

NeuroDesigner® 19 channel Cap Features and Instructions v1.1



OVERVIEW

Cap size is med to med large, fits most heads with a little adjustment.

The electrodes and plastic components are manufactured in house and each cap is hand assembled and tested.

FEATURES OF THIS CAP

- ✓ The plastic is antimicrobial.
- ✓ Large electrode surface area for better signal acquisition.
- ✓ The cap size is adjustable, this reduces the need to have different caps for different sized clients.
- ✓ The cap is very light and comfortable on the head and typically does not induce drowsiness in subjects.
- ✓ Ear clips are included and can be substituted or replaced.
- ✓ The cap has an open design allowing for accessories such as TDCS and photo-modulation devices to be used simultaneously with the cap.
- ✓ The open design allows the clinician to access each electrode site in the event of an error, such as dispensing too much gel, and correct the issue without disturbing the other electrodes.
- ✓ The Robust amplifier connector is easy to grip for removal and is resistant to breakage.
- ✓ Wires on this cap are resistant to breakage at the electrode connection.
- ✓ The cap is easy to clean and dry. There is no cloth component to wash or dry (other than the chin strap) so water can be removed with canned air between clients allowing the cap to be used again very quickly. Heat guns or blow dryers on heat setting are not recommended.
- ✓ Wiring is more flexible and comfortable when compared with ribbon or PVC wire.

INSTRUCTIONS V1.1

REQUIRED MATERIALS:

INCLUDED

1. Cap
2. Ear Clips
3. Blue amplifier connector

SUPPLIES TO HAVE ON HAND

1. Nuprep™ or equivalent skin preparation gel designed for EEG.
2. Electro-Gel™ or equivalent electrolyte gel product designed for EEG electrodes.
3. 10ml Syringe with 16ga blunted needle.
4. Washcloth
5. Measuring Tape
6. 6" cotton tipped applicators
7. EEG acquisition software and compatible amplifier (NeuroField Q2x, BrainMaster Discovery)
8. Impedance checking device or software
9. Denture brush or toothbrush

PREPARING A SUBJECT FOR A QEEG RECORDING:

BEFORE THE SESSION

It is important to for clients to take the following precautions before participating in a qEEG recording.

1. Clients should not be wearing makeup, especially on their foreheads.
2. Clients should not be wearing earrings.
3. Their hair should be:
 - Recently washed.
 - Completely dry.
 - Free from sweat (no hats).
 - Free from all products such as hairspray, gel, conditioner, etc.
 - Toupee's, wigs and hair extensions should be removed.
 - Free from hairclips, pins, barrettes, etc.

DETERMINING ELECTRODE LOCATIONS:

The cap is pre-adjusted to match the International 10/20 locations for a medium to medium large head size. The cap may be adjusted to fine tune the electrode locations. The correct location for each electrode may vary between clients depending on the size and shape of their skulls. It is important, therefore, to learn how to measure each client's 10/20 locations and ensure the center of each electrode is resting directly above the corresponding location. A great tutorial on 10/20 measurement can be found at:

https://www.transranial.com/docs/10_20_pos_man_v1_0_pdf.pdf

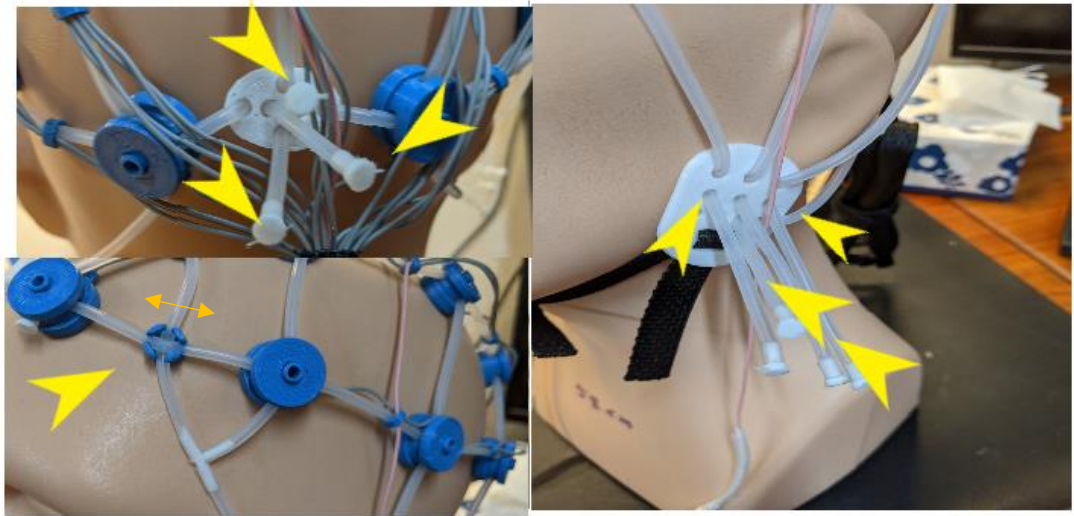
PREPARING THE FOREHEAD AND EAR LOBES:

