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Department of War–Scandinavian Biopharma Collaboration for the Development of ETVAX to Prevent Diarrhea in Deployed Troops

Ensuring Force Readiness through Immunization Innovation

Strategic Partnership Presentation | Research and Development Overview

Thomas F Wierzba, PhD, MPH
Section on Infectious Diseases
Wake Forest University School of Medicine

This work is supported by funding from the Defense Health Agency

Disclosure

*Dr. Wierzba is a consultant to Scandinavian Biopharma (SBH)
*Agneta Lissmats is an SBH employee
*Björn Sjöstrand is SBH CEO

Operational Impact of ETEC

Traveler's diarrhea remains a significant non-combat illness challenge for deployed forces.

- **High Incidence:** 30-40 cases per 100 person-months in endemic regions.
- **Mission Loss:** Extensive loss of duty days and degradation of force readiness.
- **Key Pathogen:** ETEC is the most frequently identified etiology.
- **Critical Need:** Rapidly deployable ETEC vaccine.

Strategic Partnership

To mitigate this operational burden and preserve readiness, the US Department of War (DoW) and Scandinavian Biopharma (SBH) are advancing an oral inactivated ETEC vaccine

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Key Development Roadmap

ETVAX

Early 90s

Initial NAMRU-3 WRAIR funded trials focusing on SBH whole-cell ETEC immunity

Phase I/II

Successful safety and immunogenicity trials in:

Swedish adults;

Bangladeshi adults, children, and infants; and

Zambian Adults, Children, Infants

Benin Travelers Trial

Phase 2b efficacy trial in Finnish traveler population

Gambia Pediatric Trial

Phase 2b efficacy trial in Gambia Children

Future

US Defense Contracting Agreement supporting manufacturing, formulation, and dose verification study for controlled human infection model of ETVAX

EMA-confirmed readiness for pivotal Phase 3 pediatric trial

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Clinical Studies in Egypt (NAMRU3) of Whole Cell Oral ETEC Vaccine

Killed, oral ETEC vaccine consisting of whole cells plus recombinantly produced cholera toxin B subunit (rCTB)

Trial Population	Design	Safety Results	Immunogenicity	Key Finding
Adults (n=74)	Placebo-controlled, Randomized, Phase I	Comparable, no severe events	Proportion responding>80% for all antigens except CS1	Safe, Immunogenic
Children (n=105, 6 to 12 years; n=97 2 to 5 years old)	Placebo-controlled, Randomized, Phase I	Comparable, Well-Tolerated	ASCs (6-12y/2-5y): CFA/I (100%/95%), CS2 (92%/83%), CS4 (93%/81%)	Safe, immunogenic in 2- to 12-year-olds
Infants (n=64, 6 to 18 months)	Placebo-controlled, Randomized, Phase I	Comparable, Well-Tolerated	IgA\IgG: rCTB (97% each), CFAI (61%/64%), CS2 (26%/53%), CS4 (39%/58%)	Safe, immunogenic
Infant Efficacy (n=152)	Phase 2b	Safety Profile Met	95% CTB conversion, 66% CFA/1 seroconversion	No efficacy, 20% (-29% to 50%)

Data sourced from published SBL-DoW clinical trials

The Egyptian findings guided a complete redesign of the vaccine including antigen optimization and addition of a mucosal adjuvant, ultimately leading to the development of ETVAX, a next generation product

The ETVAX Platform

Advanced Oral Vaccine

Strategic Vaccine Design

Whole-Cell Base

Four inactivated genetically modified ETEC strains overexpressing colonization factors (CFA/I, CS3, CS5, CS6).

B Toxin Subunit Hybrid

Hybrid LTB/CTB (LTCTBA) components providing broad enterotoxin neutralization.

dmLT Adjuvant

Double Mutant Heat-Labile Toxin (dmLT)* adjuvant to maximize mucosal immune response.

* Initial research support for mLT (single mutant LT) by Navy Research Funds

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Key Phase 1/2 Clinical Trials

Study Population	Safety Results	Immunogenicity
Swedish Adults	Excellent (No SAEs)	Strong serum and mucosal immune responses
Finnish Travelers	Well-Tolerated	robust serum IgG - IgA antibody responses to colonization factors and heat-labile toxins
Gambian Infants	Well-tolerated	increasing antibody responses to multiple vaccine colonization factors and heat-labile toxins

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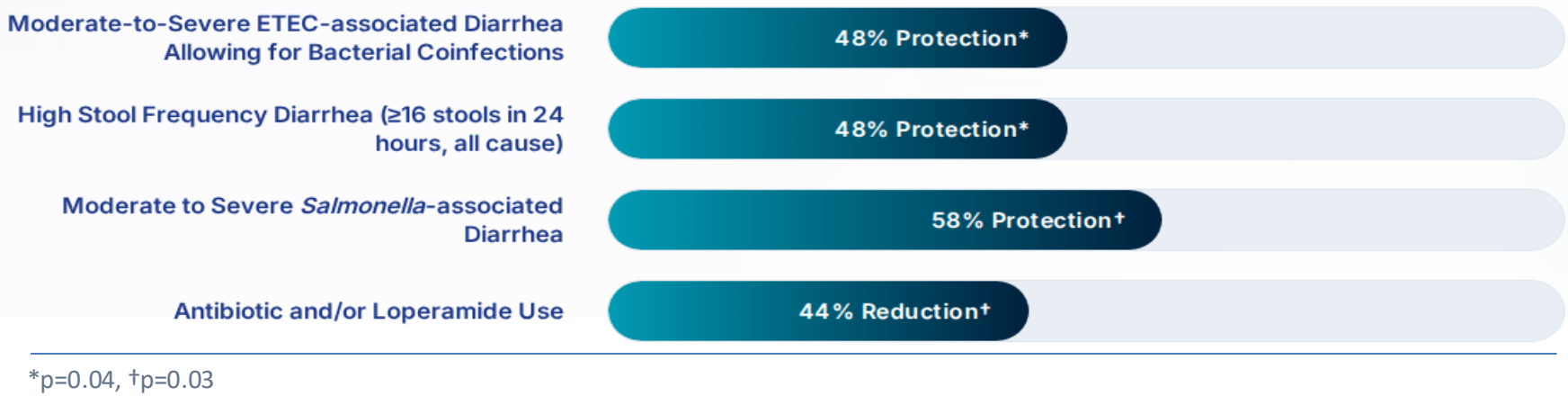
Field Efficacy: Benin Trial Results

