General information on transcorneal electrical stimulation
For most of the degenerative retinal and optic nerve diseases there is no satisfactory treatment to reverse or even stop the course of degeneration. As a result, several million people worldwide become blind every year - in Germany alone, for example, there are 30,000-40,000 patients with retinitis pigmentosa.

In the last few years, there have been renewed efforts to use electrical currents therapeutically, to restore lost neuronal function or to slow the progressive degeneration of a usually progressive degeneration. Research shows unequivocally that transcorneal electrical stimulation (EST) has a cell preserving effect on dying retinal cells.

How does the electrical stimulation work?
The effectiveness of electrical stimulation in various eye diseases has been impressively demonstrated in numerous animal experiments. The effect of electrical stimulation is attributed to the activation of several neuroprotective systems and factors – in particular, the stimulation of the insulin-like growth factor-1 system and an increase in the secretion of fibroblast growth factor-2, B-Zelllymphoma-2 protein, ciliary neurotrophic factor (CNTF) and brain-derived neurotropic factors.

Previous experience with the transcorneal electrical stimulation in patients with retinitis pigmentosa
A pilot study with retinitis pigmentosa patients, carried out by the Electrical Stimulation Research Group of the Department of Ophthalmology, Tübingen, led by Prof. Florian Gekeler, has shown the safety of transcorneal EST as well as positive effects. In the study 24 patients with a relatively early form of classical rod-cone dystrophy (retinitis pigmentosa) were included. Patients were randomly assigned to one of three groups (8 patients per group): 1. Sham stimulation with the electrode system but without current flow; 2. Stimulation with 66% of the individually
determined electrical phosphene threshold; 3. Stimulation with 150 % of the individual phosphene threshold. The phosphene threshold is the lowest current that induces flashes of light in the eye. It is slightly different for each person.

Stimulation was carried out using DTL fiber electrodes for 30 minutes once a week, performed during 6 consecutive weeks. In the group of patients that were stimulated with 150 % of their threshold, 8 of the 18 examined parameters remained constant, another 8 showed a trend towards improvement, but were not statistically significant. The area of the visual field (evaluated with the Goldmann III/4e target size) and the scotopic b-wave amplitude improved significantly. In the group with 66 % stimulation and in the sham-stimulated patients, there was no overall trend. Symptoms of dry eye after stimulation sometimes occurred; serious adverse events did not occur. The results of this world's first scientific study on the use of electrical stimulation are encouraging. Meanwhile the system OkuStim® from Okuvision GmbH (www.okuvision.de) has been approved. Two more studies with a significantly higher number of patients and a significantly longer period of time must show whether long term use of electrical stimulation can slow or stop disease progression in RP and to ascertain what level of current is best suited.

**The studies EST 2 and TESOLA**

For security reasons in both studies only one eye will be stimulated.

The first study named EST 2 will take place only in Tübingen. Please notice: Inclusion into EST II is not possible anymore.

The other study named TESOLA is going to be performed in a number of centers in Germany and neighboring countries. TESOLA is an open application study. Every included patient is stimulated with the effective dose of the first study. The costs for the stimulation device or the treatment in clinic initially has do be paid, in this case, by the patient because the costs by now will not be adopted routinely by the health insurance. Application on special case is possible.
The observations of the safety of electrical stimulation in 100 patients with Retinitis pigmentosa should be evaluated. All patients are treated with 150 % of the current perception threshold for a period of 6 months stimulated for 30 minutes once a week. This is the same amperage the promise in the first study with a six-week application was.

After completion of the stimulation can - with appropriate study results - be made a regular electrical stimulation and it can be recommended a Regulation by ophthalmologists in private practice. Inclusion is still possible.

The stimulation in both studies is provided by the system OkuStim® from Okuvision GmbH (www.okuvision.de). This devise is capable of controlling all parameters acquired in the preliminary study.

**Who is suitable for study participation in TESOLA**

- adult patients, capable of giving consent, with retinitis pigmentosa (rod-cone dystrophy)
- Visual acuity at least 0.02

**Who cannot participate in the trial?**

Patients with the following disorders are not suitable for electrical stimulation:

- Retinal degeneration others than Retinitis pigmentosa
- Age-related macular degeneration
- Macular Oedema (fluid accumulation under the retina)
- Retinal circulatory disorders (blood vessel occlusion)
- Retinal changes due to diabetes mellitus (diabetic retinopathy)
- Retinal detachment
- Glaucoma
- Corneal degeneration
Information on the OkuStim®-System

How OkuStim® is applied?

The system contains 3 components: the Neurostimulator OkuStim®, the frame OkuSpex® and the electrodes OkuEl®. The OkuEl® Electrodes are packed sterile and suitable for single application.

The operating of the appliance is easy and suited to the needs of the patients. The electrode thread is placed below the pupil on the Ocular surface and is only hardly noticed the patient. The frame then is connected to the OkuStim® via cable. The treatment is carried out with closed eye and the appliance has a soundsystem which enables a proper handling even for RP patients in advanced Thresholds individually are determined by the doctor for each patient. These serve as a baseline for subsequent therapy setting (Amperage). These data are saved on a USB-flash drive of the appliance and are checked by the treating ophthalmologist for the given period of time at regular visits.

How often should the OkuStim system be used?

Based on the clinical test results achieved to date, stimulation for 30 minutes once a week is currently recommended. In addition to weekly stimulation, regular ophthalmic examinations by specialized ophthalmologists are necessary in order to monitor the success of the therapy.

Is the treatment painful or unpleasant?

No, the OkuStim treatment is not painful. Patients may experience slight discomfort or redness after using the device. If this occurs, the use of artificial tears during the stimulation session is recommended.

How can I get an OkuStim® system?

You will need a prescription from your doctor to get an OkuStim® system. Currently, use of transcorneal electrical stimulation is recommended only with participation in an Okuvision study.
Contact

If you have questions please contact us:

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Or visit our website www.okuvision.de.

The following centres are interested in conducting the trial. If you want to participate please contact directly the nearest center:

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