

SANGUINATE®: A Universal, Field-deployable, Ready to use Oxygen carrying Agent for Hemorrhagic Shock when Blood is Not Available

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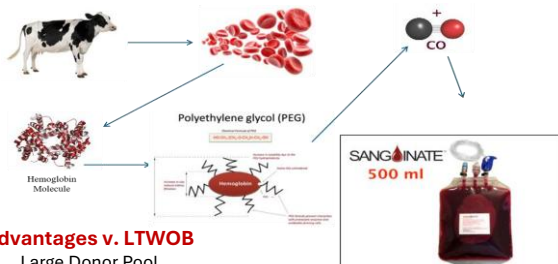
MHSRS-26-6033: Future Anti-shock Solutions in the Pre-Hospital Environment

Background: Severe anemia and hemorrhagic shock in austere battlefield settings are frequently life-threatening when typed, crossmatched, cold-stored blood is unavailable. SANGUINATE® (SG), a PEGylated bovine carboxyhemoglobin, was developed to provide temporary oxygen-carrying support in blood-not-an-option (BNAO) scenarios.

Results: SG has been extensively evaluated across hemorrhagic animal models, human expanded-access IND use, and clinical trials. Data on SG demonstrate favorable outcomes with meaningful impact on both supply-chain constraints and Role 1 medic capability — offering a single, universally compatible agent capable of rapidly restoring blood pressure, microvascular perfusion, and tissue oxygenation. SG remains stable for over 3 years at 4°C and maintains stability across a wide field-relevant temperature range, including 3 months at 40°C — eliminating the need for rucksack cold-storage devices and enabling greater on-hand product volume.

Summary: SANGUINATE's unique biophysical and biological properties position it as a high-value wartime solution for battlefield management of hemorrhagic shock when blood is not an option.

SANGUINATE® What is It?

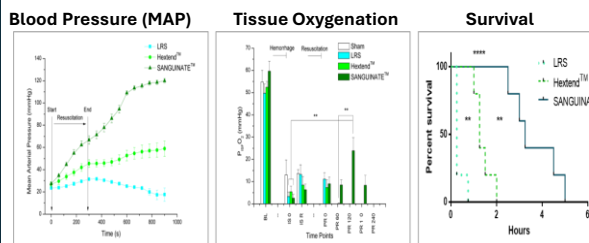
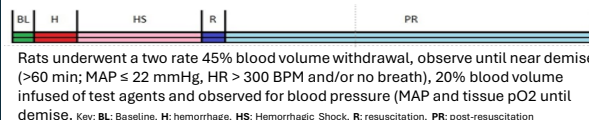


Advantages v. LTWOB

- ✓ Large Donor Pool
- ✓ Stable > 3yr 4C depot
- ✓ Stable > 3mo 40C field use

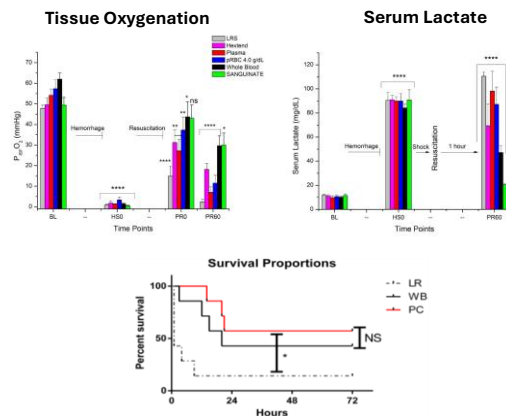


Rat Prolonged Ischemic Shock Lethal Models



(LEFT) Mean Arterial Pressure (MAP) (CENTER) Tissue Oxygen (P_tO₂) and (RIGHT) Survival were monitored over seconds, minutes and hours, respectively.

Rat Ischemic Shock Lethal Model – 72h Survival

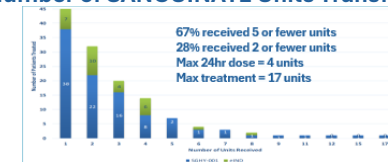


(LEFT) Raw tissue oxygenation data using two-way ANOVA with Dunnet's post hoc to compare intragroup time points to baseline. (RIGHT) Serum Lactate comparison to BL with Two-Way ANOVA and Dunnet's post hoc. (BOTTOM) Survival analysis up to 72h post-HS.

Blood is Not An Option – Human Subjects

INDICATION 1	INDICATION 2	INDICATION 3
Transfusion Declined	HyperHemolysis	Incompatibility
Blood Available	Recent Transfusion resulted in RBC destruction	Known alloimmunization or incompatibility with Transfusion
personal/religious grounds		

Number of SANGUINATE Units Transfused



SG Treated BNAO Subject Summary

Baseline Demographics		Overall (n=134)
Age (years)	Mean (SD)	55.67
	Median	54.5
	Min	10
	Max	91
Sex	n (%)	
	Male	42 (31.3%)
	Female	92 (68.7%)
Baseline Hb (g/dL)	Mean (SD)	4.37
	Median	4
	Min	1.6
	Max	15.3
Final Hb (g/dL)	Mean (SD)	5.35
	Min	2
	Max	15.2
Units Given	Mean (SD)	2.98
	Total	392.5
Hb Change	n (%)	
	Improved	56 (58.9%)
	Not Improved	12 (12.6%)
	No Change	27 (28.4%)
	N/A (eIND)	29 (-)
Survival Rate	n=124	83 (67%)

SG Compared to Blood Products

Resuscitating Agent	Expiry 4C	Expiry 37C	Cold Storage Required	Oncotic Pressure (mOsm/L)	Targeted Hypoxic Delivery (p50 mmHg)	*Capillary Flow	*Ischemia-Reperfusion Injury	*Coagulation
SANGUINATE	> 36 mo	> 3 mo*	No	56	Yes (12.5)	Yes	Yes	No
pooled RBC	42 days	4 h	Yes	1.9	25	No	No	No
LTWOB	21-35 days	4 h	Yes	20	25	No	No	Yes

*Actual Temp 40C

SANGUINATE Status – An Advanced Clinical-Stage Agent

344 treated subjects across 13 clinical trials and eINDs
Breakthrough designation for Acute Ischemic stroke (2026)
Phase 3 HEMERA-2 stroke trial planned 1Q2027
Ongoing Manufacturing Operations (clinical trial supply)
A BNAO Solution in a Constrained Austere Environment