# TRANSACTIONS OF THE DANISH OPHTHALMOLOGICAL SOCIETY 1969–1970

BY

E. GOLDSCHMIDT, Secretary

*425th Meeting, September 27, 1969, in Copenhagen*
*(Eye Department, University Hospital, Blegdamsvej)*

P. M. Møller: *Operation films:*
(a) *Recession of eye muscles by the self-edge method.*
(b) *Trans-conjunctival obliquotomy.*

Discussion: *V. Clemmesen, K. Dreisler.*

Michael Nielsen: *The blood-vitreous barrier.*

Discussion: *O. A. Jensen, N. Ehlers.*

M. S. Norn: *Dendritic keratitis. A follow-up study of the corneal sensibility.* Publ. Acta ophthal. (Kbh.) vol. 48, 1970: 91–108, 214–226, 227–236, 383–395.

Discussion: *J. Edmund, Godfred Larsen, E. Skeller, P. Kjer, E. Sebber, N. Bülow.*

S. Ry Andersen: *On Centralization of Radiotherapy of Retinoblastoma.*
In the eastern and central states of the United States, the treatment of retinoblastoma has been extensively centralized at Presbyterian Hospital, New York, where about 50–60 new cases are being treated every year.

The chief method [1] is still enucleation of the first and radiotherapy of the second eye, but occasionally also of the first. All examinations are performed by Dr. Ellsworth or Dr. Reese, always under anaesthesia. The results are traced on a diagram, and the treatment is in close collaboration with the radiotherapist Dr. Tretter. The standard treatment is high-voltage X-ray irradiation (betatron), in the more unfavourable cases combined with chemotherapy in the form of T.E.M. administered intraarterially. Small

tumours and recurrences are often treated by electrocoagulation. Orbital exenteration is used in the event of recurrences in the optic nerve or orbit.

The last analysis[2] showed freedom from recurrence, with a visual acuity exceeding 10/200 in 87–60 per cent of groups 1–4, lower for group 5. For the entire material the rate was about 50 per cent.

In Denmark the treatment is centralized in the Radium Centre for Jutland in Århus. In spite of great skill and energetic efforts, the results are considerably inferior to those in New York. However, the tumours in the Danish material are considerably larger than in the American one.

The Danish results may no doubt be somewhat improved by the following measures:

The ophthalmologists should follow the second eye regularly, at intervals of a couple of months, under anaesthesia, so that radiotherapy may be instituted earlier than is now the case.

The radiotherapy may be technically improved in several respects, *inter alia,* by using high-voltage units instead of cobalt (this is already being altered). Electrocoagulation and T.E.M. should be used more liberally.

All considered, however, I do not believe that technical changes will afford marked improvement. No doubt, the decisive factor is a sufficiently large material. Even the most efficient team is unable to gather sufficient experience by treating a few cases annually, and definitely not experience enough to try irradiation of the first eye.

At long sight I feel that the radiotherapy of retinoblastoma should be solved on a Scandinavian level. As many Scandinavian countries as possible, preferably all of them, should centralize the treatment in one radiotherapy department combined with an eye department. Some of the follow-up examinations could be carried out in the respective countries. Where such centralization should be located has to be jointly decided by radiotherapists and ophthalmologists. I suggest that a discussion on centralization be instituted in the Scandinavian countries.

*References:*

1) Andersen, S. Ry: Radiotherapy of eye diseases. Paper read before the Pacific Coast Oto-Ophthalm. Society, San Francisco, April 1969. Publ. Trans. Pacif. Cst. oto-ophthal. Soc. 1970.

2) Hyman, G., R. Ellsworth, C. Feind & P. Tretter: Combination Therapy in Retinoblastoma. Arch. Ophthal. 80: 744, 1968.

Discussion: *N. Ehlers, V. A. Jensen, H. H. Seedorff, H. Ehlers, P. M. Møller, M. Warburg.*

---

## *Extraordinary General Assembly*

Discussion and approval of the report on future structure and educational problems in Danish ophthalmology. Publ. Ugeskr. Læg. 131: 1969, 2004–2009.