Methods: A phase 2b, randomized, double-blind, placebo-controlled (V333 vs. P346) trial of Finnish adults visiting Benin for 12 days given two ETVAX doses

Results in placebo recipients: 8.1% moderate-to-severe ETEC-associated diarrhea allowing bacterial coinfections; 8.1% ≥ 16 stools in 24 hours, 5.8% *Salmonella* positive; 10.9% antibiotic and/or loperamide use



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Field Efficacy: Benin Trial Results for LTB IgG < Median

Results in placebo recipients: 12.6% moderate-to-severe ETEC-associated diarrhea allowing bacterial coinfections; 11.4% ≥ 16 stools in 24 hours, 6.6% *Salmonella* positive;

* p = 0.02, † p = 0.01, ‡ p = 0.05

Significant protective effect suggested in a highly infectious, multi-pathogen environment typical of military deployment zones.

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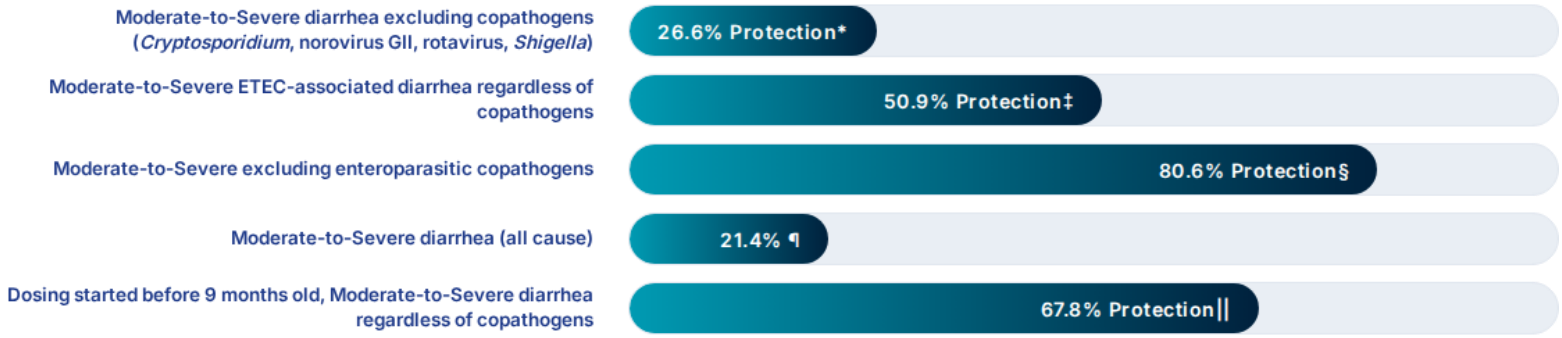
Gambia Trial Efficacy Outcomes – Consistency of Findings

Methods: A phase 2b, randomized (1:1) double-blind, placebo-controlled trial of ≅5,000 Gambian children 6 to 18 months old followed for 12 to 24 months given three ETVAX doses

Results in placebo recipients (per 100k days): 1.36 ETEC cases excluding copathogens, 1.62 regardless of copathogens, 1.36 excluding enteroparasitic copathogens, 16.71 all cause diarrhea, 4.14 dosing before 9 months.



*p=0·43, ‡ p=0.023, § p=0·0092, ¶ p=0·026, || p=0·032

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Future: Path to Deployment in the Military

SBH entered a Federal Acquisition Regulation (FAR) agreement with USAMRAA to support the production and clinical development of the vaccine.

- **Purpose:** Protecting both travelers and military populations.
- **Formulation:** Field-ready packaging.
- **ETEC strain verification study:** ETEC strain E24377A. verification trial completed confirming attack rate at John Hopkins University.
- **Efficacy Trial:** Pivotal human challenge trial planned using ETEC strain E24377A provided by WRAIR.
- **Regulatory Alignment:** FDA regulatory type C meeting held supporting single pivotal challenge trial for licensure.

Future: Path to Global Deployment for Children

Strategic alignment with international health authorities

ensures a streamlined transition to deployment.

- **Dual-Purpose:** Protecting both military populations and civilian populations
- **Global Efficacy:** Pivotal multicountry trial designed for ~5,800 Asian/African children.
- **Regulatory Alignment:** EMA Scientific Advice confirmed phase 3 ready and phase 3 design supports licensure assuming positive outcome.

Strategic Conclusion

For the Warfighter

ETVAX addresses a critical operational gap, potentially reducing ETEC as a threat to mission continuity and troop health during deployment.

Public Health Impact

ETVAX provides a platform for preventing severe diarrhea in children and travelers in low-income settings, offering global health benefits.

A proven, multivalent oral ETEC vaccine ready for pivotal Phase 3 trial.

Questions?

Thank you for your attention.

Thomas Wierzba, PhD MPH | Agneta Lissmats, BSc | Björn Sjöstrand, CEO