

ECAP amplitude difference
during Hemodialysis:
NRT Case Study

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NRT

(Neural Response Telemetry)

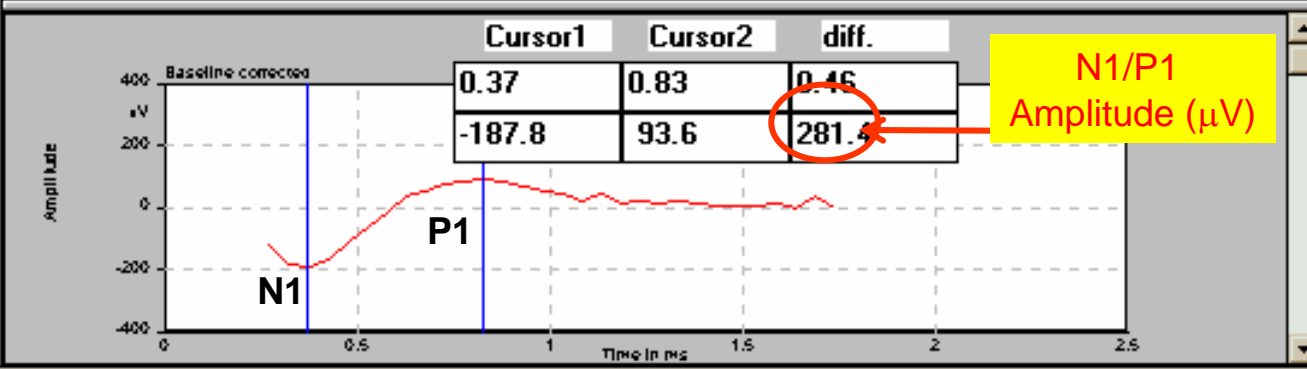