*Extraordinary Meeting on October 7, 1969, in Copenhagen*
*(Eye Department, University Hospital, Blegdamsvej)*

Wolfgang Zeman, University of Indiana: *Some problems of Spielmeyer-Vogt's disease.*

---

*426th Meeting, November 14, 1969, in Copenhagen*
*(Eye Department, University Hospital, Blegdamsvej)*

R. L. Gregory, Edinburgh: *Perceptual Implications of Recovery from Early Blindness.*

R. L. Gregory: *Understanding Perception Through Illusions.*

Discussion: *H. Skydsgaard, M. Warburg.*

---

*427th Meeting, December 6, 1969, in Copenhagen*
*(The Steno Memorial Hospital, Gentofte)*

Norman Ashton, London: *The Pathogenesis of Diabetic Retinopathy.*

---

*428th Meeting, January 30, 1970, in Copenhagen*
*(Eye Department, University Hospital, Blegdamsvej)*

N. Rosenberg: *Corrosion of the Conjunctiva Complicated by Contamination by the Isotope $^{35}S$.*

An accident occurred in a biological institute where an isotope technician was hit in

the ocular region by the contents of a crushed ampoule. The ampoule contained the organic sulphuric compound p-toluene-sulphonic acid anhydride, containing the isotope $^{35}S$.

On contact with water the sulphonic acid anhydride is converted into sulphuric acid. Immediately after the accident the patient was treated by irrigation of the eye. Examination in the Eye Clinic of the University Hospital, Blegdamsvej, half an hour after the accident disclosed merely a superficial conjunctival corrosion which was excised.

Activity measurements were instituted a few hours after the accident and showed appreciable contamination of the laboratory where it had taken place and of the technician's clothes. Less pronounced contamination was ascertained in the treatment room of the Eye Clinic. These activity measurements were carried out by the National Health Service Laboratory for Radiation Hygiene at the Health Physiology Department, Risø.

The content of the crushed ampoule was 5 millicurie $^{35}S$ of which at most 2.5 millicurie can have hit the patient.

In the periocular area an activity of the magnitude 2 microcurie was measured a few hours after the accident. Another approx. 2 microcurie was excreted in the urine during the subsequent days.

At the primary treatment (irrigation), therefore, the contamination was estimated to have been reduced by a factor of 1000.

Autoradiography of the tissue removed from the conjunctiva showed the activity to be localized to the epithelial surface.

The activity in the patient's urine decreased in a few days to immeasurable values. In the periocular area, on the other hand, activity could be traced for weeks after the accident. Attempts at accurately locating the activity showed that presumably it was in the cilia and supercilia.

The measurements cannot form the basis of a calculation of the absorbed dose, in particular with a view to the lens. $^{35}S$ emits beta particles with a mean energy of 0.05 MeV, which has little tissue penetrance, and it is estimated that the risk of reaching a cataractogenic dose is negligible.

With the increasing use of radioactive isotopes in industry, science, and clinical practice, similar accidents may be expected to occur now and then. In that event, radiohygienic expert assistance should be called immediately.

Discussion: *E. Vesterdal, E. Gregersen, P. Brændstrup, M. Warburg, H. Ehlers, S. Ry Andersen.*

J. Hvidberg-Hansen: *Enzyme Histochemical Studies of the Iridic Pigment Epithelium.*

In a series of experiments the irides of 12 rabbits were investigated for enzyme content in the pigment epithelium.

This was done by the light microscopic techniques described by Burstone (1958) and by Thomas & Pearse (1961). The former method was used for studying non-specific alkaline and acid phosphatase, while a number of dehydrogenases were assessed in Henning Andersen's modification (1965) of the latter method.

The dehydrogenases studied were lactic beta-hydroxy-butyric, succinic, isocitric, and glucose-6-phosphate dehydrogenase. The three last-mentioned enzymes were found to be present in a fairly small quantity in the epithelium, somewhat less than the content in the epithelium of the ciliary body. Alkaline and acid phosphatases showed a marked difference in the content in that part of the pigment epithelium which is situated immediately behind the sphincter, where it was of approximately the same magnitude as in the ciliary body, whereas in the more peripheral parts of the iris there

was a fairly low content of the named enzymes. For lactic and beta-hydroxy-butyric dehydrogenase there was a tendency to a lower content in the juxta-pupillary zone than in the peripheral area.

Moreover, preliminary experiments have been performed, visualizing acid and alkaline phosphatases on the same type of tissue on the fine structural level by an electron microscopic technique. Hugon & Borger's method was used for visualizing alkaline phosphatases (1967) and Barka's technique for the acid phosphatases (1964). Non-specific alkaline phosphatases were found to be localized at the invaginations corresponding to the surface and sides of the epithelial cells and at the microvillous structures situated on the cellular surface facing the stroma. This applied to the epithelial cells in the ciliary body as well as in the iris, the invaginations being somewhat more scanty and scattered in the latter.

