



**REPORT FOR  
EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF  
PERSIST™ ANTISEPTIC SOLUTION**

**REF.: 96-5517-11**

**FOR**

**BECTON-DICKINSON VASCULAR ACCESS  
9450 S. STATE STREET  
SANDY, UTAH 84070**

**July 8, 1997**

**BY**

**HILL TOP RESEARCH, INC.  
(FORMERLY HILL TOP BIOLABS, INC.)  
MAIN AND MILL STS.  
MIAMIVILLE, OHIO 45147**

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## **1.0 SUMMARY**

The Persist™ product is considered to be efficacious as a catheter site antiseptic agent having reduced the bacterial count below 12 colony forming units / square centimeter of skin at the 10-minute post-treatment sampling interval.

- The objective of this study was to evaluate whether a proposed antimicrobial agent was as effective as the povidone iodine in glass ampules (commercially available product) for routine site preparation as demonstrated by the reduction in the number of viable bacteria recoverable from the skin surface.
- The study was a paired comparison design. Treatment sites were randomly assigned to test and control treatments and sampling intervals to ensure a statistical distribution.
- Two test articles identified as PERSIST™ Lot N5NC260 and 0.6 mL Povidone Iodine Lot 77T95 were evaluated in this study.

## **2.0 SPONSOR STUDY MONITOR**

Mohammad A. Khan, Ph.D.

This study was not monitored by the Sponsor.

## **3.0 INVESTIGATIVE PERSONNEL**

Investigator: Gayle K. Mulberry, M.S.

Director, Biostatistics James P. Bowman, M.S.

Project Supervisor: Ann R. Brady, A.S.

Manager, Biostatistics: Barbara Fath

## **4.0 CLINICAL RESEARCH STANDARDS**

The clinical investigation, including the informed consent was reviewed by an Institutional Review Board in accordance with Title 21 of the Code of Federal Regulations, Parts 50 and 56. Approval by the Board was obtained on April 22, 1996, prior to initiation of the investigation (See Appendix I).

## **5.0 PROTOCOL**

The study protocol and amendments were followed (See Appendix II).

Deviations from the protocol were recorded during this study. The deviations are listed in Appendix III.

## **6.0 SUBJECTS**

One-hundred forty-eight (148) subjects were enrolled in the study and nineteen (19) completed the test phase.

One-hundred twenty-nine (129) subjects were excluded or withdrawn from the study. See Appendix IV for subject numbers and reasons for being excluded or withdrawn from the study.

## 7.0 TESTING SCHEDULE

Screening or  
Conditioning Date: April 23, 1996  
Date Initiated: May 7, 1996  
Date Completed: June 26, 1996

## 8.0 TEST ARTICLES

Two study articles were received from Becton-Dickinson. They were identified as follows:

<u>HTB Code</u>	<u>Sponsor's ID</u>	<u>Description</u>	<u>Date Rec.</u>
A	PERSIST™ Povidone Iodine Prep Topical Antimicrobial 0.75% Available Iodine with Alcohol Lot No. N5NC260 Exp. II/98, Cat No.38110111	4 white cardboard boxes w/black & blue print	5-2-96
B	0.6 Povidone Iodine Topical Solution U.S.P. Lot #77T95 Exp. II/99	Clear plastic bag containing 300 small clear glass ampules w/white cardboard sleeves w/dark liquid inside	5-2-96

The randomization of the assignment of test articles to treatment groups is shown in Appendix V.

## 9.0 ADVERSE EVENTS

There were no adverse events observed or reported during the course of the study.

## 10.0 TEST FOR ADEQUACY OF NEUTRALIZER

A report on testing performed to demonstrate the effectiveness of the antimicrobial neutralizers used in this study is shown in Appendix VI.

## 11.0 METHOD OF STATISTICAL ANALYSES

The statistical analysis was designed to evaluate and compare the antibacterial activity of PERSIST™ (Sample Code P) and Povidone Iodine (Sample Code PVP-I) to each other and relative to the untreated sites (for each treated site there was a matching untreated site). Intra-treatment changes (differences from untreated) in log counts over time were also evaluated.

Analysis of variance techniques were used to test these effects. Log to transformations of the CFU/cm<sup>2</sup> were used in the comparisons of PERSIST™ and PVP-I to untreated and in the comparison of PERSIST™ to PVP-I. PERSIST™ and PVP-I were also compared using differences from their respective untreated sites. Hypothesis testing was done at the  $\ll=0.05$  level.

### 11.1 Results

See Appendix VII for the Statistical Tables.

