracellular matrix.	Zero resistance from biological tissues.
Tumor Coverage	Uneven (leaves viable cancer cells).	100% volumetric tumor coverage.
Patient Comfort	Requires direct electrode contact.	Non-invasive, ambient treatment (patient simply rests in the field).

In Vitro Proof: PMF stimulation achieves up to 100% lysis in malignant breast cancer cells.



• Key Takeaways:

- Dose-dependent response: MDA-MB-231 cells exposed to 500nM digoxin and an 80-mT PMF for 15 minutes experienced 95-100% lysis.
- Control groups (drug alone, stimulation alone) showed minimal to zero effect (3-5%).
- Normal cells (MCF-10a) exposed to the exact same conditions were entirely unaffected (96.5% viable).

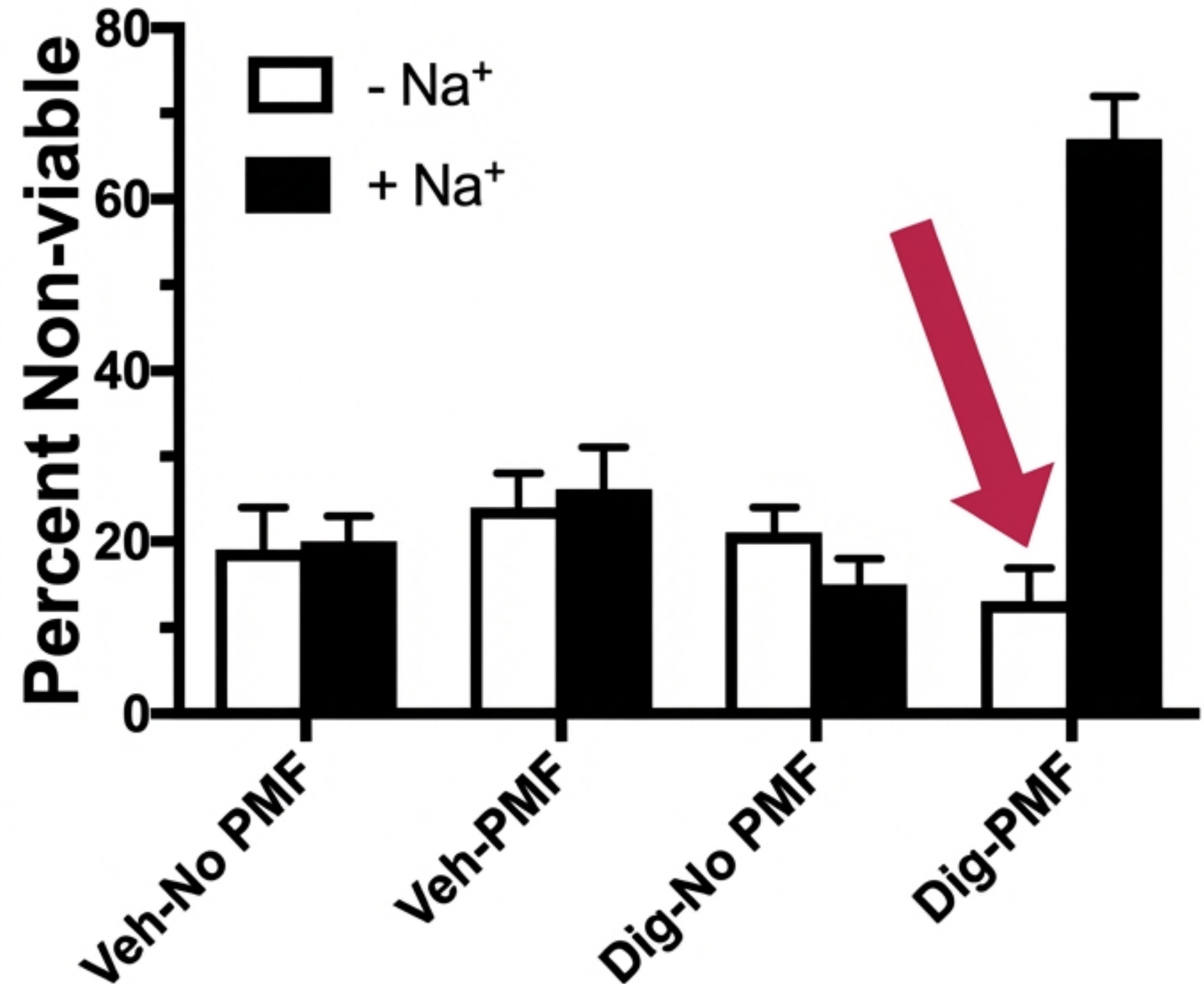
The physical proof: Lysis is entirely dependent on sodium influx.

The Physics



If cytolysis is truly driven by osmotic pressure, removing sodium from the extracellular environment should completely stop the cancer cells from exploding, even under full PMF and Digoxin treatment.

Conclusion: Without extracellular sodium to flood the open VGSCs, osmotic pressure cannot build. The cancer cells survive.



In Vivo Efficacy: PMFs successfully translate Targeted Osmotic Lysis to living subjects



The Models

Ectopic xenografts (MDA-MB-231 in J/Nu mice) and **homografts** (4T1 in BALB/c mice).



The Protocol

7 mg/kg Digoxin combined with 30 minutes of PMF stimulation over a 5-day period.



The Result

60% to 100% reduction in tumor viability (maximum 80–100% lysis achieved in treated mice).

Crucially, histopathology confirmed zero damage to normal renal, hepatic, dermal, neural, and muscle tissues.