It seems to be characteristic of the juxta-pupillary part of the pigment epithelium that the acid phosphatases are localized to the pinocytotic vesicles, while this did not apply to the ciliary body or to the epithelium on a level with the dilatator of the iris.

Discussion: *N. Ehlers, O. A. Jensen, H. Ehlers.*
(The investigation will be published in Zeitschrift für Zellforschung 1971).

K. Rasmussen & A. Faurbye: *Follow-up Study of Chlorpromazine Changes in the Lens of Long-term Treated Patients.*

Discussion: *E. Skeller, V. Dreyer, O. A. Jensen, S. Ry Andersen.*

P. H. Madsen: *Haemorrhagic Glaucoma – Aetiology and Clinical Course.*

A comparative study of heamorrhagic glaucoma in 30 diabetic and in 40 non-diabetic patients was reported. All patients admitted to the ophthalmological department of the Århus Municipal Hospital, University of Århus, during the five-year period 1963–1967 were included in the study.

Among the non-diabetics 26 had recognized thrombosis of the central retinal vein. This was found in 6 of the diabetics.

Three of the non-diabetics had severe arteriosclerosis or occlusion of the central retinal artery, but no central vein thrombosis. In 11 of the non-diabetics the fundus could not be observed. Retinal arteriosclerosis was found in nearly all 70 patients.

The average age among the diabetics was 49 years, among the non-diabetics 67 years. Proteinuria was found in 17 of the diabetics, but in only one non-diabetic.

All the diabetics but one had long-term diabetes, 24 even proliferative retinopathy in one or both eyes.

The clinical course of the haemorrhagic glaucoma was identical in patients with and without diabetes. In most cases the intraocular pressure was about 45–50 mm Hg.

Six diabetics and one patient with thrombosis of the central vein had bilateral haemorrhagic glaucoma, whereas the glaucoma was unilateral in the remaining 63 patients.

Simple glaucoma did not occur among the diabetics, but was observed in 40 per cent of the non-diabetics. Hypotonia prior to the haemorrhagic glaucoma was noted in 12 diabetics.

Rubeosis of the iris and vessels in the chamber angle are crucial features in haemorrhagic glaucoma. Rubeosis was observed in 69 patients prior to or simultaneously with the onset of haemorrhagic glaucoma. Secondary rubeosis was encountered in only one non-diabetic patient. Among 14 diabetics and 2 non-diabetics previously examined, rubeosis of the iris had been seen prior to the development of haemorrhagic glaucoma in 11 eyes for more than 12 months. In 7 eyes the rubeosis remained unchanged for 2–6

years without subsequent haemorrhagic glaucoma, and in 3 non-glaucomatous eyes the rubeosis disappeared spontaneously.

Discussion: *H. Skydsgaard, V. Dreyer, P. Brændstrup, H. Ehlers, O. A. Jensen.*

P. H. Madsen: *Haemorrhagic Glaucoma – Treatment.*

Treatment of heamorrhagic glaucoma is an unrewarding task. In nearly all cases vision is lost, and the only objective of the treatment is to relieve the pain, which is often very intense.

77 eyes in 70 patients were treated for haemorrhagic glaucoma during the five-year period 1963–1967 at the Department of Ophthalmology, Århus Municipal Hospital, University of Århus. In 18 of the eyes conservative treatment (pilocarpine, diamox, and oral glycerin) or retrobulbar injection of alcohol resulted in subsidence of pain, and further treatment was unnecessary. X-ray irradiation, given in three cases, proved ineffective. Primary enucleation of the eye was performed in two cases.

54 eyes were subjected to some type of operation. The most common procedure was Preziosi's filtering operation with galvano-cauterization, which was performed in 31 eyes; at least 17 remained free of pain for from 12 months to 4 years, including 8 in which the intraocular pressure returned to normal. During the last 2 years cyclocryotherapy had also been used, but the follow-up periods were too short for a proper evaluation of the long-term effect.

The postoperative course did not seem to differ in diabetic and non-diabetic patients.

11 of the 77 eyes had to be removed.