1. After adjusting the cap electrodes, it is time to exfoliate their forehead and ear lobes with a little Nuprep™. Squeeze a pea sized drop of gel onto two fingers and massage the client's scalp at location Fp1 to remove dead skin cells. Rub the Nuprep™ on the skin using a circular motion about 1 inch in diameter.
2. Repeat step 2 for location Fp2.
3. Use a pea sized drop of gel to exfoliate the back of each ear lobe (the part of the earlobe which is not visible and is closest to the head). Be sure to avoid locations with holes from ear piercings.
4. Remove the Nuprep™ from the client's forehead and earlobes using a soft cloth or towel.

FITTING THE CAP:

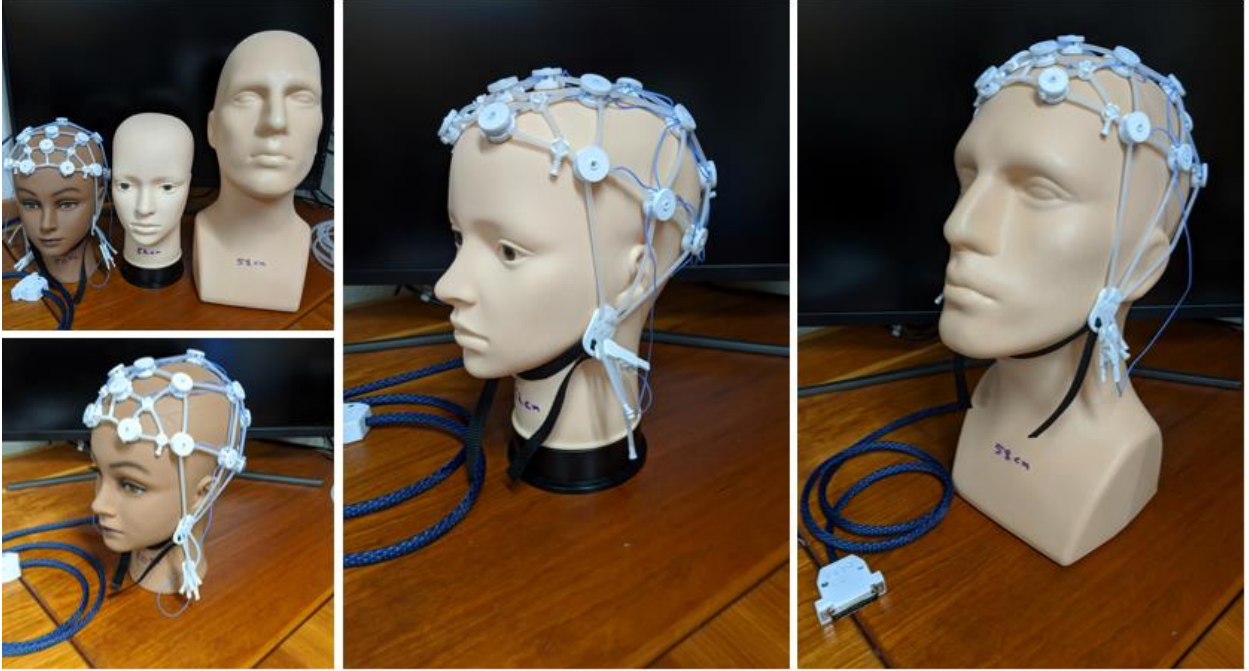
1. Place the cap on the client's head, making sure the chin strap is secure. Locations O1 and O2 are located on either side of the wire bundle which leads to the grey connector. Fp1 and Fp2 are located on the direct opposite side of the cap from O1 and O2.
2. If necessary, adjust the electrodes Each electrode slides along the rubber tubing it is attached to. To adjust, grip the tubing with one hand and the electrode with the other hand. Pull the electrode along the tubing in the desired direction until it is in the correct position (**IMPORTANT: NEVER PUT STRESS OR TENSION ON THE WIRES!**). Additionally, the cap can be adjusted by pulling the four tubes protruding from the jaw tabs. This has the effect of tightening Fp1 and Fp2. Fp1, Fp2, O1, and O2 can also be

adjusted as well by pulling on the tube protruding from the bottom of each electrode and sliding the electrode up toward Cz.