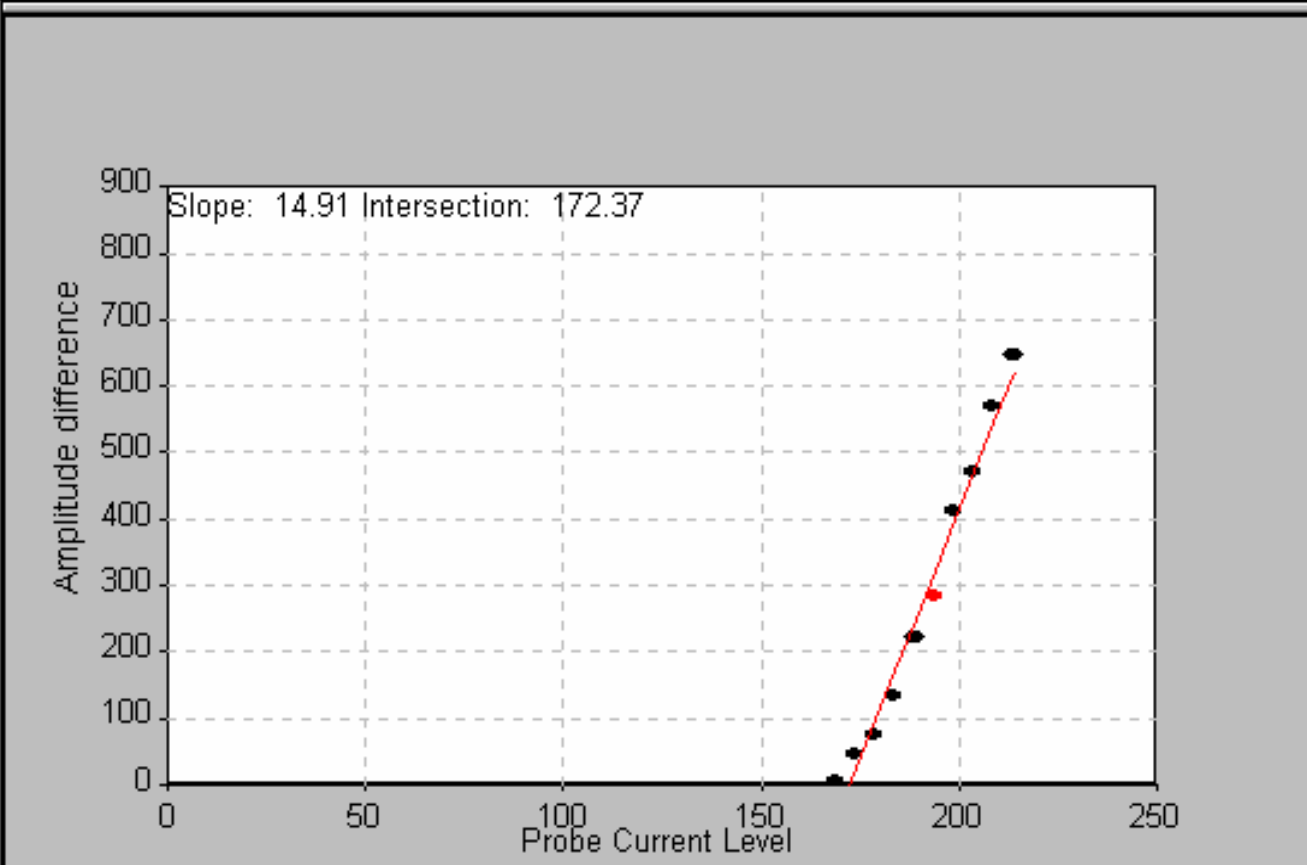
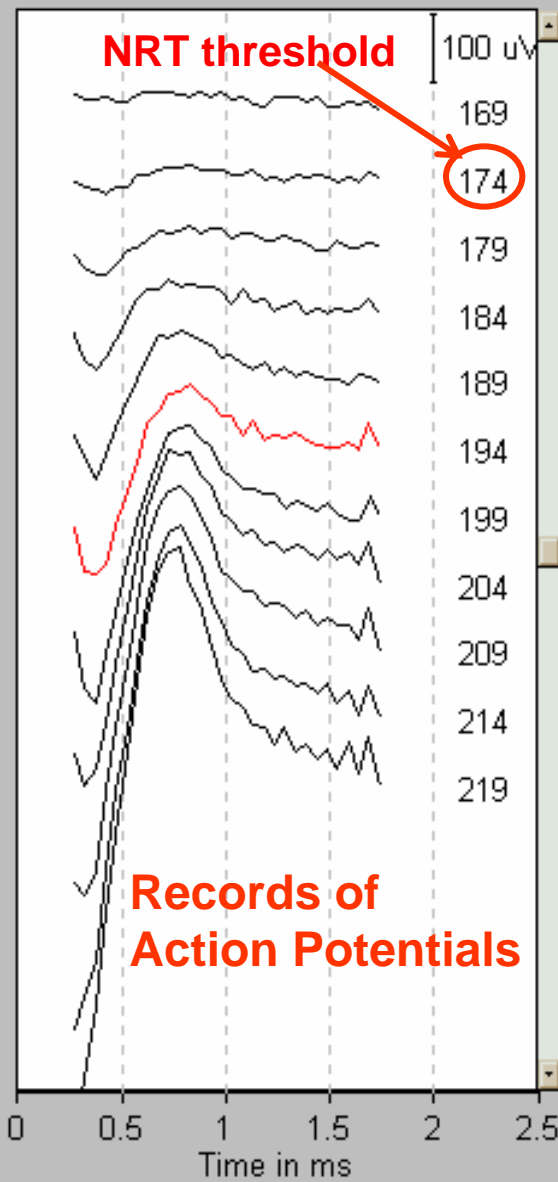
- A new telemetric test to record compound action potentials of spiral ganglion cells in CI users.
- Available only for Nucleus[®] users.