Discussion: *P. Svane-Knudsen:* In the Eye Department, Kolding, we have successfully used Vogt's cyclodiathermy, electrocoagulating the ciliary body in two rows, sometimes supplemented by three perforating coagulations and finished by puncture of the chamber to reduce the tension on the day of operation. Since 1963 we have carried out 39 cyclodiathermic procedures in 32 cases of haemorrhagic glaucoma and in 7 of secondary, absolute, painful glaucoma. Eight of these 39 eyes have later been enucleated because of phthisis, panuveitis, or an incontrollable high tension. In the remaining 31 patients we have obtained a mean tension of 26 mm, and all eyes are reported to be painless. Perusal of the case records has revealed that patients with haemorrhagic glaucoma are often in a poor general condition, and a striking number have died within the first years.

Cyclodiathermy was recommended as a gentle operation, which preserves the eyeball, in absolute, painful glaucoma.

Further discussion: *H. Ehlers, H. Skydsgaard.*

*P. M. Møller & E. Goldschmidt: Paresis Following Strabismus Surgery.*

After obliquotomy of the inferior oblique muscle and a 4 mm retroposition of the internal rectus muscle a 7-year-old boy developed total paralysis of the internal rectus. On the following day it was ascertained by re-operation that the internal rectus was *in situ*. There were no signs of haematoma, but the internal rectus remained totally paralysed for 22 days. Thereafter, its function returned in a few days, and the operative result was satisfactory.

Similar examples of such long-lasting paretic states after an otherwise uncomplicated operation in the hands of a trained surgeon do not seem to have been reported previously.

*429th Meeting, Jointly with the Ophthalmological Society of Southern Sweden, February 21, 1970, in Copenhagen (Eye Department, University Hospital, Blegdamsvej)*

C. E. T. Krakau: *Photoelectric Measurements of the Pupillary Aqueous Flow.*

With the aim of obtaining a less elaborate method than the photographic one for measuring the pupillary aqueous flow, a photoelectric technique was tried. In accordance with theoretical expectations, model experiments have given very satisfactory results. However, the inevitable small movements of the living eye cause difficulties and give dispersion in the flow estimates. Attempts to solve these problems are going on.

B. Ehinger: *Adrenergic and Cholinergic Neurons in the Eye.*

Adrenergic (sympathetic) nerve terminals in the eye were studied by the Falck-Hillarp fluorescence technique. The connection with cholinergic nerves was investigated, *inter alia*, by the methylene blue technique. The sphincter as well as the dilatator pupillae muscles were found to contain adrenergic (sympathetic) *as well as* cholinergic (parasympathetic) nerve terminals. By light as well as electron microscopy it was demonstrated that the terminals are situated so close together that axonal contact may easily occur. This finding has been interpreted to the effect that frequently the peripheral autonomic nervous system contains a predominant type of nerve terminals and a modulating type. The density of adrenergic nerves varies within wide limits between the animal species, even between various monkeys and man. Adrenergic terminals are abundant in ciliary processes and beneath the epithelium of the ciliary body without major species variations. In the trabecular network of the chamber angle, on the other hand, the variations are pronounced: Among primates man has very few adrenergic terminals, while e. g. the capucine monkey (*Cebus capucinus*) has a relatively large number. Like the iris muscle the ciliary muscle has a double innervation. The number of terminals varies widely between the various species. Man has relatively few. Humans and monkeys of the old world have a thin layer of adrenergic neurons in the inner plexiform layer of the retina. Monkeys of the old world have terminals throughout the inner nuclear and plexiform layers, possibly in contact with photoreceptors. Adrenergic cell bodies are present in the inner nuclear and inner plexiform layers and among the ganglion cells. The majority of retinal adrenergic neurons contain dopamine as transmitter substance.

G. Stigmar: *The Diagnostic Value of Adaptometric Examination in Diseases with Vitamin A Deficiency.*

Preliminary data were reported from a systematic study of the light sense in diseases in which a disorder of resorption, metabolism, or blood transportation of vitamin A could be suspected. The dark adaptation curves were determined with the Krakau-Öhman apparatus. With the examination procedure strictly standardized, intra-individual variations were found to be low, thus permitting an evaluation of the effect of the therapy and the course of the disease.

In vitamin A deficiencies secondary to malabsorption most cases gave a good adaptometric response on vitamin A, contrary to the low or absent response which characterized the patients suffering from chronic liver diseases. In one case of steatorrhoea the pathological adaptation curve was normalized by a gluten-free diet.

In some chronic disorders of the liver the adaptation curves often have a typical

shape. The transition from the photopic to the mesopic phase of vision is delayed, but the terminal threshold of light sense may still be normal.