Adjustment Areas, Tubes may be slid or pulled to shorten or lengthen.

Same Cap on a small, small medium and medium /large head.



ATTACHING THE EAR CLIPS:

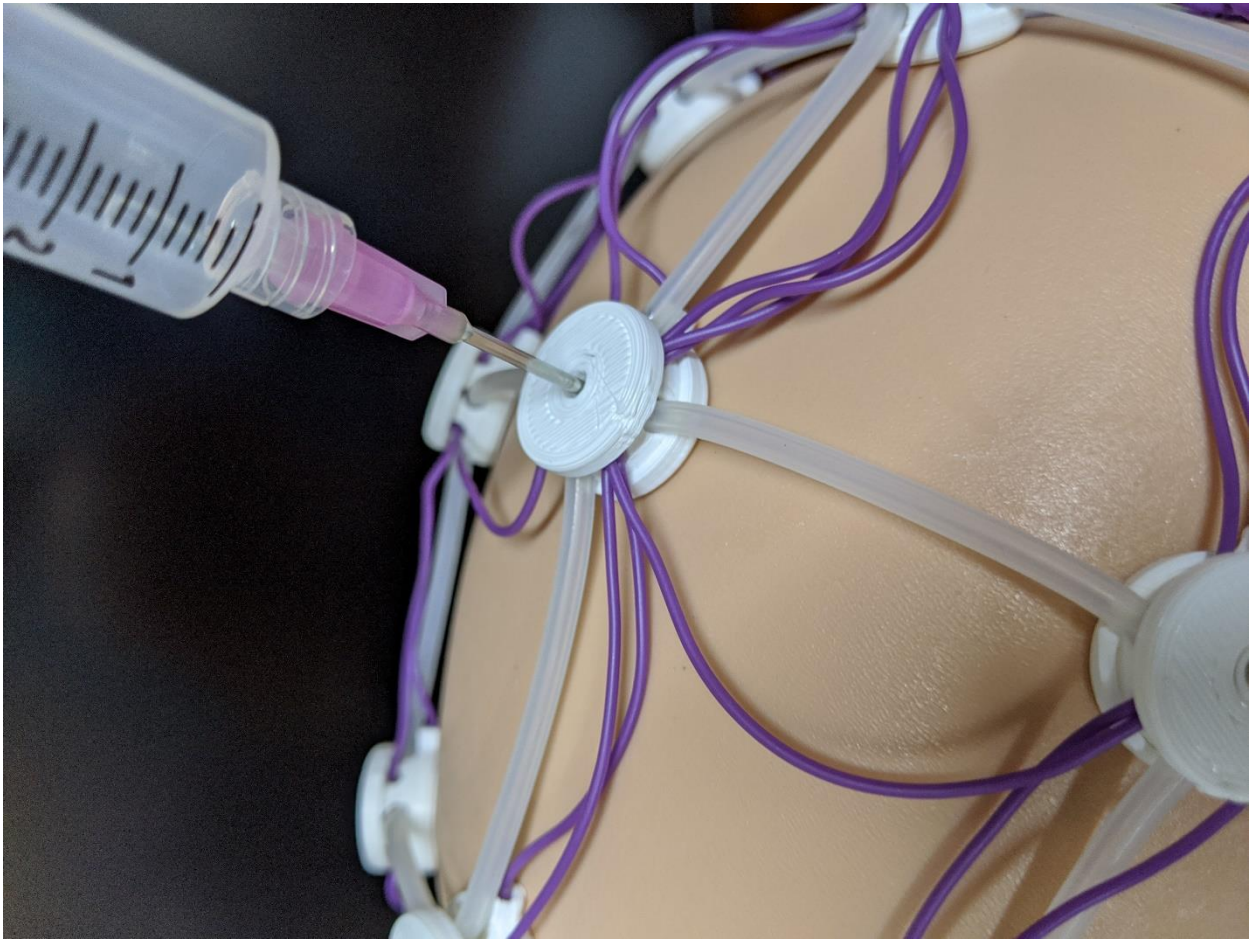
1. Once the cap is adjusted and the electrodes are in the proper position, open one of the attached ear clips to expose a metal electrode. Each ear clip contains only 1 electrode which appears as a metal disk, inside the clip, opposite the spring. Using a syringe, with a blunted needle full of gel, cover the entire surface of the electrode with Electro-Gel, ensuring the drop of gel is 1-2mm thick.
2. Keeping the ear clip open, clip it on the back of the earlobe of the ear which is on the same side of the cap the ear clip is connected to. This should be the same area you scrubbed with Nuprep™ that avoids earring holes. Also, make sure no hair is touching the electrode on the ear clip after it is clamped. Repeat these steps with the second ear clip on the opposite ear.
3. You can substitute or replace the ear clips if you wish. They should use tin electrodes.