Amplitude of ECAP

- Amplitude of the ECAP is related with number of the activated SGC.
- ECAP amplitude increases as the involving number of the SGC increase.



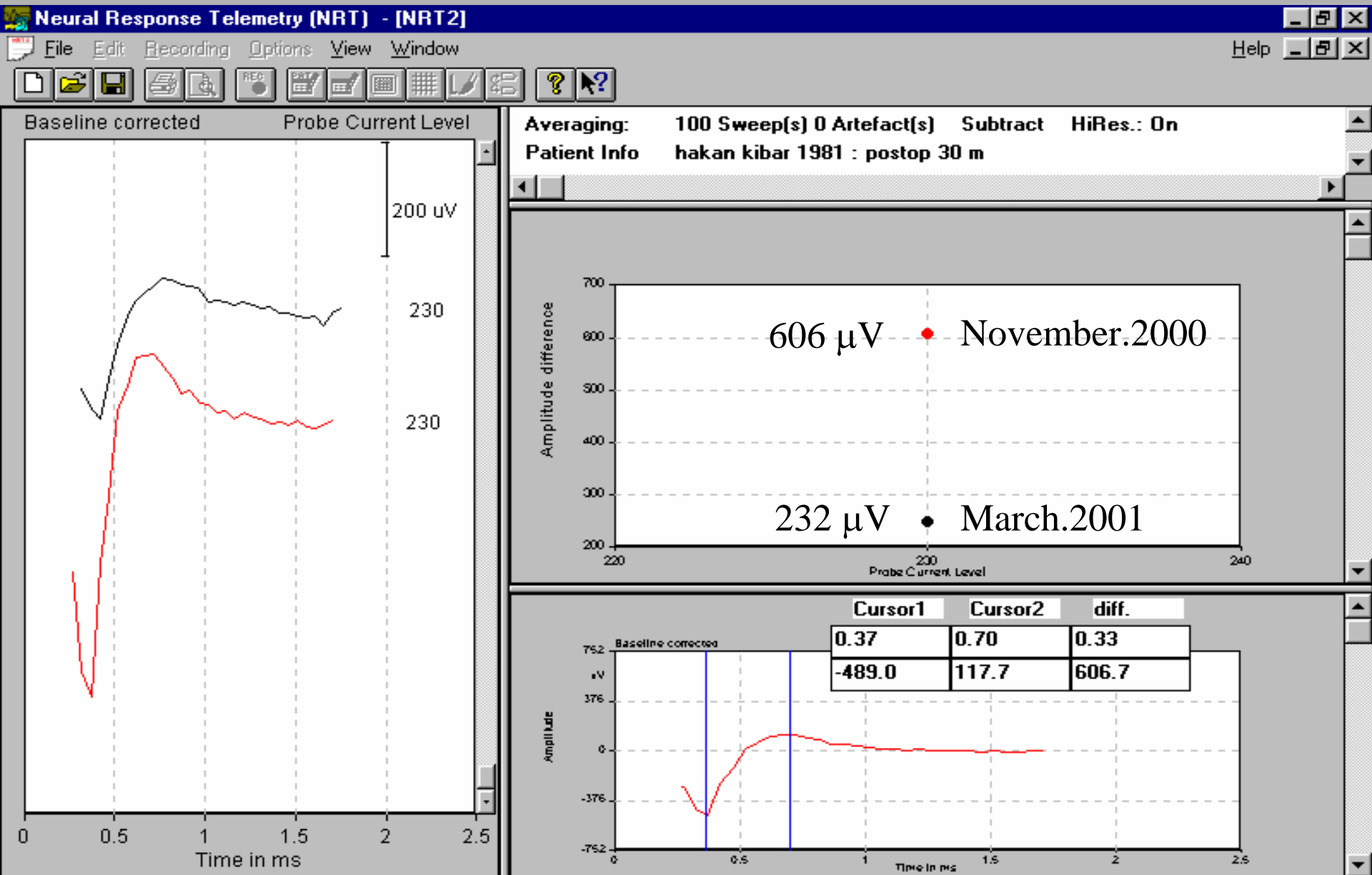
Baseline corrected Probe Current Level



The Patient

During the routine NRT controls it was seen that ECAP amplitude of the patient degreased dramatically from 606 μV to 232 μV in 4 months.