The specific protein, Retinol Binding Protein (RBP), which is an essential part of the transport mechanism for vitamin A, has been determined (by Pär Pettersson, M.D., Uppsala) in these patients. In some patients with hepatic cirrhosis and pathological dark adaptation, RBP was found to be extremely low, and abnormal RBP values were also found in several other cases with sub-normal adaptation. In summary, it may be stated that a thorough examination of the dark adaptation is still of great value in diagnosing vitamin A deficiency. As a sensitive physiological test it is a useful complement to chemical determination of the blood vitamin A concentration.

Discussion: *H. Ehlers, P. Brændstrup, O. A. Jensen, H. Frandsen, S. Ry Andersen.*

P. M. Møller & J. Wegener: *Measurement of Oxygen Tension in the Rabbit Anterior Chamber.*

Previous investigations into the oxygen tension in the rabbit anterior chamber were reviewed. The authors used a polarographic method. By means of a Beckman electrode, inserted by the principle of Clark into the anterior chamber, the oxygen tension was measured both under standard conditions, the rabbit breathing atmospheric air, and under conditions at which the oxygen tension in the inspired air was 100 per cent. The mean value in 28 eyes was found to be 29.2 mm Hg.

Discussion: *J. Edmund, E. Skeller, O. A. Jensen, N. Willumsen, H. Skydsgaard, C. E. T. Krakau, N. Rosenberg, H. K. Dyster-Aas.*

E. Gregersen: *Clinical Features of Secondary Exodeviations.* (Publ. in Strabismus '69. Transactions of The Consilium Europaeum Strabismi Studio Deditum Congress, London, Henry Kimpton, 1970).

Secondary exodeviation was found in 69 out of 231 successive cases of exodeviations (exophorias and exotropias). The great majority (49 out of the 69 cases) had occurred after operation for convergent strabismus. The mean follow-up period after operation is 15 years. Thus, the material is old and includes a number of free tenotomies which are responsible in most cases for the postoperative insufficiency of the medial rectus, found in about one-third of the patients. The clinical features of postoperative exotropia were reviewed. It was pointed out that hypermetropia, amblyopia, and abnormal retinal correspondence are predominant in the material. The postoperative divergent strabismus arose in about two-thirds of the cases immediately or very soon after the operation for convergent strabismus, whereas in about one-third it was a very late occurrence, on the average 13 years after the operation for convergent strabismus.

It was concluded that caution must be displayed and under-correction used in operating for non-accommodative convergent strabismus with hypermetropia and amblyopia. Postoperative insufficiency of the medial rectus must be avoided, and free tenotomy must be considered ophthalmological history.

*Discussion:* The development of the secondary (postoperative) divergence in the present material is presumably due chiefly to the following factors: (1) The postoperative insufficiency of the rectus medialis (observed in one-third of the cases). (2) Possibly gradually decreasing accommodation and convergence impulses. (3) The amblyopia and the abnormal retinal correspondence which makes the "resting" or "sleeping" position of the eyes, which is generally divergent, predominant and decisive to their position. Early primary operation for convergent strabismus, i. e. around the age of 1 or 2 years, presumably entails a larger number of re-operations than primary operation around the age of 3–5 years.

Discussion: *E. Goldschmidt, B. Bengtsson, H. Ehlers, G. Stigmar, K. Dreisler, P. Brændstrup.*

H. Bynke & O. Wiebert: *Ocular Hypotension in Pregnancy.* (University Eye Clinic, Lund, Sweden).

Ocular hypotension may occur in pregnancy (1). For example, Dominguez stated that a pressure below 7 mm Hg may indicate pregnancy (2).

Two young women with ocular hypotension were treated with abortion because of imminent blindness. The first one, aged 16, was in the third month of pregnancy, the second one, aged 20, in the sixth month. Both pregnancies were normal, and there were no signs indicating diabetes or exogenous intoxication. Both patients had binocular changes consisting of uveitis, choked discs, and retinal oedema. Their ocular pressures were between 3 and 7 mm Hg. In the first patient, who was also treated by steroid medication, the pressure returned to normal within 3 weeks after the abortion, and the inflammatory and exudative changes gradually subsided. The final visual acuity was 0.9 R.E. and finger counting 1 m L.E. In the second case there has been major improvement 3 weeks after the abortion, i. e. at present. The visual acuity is almost normal in both eyes.