ATTACHING THE ELECTRODES:

1. Gently insert the Electro-Gel filled syringe into the hole in the middle of the electrode, using the blunted needle, until it contacts the client's scalp. Pull back just enough that the scalp is not preventing gel from flowing out of the needle tip, but where the tip remains between the electrode and the scalp.
2. Using your thumb to depress the plunger, deposit a small amount of gel on the scalp so it fills the gap between the electrode and the scalp. You can test to see if you have the right amount of gel by gently pressing the electrode down on the scalp. If the gel leaks out from under the electrode, you dispensed too much. If you dispensed too little, you would not see any gel rising in the hole where you previously inserted the blunted needle.

You can always flip the electrode up clean off the electrode and scalp and reapply the gel if you get into trouble.

3. The right amount of gel will not leak out from under the electrode but can be seen entering the hole in the middle, when the electrode is pressed. This process takes practice but will eventually become second nature.
4. Repeat the steps above for all 19 electrodes.



ACQUIRING GOOD IMPEDANCE VALUES

1. Once the cap is properly attached to the client and gel has been applied to all electrodes, and ear clips, it is time to ensure a good connection between the scalp and electrode. To do this, you will need to attach the grey connector to impedance checking software or a separate impedance checking device.
2. The software or device will display the impedance for each electrode in kilohms, including the ear clips. The goal is to get an impedance value of 5 or less kilohms(K), 10K or less is acceptable. Impedance for the ear clips also needs to be as low as possible. Aim for under 5K at the ears, but under 20K if you are having difficulty.
3. Follow these steps to lower the impedance values of an electrode. One method is to take the wooden end of a cotton tipped applicator and insert it into the hole in the middle of the electrode until it contacts the scalp. Taking care to not break the client's skin, twist the applicator between your fingers in alternating directions to abrade the scalp. For the client's comfort, abrade for 1-2 seconds, then lift the applicator off the scalp for 1 second, return the applicator to the scalp and abrade, then lift again. As you abrade the scalp and ensure the gel is filling the gap between the electrode and the scalp, the impedance values will fall. Repeat the process until the desired impedance value is reached, then move on to the next electrode. Do this for all 19 electrodes.
4. The ear clips impedance value can depend on how well the ear lobes are abraded with the Nuprep™. If the ear clips' impedance value is too high, first check to make sure there is no hair between the electrode and the ear. Even a couple strands of hair can raise the impedance value. If removing hair does not lower the impedance enough, remove the ear clips, wipe the gel from the earlobe with a cloth, and rescrub the ear lobe with Nuprep™. Then wipe off the Nuprep™, reapply gel and attach the clip to the ear like it was before. You can also check to see if the ear clip electrode is resting on an earring hole. Moving the ear clip to an area without holes should lower the impedance value as well.

5. When the impedance values are adequate, attach the blue connector to A NeuroField Q20/Q21 or BrainMaster Discovery amplifier and follow the manufacturer's instructions. **IMPORTANT: WHEN PLUGGING IN OR UNPLUGGING THE CAP, GRIP THE GREY CONNECTOR ONLY, DO NOT EVER PUSH OR PULL ON THE WIRES.**

