

Measurement and Application and Overview

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Tools of the Trade

- As with any profession, a tech is only as good as the tools used.
 - You will need to have marking pencils in two different colors, a centimeter tape measure, calipers and hair clips (for patients with long hair).
 - The marking pencils need to be sharp to avoid thick marks which may contribute to errors. Why measure in millimeters if you make marks that are 5 mm wide?
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10-20 System

The 10-20 system name is based on the percentages used for determining electrode placements.

A total measurement is divided either into 10, 20 or 25% segments.

We will use hypothetical measurements for illustration purposes in this conference.

Hypothetical Numbers

- Nasion to inion 35 cm
 - Pre-auricular to
 pre-auricular 35 cm
 - Circumference 55 cm
 - Parasagittals 24 cm
 - Anterior transverse 22 cm
 - Posterior transverse 24 cm
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Our Patient

- This young lady volunteered to go through the measurement process again after her EEG was already completed! Can you imagine?

 - Make a mark at the nasion and the inion. Use a different color for these marks to distinguish them from the remaining measurements.

 - The first step is to section the hair from anterior to posterior (nasion to inion) going through the vertex.
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Doing your math

Measure from nasion to inion. The total is 35 cm.

Take 10% of that number or 3.5 cm and make a mark
3.5 cm above the nasion.

Take 20% of the 35 or 7 cm and add that to the 3.5.
Make a mark at 10.5, then 17.5, and 24.5.

Your final mark should be 10% (3.5 cm) above the inion
mark

Continuing sagittal measurements

- You have now made the marks that will determine the anterior-posterior positions of Fpz, Fz, Cz, Pz and Oz. (although Fpz and Oz are not usually used in routine work.)



Pre-auricular to Pre-auricular

- Section the hair from ear to ear going through the vertex.
 - Ask the patient to open and close their mouth. Find the indentation created by the temporo-mandibular joint when the mouth is open and mark that point on each side.
 - Measure between those marks going through the vertex (Cz) mark made in last step.
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Pre-auriculars continued

- Take 10 % of the total or 3.5 and make a mark above the pre-auricular mark you created.
 - Take 20% of the total or 7 cm. Add 7cm to 3.5 and make a mark at 10.5.
 - Continue adding 7 cm to the previous number; then mark 17.5 and 24.5. The last mark should be 3.5 from the mark over the ear.
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Alternate Method Hint

- An alternate method is to just move the tape each time, always lining up the 0 with the previous mark and marking at 7.
 - Some say this can contribute to mistakes but so can adding numbers incorrectly!
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First Position Determined

- At this point, you will have a cross mark at the intersection of the vertex. This is the Cz location.

 - As measurement continues, you will make the cross marks at every electrode position.
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Circumference

- Section hair around the circumference using the Fpz, Oz and marks just above the ears as a guide.
 - Now using the tape as a guide, place it under the Fpz mark and the mark above the ear. Make a mark above the tape along the top edge of the tape at the approximate location of F7, T5, T6 and F8.
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Circumference continued

- Measure the total circumference.
 - Take 10% of the total or 5.5 cm and set the calipers to 5.5 cm.
 - Place the caliper legs with the nose evenly dividing them and make a mark at the tip of each leg.
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Circumference continued

- The final mark should be 5.5 cm from the first mark.
 - You should now have cross marks at F7, T3, T5, T6, O1, O2, T6, T4 and F8.
 - Using the Fpz mark as a guide for the level, make the cross marks at Fp1 and Fp2.
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Parasagittals

- Section the hair from Fp1 to O1 going through the mark at the central electrode position.
- Measure the total from Fp1 to O1. Total is 24. Take 25% of total which is 6 and make a mark at 6 cm, 12 cm and 18 cm. Mark above the tape.
- You should now have a cross mark at the C3 position. Repeat for the right side being sure to mark above the tape just like you did on the left.



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POSTERIOR TRANSVERSE

- Section hair from T5 to T6 going through the marks at the parietals

 - Measure from T5 to T6. Total is 24.

 - Divide 24 by 25%. Make a mark at 6, 12, and 18.

 - You now should have cross marks at T5, P3, Pz, P4 and T6.
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TRANSVERSE FRONTAL

- Section hair from F7 through Fz to F8
 - Measure the distance from F7 to F8
 - Total is 22 cm. Take 25% of that which is 5.5 cm
 - Make a mark at 5.5 cm, one at 11 and one at 16.5 cm.
 - There should be cross marks now at F7, F3, Fz, F4 and F8.
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SECTIONING HAIR

- As the final step, section the hair and secure with hair clips or rubber bands.
 - When the hair is all clipped out of the way, electrode application can be achieved much more efficiently.
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Final Inspection

- Look at the marks to see if they appear to be anatomically correct.
 - During the Measurement and Application section of the board, now is a good time to remeasure and check electrode positioning.
 - Are they anatomically correct? Did you mark nasion and inion so the examiners can easily identify them?
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T1 and T2 Measurements

- Measure from pre-auricular point to the outer canthus of the eye
 - Make a vertical mark at one third the distance
 - Make a mark along the top edge of the tape
 - Measure up one centimeter from the last mark and intersect with the vertical mark
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THANK YOU!!

- We encourage you to practice until this becomes second nature to you.
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