The mechanisms were obscure. However, it seems reasonable to assume that the choked discs and the retinal oedema were caused by the hypotension, which was more excessive than can be accounted for by the uveitis.

*References:*

1. Leydhecker, W.: Glaukom. Ein Handbuch. Springer Verlag. 1960. p. 94.
2. Dominguez, W. N.: Oftalmotono en obstetricia y ginecologia. Semana méd. 1951. Ref. Zentr. bl. Ophth. 56: 249, 1951/52.

J. Edmund & S. Ry Andersen: *Pathogenesis of Retinal Detachment.*

Retinal detachment may occur as a result of e. g. malformations, severe trauma, ocular infections, or ocular tumours. Otherwise, retinal detachment presumably occurs only when predisposing factors are present in the retina, choroid, as well as vitreous. The most important predisposing factors are lattice degeneration, peripheral chorioretinal degeneration, peripheral cystic degeneration, and vitreous degeneration with liquefaction and syneresis. All these factors are observed earlier and more marked in myopes. If they are present, a sudden movement of the eye or an indirect trauma may give rise to traction on the retina, especially close to vitreo-retinal adhesions, resulting in a tear. Tears are often observed without detachment, and there are many findings which indicate that the French school is right in attaching great importance to transudate from the choroid. However, numerous factors still remain unelucidated. Norton, Machemer & Kroll's experimental studies producing artificial detachment in monkeys have confirmed the clinical experience that a flat detachment causes far less severe degenerative changes of the entire inner retinal layer than does a large detachment. These experiments indicate that the retinal pigment epithelium and the choriocapillaris play a certain role in the metabolism of the entire retina. The outer segments and the lameller inclusion bodies in the pigment epithelium degenerate very early (as in vitamin A deficiency), but considerable regeneration must take place if the detachment becomes re-attached, both experimentally and in man. It is possible that a flat detachment is in fact no detachment at all, but oedema between the stretched outer segments. It was also suggested that the elongated outer segments in these cases might be partially due to accumulation of segments, the oedema preventing the pigment epithelium from absorbing (phagocytizing) the lamellae of the outer segments as it normally does. This

can only be decided by electron microscopy. If it is correct, the action of light as well as of vitamin A may possibly harm a detached retina by stimulating the production of lamellae.

This paper has been previously published in part in Rosengren, B. (editor): Retinal Detachment Surgery, Almquist & Wiksell, Gothenburg 1966 (chapter IV, pp. 25–44).

---

## *430th Meeting, April 4, 1970, in Copenhagen (State Institute for the Blind and Weaksighted)*

B. Rosengren: *Electrophysiological Orientation Devices for the Blind. Experimens Using the Tip of the Tongue as Receptor.*

The most widely used orientation apparatus for the blind is the white stick. Through the signals transmitted to the carrier of the stick through deep sensibility, the blind person gains a punctate impression of his environment. The blind person who picks his way with the stick may be likened to a person who has only a minimal visual-field remnant.

To obtain a more reliable orientation ability, information has to be received from different parts of the visual field. The more information that can be procured in this way, the closer we can approach the impression of the surroundings obtainable through indirect vision.

The Polish ophthalmologist Starkiewicz has designed a camera in which the film is replaced by a mosaic of photo-elements. Each element is connected by a flex to a vibrating element. A number of such vibrating elements are fixed in a position which makes it possible for the tactile receptors in the forehead to produce sensations that may afford an impression of the surroundings. Similar experiments, using the dorsal skin and a larger number of elements, have been performed by Bach-y-Rita in U.S.A.

Recently, Grindley & Lewis have performed experiments placing electrodes intracranially over the visual cortex and inducing sensations direct from the visual cortex. The testing done so far has proved that this is possible, but the risks involved by this stimulation restrict the possibilities of its further development. And indeed it is difficult to imagine this method elaborated with a large number of elements.

At present, the utilization of the tactile sense appears to be the only possibility. On this basis, the author, in collaboration with Professor Wallmark and Mr. Carlstedt, M. Sc. (Eng.) of Chalmers Technical College Gothenburg, has tested a stimulation based upon the high sensitivity of the tip of the tongue, where tactile elements are even denser than in the finger tips. The idea is that with the tip of the tongue the subject should explore a large number of elements contained in a plate in the palate.