ECAP Amplitude Difference



The Patient

Birth:	1981
Diagnosis of HL:	1988
1st Hemodialysis period:	1990 - 1993
Kidney Transplantation:	1993
Cochlear Implantation:	May/1998
Refusal of transplanted kidney:	1999
2nd Hemodialysis period :	1999 -

Aim

To find out effect of hemodialysis on ECAP amplitude

Method

Impedance Telemetry

Electrodes' impedance were tested at the beginning and end of the dialysis.

Method

NRT

- Total of 5 measurements were done during dialysis with 1 hour intervals.
- T-NRT and ECAP amplitude were found at the each measurement.

Method

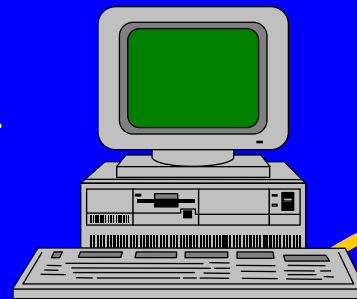
E.A. Immitance and Stapedius Reflex Threshold

Tympanogram and contralateral electrically stimulated stapedius reflex thresholds were obtained just before and after the dialysis.

Electrically Stimulated Stapedius Reflex Threshold

Test mode:
Contralateral reflex
decay

Electric
stimulator



Ipsi Probe
(Recording)

Results

Tympanogram:

Static compliance degreased from 0.57 cc to 0.42 cc during dialysis.

Explanation:

Dialysis reduced percentage of urine in blood. ➡ H₂O passed from vessels to lymphatic channels by Osmotic mechanism. ➡

Pressure of endolymph and perilymph increased ➡ Stiffness of the middle ear increased ➡ Static compliance degreased.

Results

Impedance Telemetry

- In CG mode electrodes impedance increased between 1.2 kOhm to 0.8 kOhm.
- In MP modes there wasn't a significant differences.

