

Skin impedance

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Most measurements in bioimpedance yield a fixed reproducible result. But I always liked to work on bioimpedance of the skin because it is so challenging. It is important to know the impedance of the skin when measuring the electrocardiogram because if your amplifier input impedance is not high enough, undesirable attenuation will occur. A typical skin impedance is about 500 k Ω for 1 cm². But Rosell *et al.* [1] showed that at 1 Hz there is a wide spread for different subjects from 10 k Ω to 1 M Ω . And as the frequency increases to 1 MHz, impedance decreases to about 300 Ω . Then impedance changes with time.

Olson *et al.* [2] showed that impedance decreases steadily or exponentially with time constants of several hours. Lozano *et al.* [3] note that impedance varies with body location and is much lower on the tongue than elsewhere on dry skin. Bahr *et al.* [4] show that impedance decreases from 1 M Ω to 200 k Ω in 1 min during a hot flash. De Talhouet *et al.* [5] showed that impedance drops from 500 k Ω to 5 k Ω after 12 skin strippings using Scotch tape.

If you calculate the skin impedance under a defibrillator electrode you get 500 k Ω /100 cm² = 5 k Ω . But after defibrillation if you remeasure you get 50 Ω . What has happened is the high defibrillator voltage has arced through the skin and created many holes that lower the impedance

and redden the skin. There are a variety of subject areas if you want to further explore skin impedance.

References

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