Compassionate Use Translation: Massive necrosis without systemic toxicity.



Canine Models

Subjects: Advanced nasopharyngeal, bronchoalveolar, and metastatic anal gland carcinomas.

Results: 75–90% tumor necrosis extending beyond typical central zones. No aversive behavioral signs during treatment.



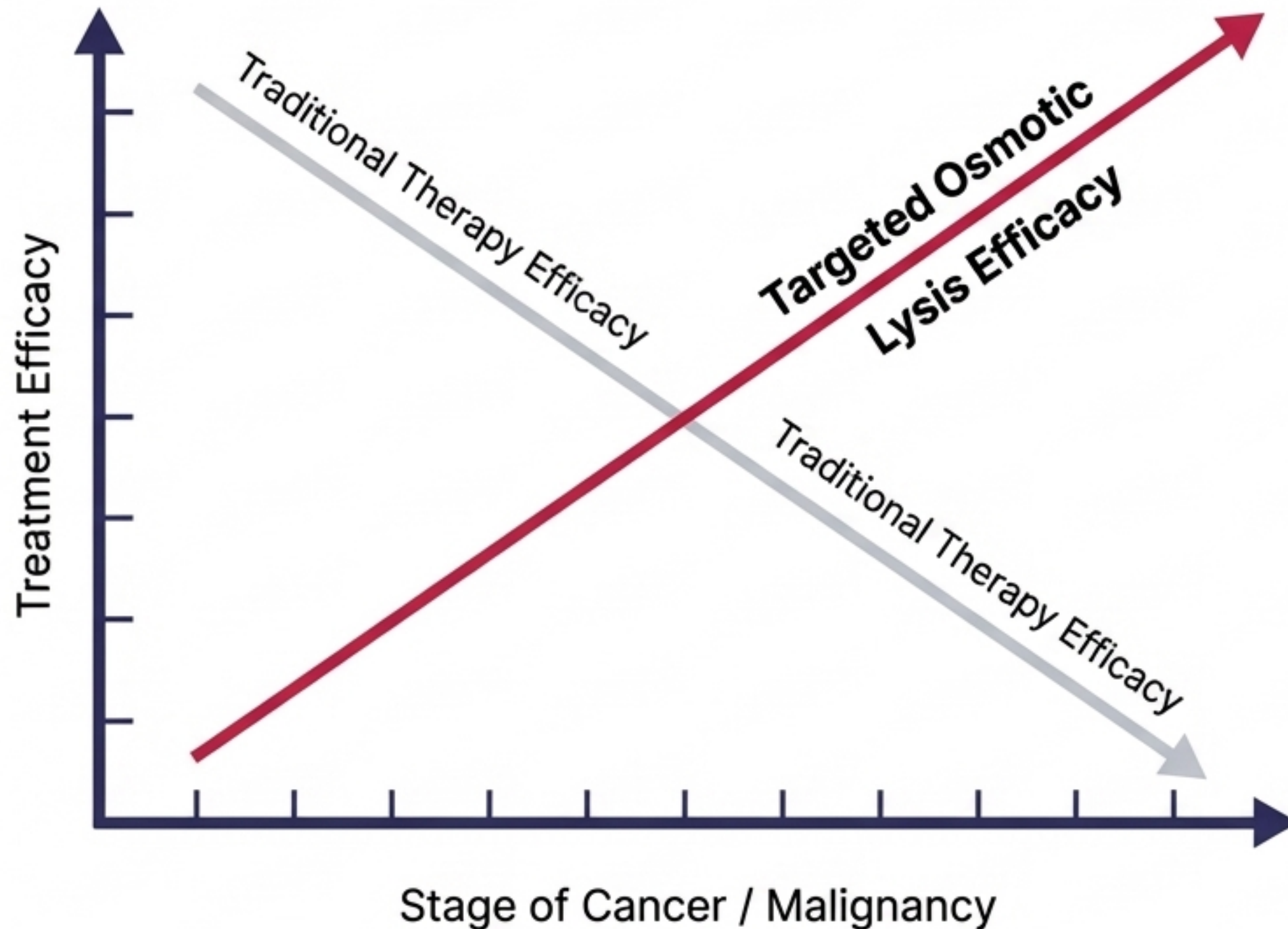
Human Subject

Subject: Late-stage squamous cell carcinoma of the cervix (Emergency Use Protocol).

Results: Post-treatment imaging revealed large regions of tumor hypodensity (necrosis).

Quality of Life: Patient reported zero pain from treatment, increased appetite, and improved cognitive energy. Survival significantly exceeded initial prognostic expectations.

The Aggression Paradox: Cancer's greatest strength becomes its fatal vulnerability.



- In traditional oncology, the more advanced and metastatic a cancer becomes, the harder it is to kill.
- Because VGSC expression correlates directly with malignancy, advanced carcinomas literally build the machinery required for their own destruction.
- The paradigm shift: The more aggressive the cancer, the more vulnerable it makes itself to Targeted Osmotic Lysis.

A new horizon for advanced-stage disease control.



Complete Volumetric Penetration

Pulsed Magnetic Fields bypass the physical barriers that defeat chemical and electrical therapies.



Preservation of Healthy Tissue

A non-invasive mechanism that leverages basic osmotic physics, entirely sparing non-malignant cells.



Quality of Life

A treatment protocol involving resting in an ambient magnetic field, extending life without toxic collateral damage.

Proving that late-stage cancer does not have to be a death sentence, nor does its treatment have to destroy the life it attempts to save.