Results

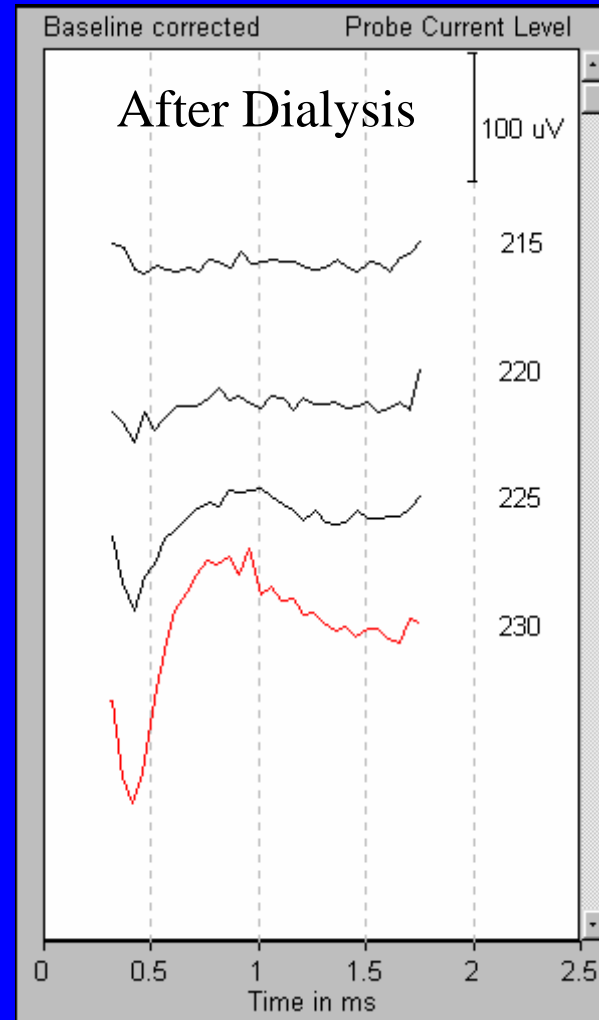
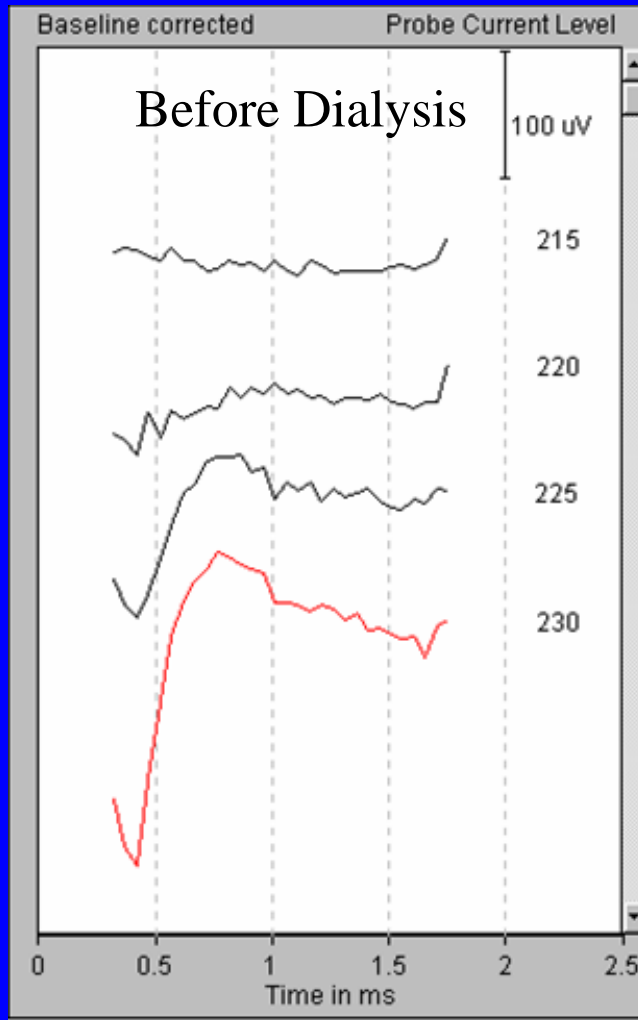
(Impedance Telemetry)

Explanation:

- In CG mode we test the impedance between the inserted electrodes which are surrounded with perilymph. After the dialysis conductivity of perilymph decreases. This increases the electrodes impedance.
- In MP modes we test the impedance between ball/plate electrode and inserted electrodes. Conductivity of the tissue between these electrodes does not effected much from dialysis.