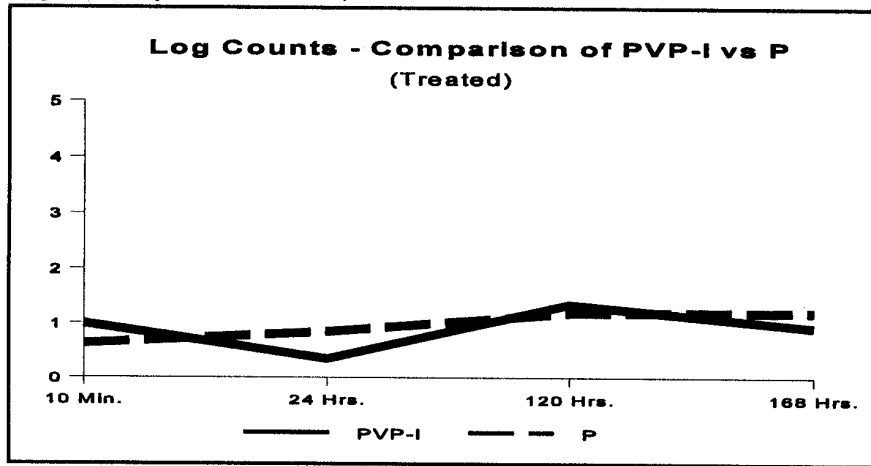
Analysis of the data indicated the following:

- PERSIST™ (Sample Code P) and Povidone Iodine (Sample Code PVP-I) exhibited significant efficacy relative to the untreated sites at 10 minutes, 24 hours, 120 hours and 168 hours ( $p=0.0001$ ).

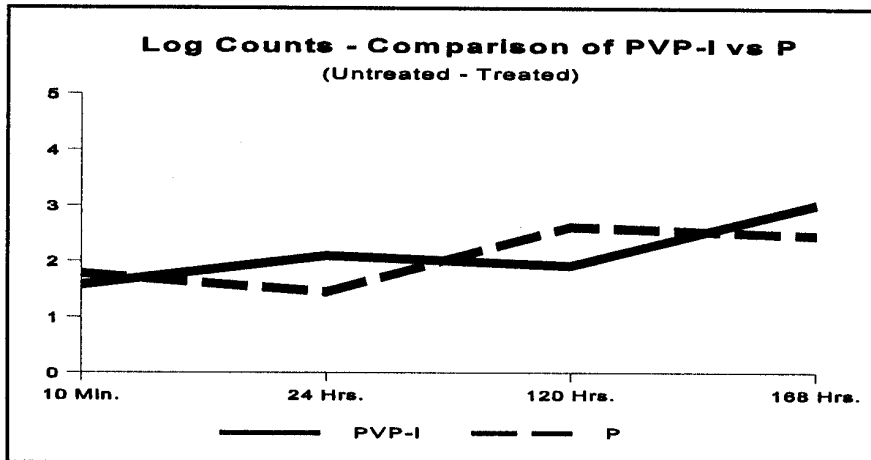
Sample Code	Log Counts - Comparison to Untreated				Results
	10 min.	24 hrs.	120 hrs.	168 hrs.	
PVP-I	1.00	0.35	1.36	0.93	<sup>1</sup> Significance favoring Sample PVP-I
Untreated*	2.58	2.45	3.29	3.87	
p-value	0.0001 <sup>1</sup>	0.0001 <sup>1</sup>	0.0001 <sup>1</sup>	0.0001 <sup>1</sup>	
P	0.63	0.85	1.20	1.21	<sup>2</sup> Significance favoring Sample P
Untreated*	2.41	2.30	3.83	3.68	
p-value	0.0001 <sup>2</sup>	0.0001 <sup>2</sup>	0.0001 <sup>2</sup>	0.0001 <sup>2</sup>	

(\*For each treated site there was a matching untreated site.)

- Povidone Iodine (Sample Code PVP-I) proved to be significantly more efficacious than PERSIST™ (Sample Code P) at 24 hours. The performances of PERSIST™ and PVP-I did not differ significantly at 10 minutes, 120 hours or 168 hours.



Sample Code	10 min.	24 hrs.	120 hrs.	168 hrs.	Results
PVP-I	1.00	0.35	1.36	0.93	<sup>3</sup> Significance favoring Sample PVP-I
P	0.63	0.85	1.20	1.21	
p-value	0.0716	0.0169 <sup>3</sup>	0.4729	0.1917	



Sample Code	10 min.	24 hrs.	120 hrs.	168 hrs.	Results
PVP-I	1.58	2.10	1.92	3.02	<sup>4</sup> Significance favoring Sample PVP-I
P	1.78	1.45	2.62	2.47	
p-value	0.3670	0.0199 <sup>4</sup>	0.1758	0.2096	

(Data in this table were derived by subtracting the treated counts from the untreated counts for each paired group. See table on page 4.)

- The difference between PERSIST™ (Sample Code P) treated sites and untreated sites was significantly less at 24 hours than at 120 and 168 hours.

Log Count Differences From Untreated Compared Over Time		
Time	Sample P	Significant Comparisons
10 min.	1.78	24 hrs vs. 120, 168 hrs
24 hrs.	1.45	
120 hrs.	2.62	
168 hrs.	2.47	
p-value	0.0039	

- The difference between Povidone Iodine (Sample Code PVP-I) treated sites and untreated sites was significantly less at 10 minutes and at 12G hours than at 168 hours.

Log Count Differences From Untreated Compared Over Time		
Time	Sample P	Significant Comparisons
10 min.	1.58	10 min, 120 hrs. vs. 168 hrs
24 hrs.	2.10	
120 hrs.	1.92	
168 hrs.	3.02	
p-value	0.0175	

## 12.0 **RESULTS**

The bacteria counts obtained from each subject at baseline and post-prep sampling intervals were recorded on individual data sheets.


The baseline counts are recorded on data sheets attached as Appendix VIII.A. The post-prep counts are recorded on the data sheets attached as Appendix V111B.



**15.0 QUALITY ASSURANCE STATEMENT**

This study was inspected in accordance with the Standard Operating Procedures of the Hill Top Companies. To assure compliance with the study protocol, the Quality Assurance Unit performed an inspection during the conduct of this study and completed an audit of the study records and final report.

Report Reviewed by:

  
\_\_\_\_\_  
Margot Riester  
Quality Assurance Auditor

7.10.97  
Date

**COMPANY  
CAPABILITIES**

# HILL TOP RESEARCH, INC.

Hill Top Research, Inc. is one of the world's leading providers of clinical and biological research, scientific testing and related consulting services. Hill Top offers consumer product testing, dermatology research, sensory evaluation, toxicology, microbiology and Phase II-IV clinical trials. Founded in 1947, the company is a valued partner to hundreds of firms marketing such products as cosmetics, toiletries, pharmaceuticals, household products, dental products, chemicals, non-wovens and medical devices.



## MARKETS SERVED

Hill Top Research, Inc. serves the consumer product, oral care and pharmaceutical industries. Hill Top specializes in testing consumer products for safety and claims substantiation including cosmetics, skin care, antiperspirants, eye area, hair care, nail care, baby care, deodorants, household and feminine hygiene products.

## TECHNOLOGIES

Hill Top Research provides technological consultation for protocol development and methods development for the consumer products industry. Hill Top is experienced in working with industry associations to develop testing standards, including the *E1174: Standard Test Method for Evaluation of Health Care Personnel Handwash Formulation*

and *Axillary Deodorant Testing ASTM E1207-87*.

## TECHNICAL SERVICES

The company conducts human safety, claims support and sensory evaluations in six locations throughout the U.S. and Canada for the consumer products industry. Safety testing includes irritation sensitization, use and

photosensitization. Claims support and efficacy are conducted for a wide variety of products including cosmetics, skin care, antiperspirants, eye care, hair care, nail care, baby care, deodorants,

household and feminine hygiene products. Sensory testing includes trained descriptive panel for skin feel (DermatoSensory Profile®). Hill Top's toxicology expertise is in conducting acute toxicology and delayed contact hypersensitivity testing. Its Microbiology department performs EPA and FDA registration testing, topical antimicrobial testing and preservative testing.

## FACILITIES

Hill Top Research, Inc. is headquartered in Cincinnati, OH with consumer product testing facilities in:  
Cincinnati, OH  
East Brunswick, NJ  
Scottsdale, AZ  
St. Petersburg, FL  
West Palm Beach, FL  
Winnipeg, Manitoba, Canada

**HILL TOP  
RESEARCH, INC.**  
P.O. Box  
429501  
Cincinnati, OH  
45242

**TEL:**  
513 / 831-2240  
**FAX:**  
513 / 831-2219

**NUMBER OF  
EMPLOYEES:**  
425

**DATE FOUNDED:**  
1947

**COMPANY  
DESCRIPTION**