## *431st Meeting, May 2 and 3, 1970, in Århus*
## *(Scanticon)*

Subject: *Metabolic Ocular Changes.*
Invited experts: *J. Melchior, M.D. and N. J. Brandt, M.D.*

H.-W. Larsen: *Modern Treatment of Diabetic Retinopathy.*

After briefly reviewing previous attempts at treating diabetic retinopathy, the author gave a more detailed account of this treatment using photocoagulation and hypophysectomy.

It was concluded that the treatment of diabetic retinopathy was far too often unsatisfactory, due not least to the fact that many patients are referred too late.

In the author's experience photocoagulation seems able, in many cases, to delay the further progress of the retinopathy or even to arrest it for a long period. Photocoagulation is preferable to hypophysectomy in the early stages of proliferative retinopathy.

Although it is a palliative procedure, photocoagulation must be considered the most gentle method available so far and the one that best preserves vision. Although we do not yet know the long-term prognosis, this treatment should be continued until better possibilities become available.

Only by a more profound understanding of the pathogenesis of diabetic angiopathy can we arrive at a preventive and effective treatment of the retinopathy.

P. H. Madsen: *Ocular Findings in Proliferative Diabetic Retinopathy.*

During the period 1963–1968 the author examined 123 diabetics with proliferative retinopathy at the Eye Department of the Århus Municipal Hospital, University of Århus, 61 males and 62 females. 69 per cent of the patients were under 50 years of age. The average duration of diabetes was 22 years, and in 61 per cent the onset of diabetes had been before the age of 20. The great majority were on insulin, 60 per cent had proteinuria, 25 per cent elevated serum creatinine, and 23 per cent a diastolic blood pressure exceeding 100 mm Hg.

In 43 per cent of the eyes the visual acuity was $\geq 0.33$, in 65 per cent $\geq 0.33$ in one or both eyes, while 20 per cent had a visual acuity $< 0.1$ in both eyes.

70 per cent of the patients had lenticular opacities of different degrees; most often there was a posterior cortical cataract and snowflake-like opacities.

Iridic rubeosis was observed in 96 eyes of 63 patients. In several of the eyes this condition had persisted for several years. Only 21 of the eyes developed haemorrhagic glaucoma, and in 15 eyes the rubeosis disappeared entirely.

The intraocular pressure was on the whole low in patients with proliferative retinopathy, lowest in eyes with pronounced proliferations.

Common diabetic retinopathy was present in most of the eyes. Proliferative retinopathy was observed in all degrees of severity, from small vascular new formations to severe connective-tissue proliferations. Detachment of the vitreous was observed in 105 out of 189 eyes and retinal detachment in 52. In 17 of these eyes a few venous coils were seen attached to the posterior vitreous membrane. Several cases gave an impression of a considerable traction on the proliferations and retina.

Vitreous detachment occurred with particular frequency in eyes with connective-tissue proliferations. In 65 eyes there were retrovitreous haemorrhages and in 19 intravitreous.

Photographs of the various fundal changes were demonstrated.

S. E. Simonsen: *ERG in Diabetic Retinopathy. Prognostic Use.*

Discussion on the above papers: *P. Brændstrup, H. Ehlers (vide infra), E. Gregersen, O. A. Jensen, H. Skydsgaard, J. Edmund, N. Willumsen, T. Bertelsen, E. Goldschmidt, S. Ry Andersen, K. Dreisler, E. Westerlund.*

*H. Ehlers:* Had admired Hans-Walther Larsen's skillful technique in the photocoagulations and hoped that this treatment might be beneficial in this dreaded retinopathy. At any rate, photocoagulation is a far more limited procedure than hypophysectomy, but is nevertheless a mutilation and does not repair the damage done in the retina. Besides, we do not know whether the vascular proliferations are the primary factor in the genesis of the retinopathy or merely a striking reaction to another process – perhaps in the vitreous, and possibly of immunological nature. As a rule, several years elapse between the diagnosis of diabetes and the onset of retinopathy. We must utilize this long period and institute prophylaxis. It also seems beyond doubt that according to the experience made in the Steno Memorial Hospital the severe cases of diabetic retinopathy have become more uncommon during the past decade, presumably because of increased medical supervision of the patients' condition. The question is whether local, ocular factors are at play apart from the systemic ones. This is indicated by the fact that the two eyes in the same diabetic may at times behave differently. There is also reason to point out what has been my experience in the course of the years, and which has now been confirmed from several quarters, viz. that myopic diabetics have milder ocular complications. We do not know why. It might be imagined to be due to less accommodation strain and a possible protection by the glasses, etc. Protecting the eyes from light and visual strain, which was so important in the earlier ophthalmological literature on retinopathy, has been lightly treated by modern ophthalmologists, but perhaps not rightly. It must be borne in mind that the retinal metabolism is a carbohydrate metabolism.