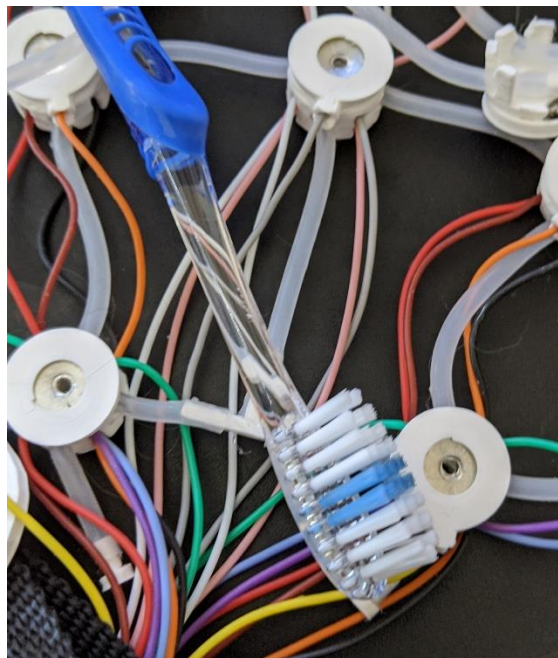


Amplifier connector

CLEANING THE CAP

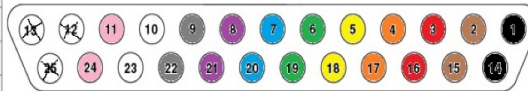
1. Turn the cap inside out and scrub each electrode with a small brush or toothbrush, under warm running water, making sure to remove all gel from the surface of each electrode and ear clip.
2. Next, take a blunted needle and clear the hole in the middle of the electrode by repeatedly inserting and retracting the needle under warm running water. To ensure all gel is out of the hole, canned air can be sprayed in each hole, although that may not be necessary if you clean the hole well enough with the needle.
3. Excess water can be removed with canned air between clients allowing the cap to be used again very quickly.
4. Hang the cap to dry.

IMPORTANT: PLEASE KEEP THE GREY CONNECTOR DRY DURING THE CLEANING PROCESS. It is best to place it off to the side away from the water source. Also, when hanging the cap, make sure the connector is not directly under the cap where water could drip on it. It is best to hang the connector higher than the cap or off to the side.



19 CHANNEL CAP PIN OUT

	Wire Color	Pin	Label		Label	Pin	Wire Color	Label	Pin	Wire Color
1	Black	1	Fp1		Fp1	1	Black	Fp2	14	Black
2	Black	14	Fp2		F3	2	Brown	F4	15	Brown
3	Brown	2	F3		C3	3	Red	C4	16	Red
4	Brown	15	F4		P3	4	Orange	P4	17	Orange
5	Red	3	C3		O1	5	Yellow	O2	18	Yellow
6	Red	16	C4		F7	6	Green	F8	19	Green
7	Orange	4	P3		T3	7	Blue	T4	20	Blue
8	Orange	17	P4		T5	8	Purple	T6	21	Purple
9	Yellow	5	O1		GND	9	Gray	Cz	22	Gray
10	Yellow	18	O2		Fz	10	White	Pz	23	White
11	Green	6	F7		A1	11	Pink	A2	24	Pink
12	Green	19	F8							
13	Blue	7	T3							
14	Blue	20	T4							
15	Purple	8	T5							
16	Purple	21	T6							
17	Gray	9	GND							
18	Gray	22	Cz							
19	White	10	Fz							
20	White	23	Pz							
21	Pink	11	A1							
22	Pink	24	A2							
		12	NC							
		25	NC							
		13	NC							



COMMENTS FROM BETA TESTERS:

“I absolutely love the NeuroDesigner cap! I know that the goal was to make an affordable cap but by the time Phil was done with it became a far superior cap as well. I have a bunch of caps from a popular manufacturer, but I stopped using those after I saw how well the NeuroDesigner cap works. It is open, lightweight, comfortable, easy to clean and maintain, produces a great EEG, durable, fully adjustable, it may one day double as a 19 channel stim (entrainment) device! “

- Preston Patterson, M.S. LMHC

“I ran some tests on your EEG cap this weekend. My feedback is that it took a little bit to get used to sizing the cap. I fumbled around with it a bit to get it right and I think, in time, I will be able to manage it better. When I ran it on QCheck the first time I initially got impedance values in the 10-15 range. However, the person I was recording had dirty hair that was oily. After 15 minutes on the head the values all dropped to roughly 1. I recorded a 0.5-70 Hz recording. The signal was unlike anything I have ever seen. It looked amazing. Clean as clean could be. The cap worked perfectly. I wholly endorse this cap and think you did a great job with it. If you go to market, I would like to buy some from you. “

- Nicholas J. Dogris, PH.D., BCN, QEEG-D

“I’ve used it twice. Love the fit and comfort. The ear clips get a protest from clients as too tight. I keep meaning to MacGyver them, but haven’t done so yet. All the impedances were great, and the recordings looked awesome.”

- Candia Smith, DMH, BCN, QEEG-D

“Love it!! Love the design, looks pretty too. Easy to get good impedance, takes about 10 minutes less, to do a full QEEG.”

- *Jamie Moore RN, QEEG-D, BCN*

“used the cap today and noticed that I had good impedance on the Qcheck but when I checked out voltage levels all channels were above 500? Have you heard that issue? Avatar impedance check showed all below 5 but the signal did not look natural. I trained patient with NF2 and the signal looked fine there. I am going to compare with previous patient session. I will start using the cap more now. Have just been busy.

Thanks for the explanation. Don't run out and by a Qcheck I will test it out more and get back to you. I got a very clean recording and I understand the Pin issue now. “

- *Henry Srednicki, Ph.D.*