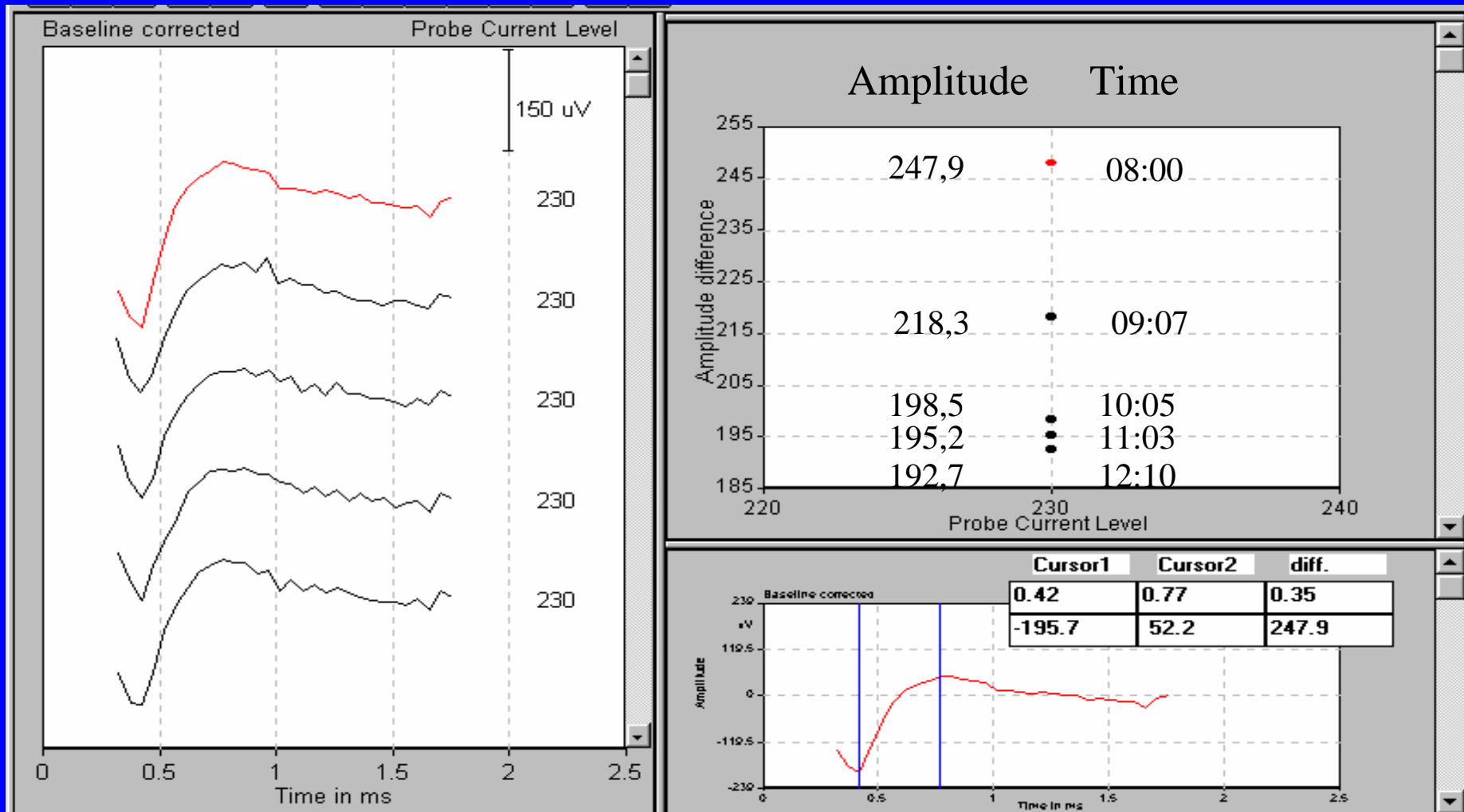
Results

NRT threshold stayed stable during dialysis



Results

ECAP amplitude decrease significantly especially in the first 2 hours of the dialysis.



Discussion

Degrease of ECAP amplitude shows that activated SGCs degreased during dialysis.

But we don't know if the effect of dialysis permanent or not.

Discussion

C Level was 50 CL higher than ESRT
(C Level: 255 CL; ESRT: 205 CL)

- The patient was over stimulated during last 4 months.
- May be over stimulation was the main reason of amplitude decrease in the last 4 months.

“Long Term Effect of Implant Usage on ECAP Amplitude”*

- 19 Patients were followed for 1 year.
- ECAP amplitude of 4 patients degreased at the end of 1 year.
- In 3 out of those 4 patients C levels were significantly higher than ESRT.

Source: M.Aksit, F.Akdas, C.Batman. 2001., 13th. Annual of of AAA.
San Diego, California.