It is not my impression that any relationship exists between the transient changes in refraction and a subsequent development of retinopathy. On the contrary, I have known patients who started having severe refractory changes, but who have not yet developed retinopathy 25 years later. Indeed, retinopathy occurs in far from all diabetics.

M. Warburg: *A Review of Diagnostic Possibilities in Metabolic Diseases of the Eye.*

E. Godtfredsen: *New Aspects of the Classification and Pathogenesis of Lipidoses with Neuro-ophthalmological Manifestations* (publ. *in extenso* in Acta Neurologica Scand. 1970).

Lipidoses are rare diseases involving severe symptoms from the eyes, central nervous system, and parenchymal organs. The ocular symptoms may be early and frequent, often so typical that the ophthalmologist may suggest or make the diagnosis. Thus, the ophthalmological interest in these diseases is understandable. After having been known for almost 100 years, the lipidoses have been recognized most recently as congenital enzyme defects: "inborn errors of metabolism". The presuppositions are partly recent activity in the biological sector – in particular within biochemistry, molecular biology (the DNA molecule), and genetics – and partly the re-discovery of Archibald-Garrod's pioneer study on "inborn errors of metabolism" from 1906 which after about 40 years' oblivion has become topical and now comprises about 100 diseases, many of which – including the lipidoses – involve characteristic ocular manifestations.

O. A. Jensen & H.-W. Larsen: *The Clinical and Histopathological Appearances in Some Lipidoses with Ocular Manifestations.*

The lipidoses demonstrated are listed in Fig. 1. Gaucher's disease, which does not involve retinal changes, was excluded from the review. Each disease was demonstrated by pictures of the fundus and by specimens studied histologically as well as histochemically. It was pointed out that from a biochemical point of view Spielmeyer-Vogt's disease is outside the group.

*Fig. 1.*
Cerebral and retinal lipid storage disease (neurolipidosis) (simplified).

| Name of the disease | Stored lipid | Composition of lipid |
|---|---|---|
| Mb. Gaucher | Cerebroside | Ceramide + hexose |
| Mb. Greenfield (metachromatic leucodystrophy) | Sulphatides | Ceramide + hexose + sulphate |
| Mb. Fabry (angiokeratoma corporis diffusum) | Ceramide trihexoside | Ceramide + glucose + galactose + galactose |
| Mb. Tay-Sachs (infantile amaurotic family idiocy) | Ganglioside | Ceramide + glucose + galactose + NA galactosamine + NANA |
| Mb. Niemann-Pick | Sphingomyelin | Ceramide + phosphoric acid + choline |
| Mb. Spielmeyer-Vogt (juvenile amaurotic family idiocy) | Lipofuscin? | Oxidized unsaturated fats and oils? |

Ceramide = Sphingosine + fatty acid

$CH_3(CH_2)_{12} - CH = CH - CHOH - CHNH_2 - CH_2OH$

Sphingosine

O. A. Jensen: *Ocular Histopathology in Gargoylism.*

The ocular changes in gargoylism were reviewed in general. In particular, the author demonstrated a case of mucopolysaccharidosis III (Sanfilippo's syndrome). The histological and histochemical findings in this case were demonstrated, and the correlation between the histochemical findings and the biochemical defect was discussed.

The material will be published *in extenso* in Acta pathol. & microbiol. scand.

Discussion on the above papers: *N. J. Brandt, J. Melchior, H. Skydsgaard, E. Godtfredsen (vide infra).*

*E. Godtfredsen:* Among the approx. 100 known metabolic diseases due to congenital enzyme defects, ocular signs occur with a high frequency, in about 20 per cent, or exactly as in congenital diseases in general. Ocular manifestations are seen in the refractive media (cornea+lens) and the perception apparatus (cf. Table). The frequency and specificity vary from the modest uncharacteristic to the frequent and pathognomonic, e. g. Kayser-Fleischer's ring and sunflower cataract in Wilson's disease, the lens ectopia in homocystinuria, and the cherry-red patch in Tay-Sachs. The practical-clinical in-

terest displayed by the ophthalmologist and his possibility of arriving at the aetiological diagnosis are well-motivated.

*Table*

| Eye sign in metabolic diseases | | