WHITEPAPER

Advice from the Field:
Probe Cleaning

PLEXON
Neurotechnology Research Systems

Table of Contents

Introduction

After completion of the experiment and removal of the probe, it is critical that any proteins, lipids, blood, or other biological matter be removed in a timely manner. If the probe is not immediately cleaned, these substances may dry on the end of the probe, covering the sites. This dried layer will greatly affect the impedance of the recording sites, and could affect signal quality. It is also critical that the electrode sites are not physically wiped with any material such as a cloth or cotton swabs. Otherwise, it may have a detrimental effect on impedance.

Lastly, probes may be rinsed briefly with alcohol, but must be allowed to air dry immediately thereafter. **The tips of the probe must not be allowed to sit in alcohol for more than 15 seconds as exposure to alcohol runs the risk of dissolving or damaging the epoxy which holds the electrode sites in place.**

There are two methods to effectively clean probes: using enzymatic detergents (recommended) or Nolvasan disinfectant. One method is sufficient. There is no need to perform both.

Protocols from Probe Technical Guide

Enzymatic Detergents

Plexon recommends using either Metrex EmPower Dual-Enzymatic Detergent (available at www.metrex.com) or Tergazyme from Alconox to clean probes after each use. These detergents contain protease enzymes which remove a variety of proteins, and surfactants to remove carbohydrates, lipids and other proteins. When used properly, the detergent will not damage the electrode sites. Please consult the detergent manufacturer's webpage for more information. NOTE: Be sure to follow all safety precautions on the container before proceeding.

Step 01

Dilute the detergent with warm water in the appropriate ratio (1:128 for Metrex) and swirl to mix. The enzyme activity is affected by temperature, so only water between 68 - 104°F (20 - 40°C) should be used. A fresh detergent solution should be made for cleaning after each experiment.

Step 02

Stir probe in the diluted detergent for approximately 30 seconds and allow it to soak for 30 minutes.

Step 03

Remove probe and stir it in distilled water to remove any detergent residue that might remain.

Step 04

Allow to air dry and place the probe in its container. If it is not possible to immediately clean the probes in the recommended enzymatic detergents after use, the probe should be submerged in water until it can be thoroughly cleaned.

Nolvasan Disinfectant

Nolvasan disinfectant is another cleaning method to consider.

Step 01

Place probe shaft and tip into diluted Nolvasan disinfectant solution for one hour.

Step 02

Run purified, distilled water over the probe.

Step 03

Allow to air dry and place the probe in its container.

If sterilization is necessary, the best method we've found is UV light. It doesn't affect the probe is any way, yet works well to sterilize. A number of Plexon customers have successfully used UV light as a method of sterilization.

Protocols From the Field

The purpose of this document is to share information that we have gathered from other researchers for reference and analysis. It is essential to note that inclusion in this document does not imply approval or endorsement by Plexon. Plexon recommends following the cleaning methods outlined in the Probe Technical guide.

Protocol #01

1. Prepare solution of 1 fluid ounce Empower to 1 gallon of water in an Erlenmeyer flask. In a 250ml flask, this is about 2ml of Empower to 250ml water.
2. Place flask on hotplate/shaker and heat to 40˚C. Allow solution to heat up before placing V-Probe.
3. Place V-Probe into groove on flask stopper with head perpendicular to groove.
4. Place V-Probe and stopper into flask, being careful not to touch tip of V-Probe to any surface. Push the stopper slightly into the flask to hold it steady.
5. Let the V-Probe sit in the solution at 40˚C for 30 minutes.
6. After 30 minutes, remove the V-Probe and stopper from the flask.
7. Rinse the flask with DI water.
8. Fill the flask with DI water and place a magnetic stirrer into the flask.
9. Place the V-Probe and stopper back on the flask.
10. Put the hotplate/stirrer to 40˚C and 300rpm.
11. Return the flask with V-Probe back to the hotplate/stirrer and let sit for 30 minutes.
12. After 30 minutes, remove V-Probe from flask and stopper.
13. Place the v-probe sleeve over a ledge, so the opening is off the ledge
14. Carefully guide the v-probe into the sleeve.

Protocol #02

1. Move probe from brain to Tergazyme solution, let stand for 30 minutes
2. Place the probe in sterile saline for an hour to wash off the tergazyme, gently moving the probe in the saline
3. Probe is then placed in ReNu (contact solution), where it sits overnight.
4. Before use in brain: place the probe in sterile saline for an hour to wash off the ReNu.
5. Light wash with Isopropyl
6. Then saline-rinse with SalJet.

Protocol #03

1. Stream daikon's solution (10% bleach, 90% saline) on the probe for sterilization followed by a stream of 100% saline for cleaning.
2. Then penetrate neural tissue through a dura-penetrating guide tube.
3. Probe goes into a solution of 100cc warm water + 1cc EmPower for ~30 minutes, followed by a stream of distilled water.
4. Then it gets sheathed with the tubing it was delivered in.

Protocol #04

1. We have used Nolvasan in the past but found that we got lower yield on the probe during the next recording session. So we currently do not use it, and instead exclusively use the Metrex enzymatic detergent after each recording session. I think it's quite difficult to rinse off the Nolvasan completely.
2. We mix up the enzymatic detergent fresh each day in a 500 mL beaker and use a hot plate/ magnetic stirrer to keep the solution at temp so the enzymatic detergent remains active throughout the cleaning.
3. We then use a stir bar to create a vortex in the beaker and agitate the solution.
4. We then lower the probes into the solution for 30 minutes as prescribed.
5. We then repeat the process in a solution of diH2O, and then use canned air to hasten drying the probes.
6. The next day we sterilize the probes by immersing them in 10% bleach solution and rinsing them with sterilized water, allowing them to air dry before being inserted into the brain.

Protocol #05

1. We use a 1% Tergazyme solution in sterile water.
2. Then, we rinse with alcohol and more sterile water before inserting.

Protocol #06

1. We use Metrizyme and Metricide for cleaning electrode.
2. I also use ultrasonic cleaner after recording.

Protocol #07

1. Immerse the probe in a beaker (with 1% tergazyme) containing a magnetic stirrer (in movement) for about 30-40 minutes before and after use.
2. Then wash the probe with distilled water and air dry.
3. I've been told by a neighboring lab that conditioning all S-Probes (even a brand new one) with a 30 min incubation period in tergazyme prior to use can greatly increase signal-to-noise ratio - so that's what we do always.
4. We were using 4% generic Nolvasan in sterilized water, but have switched.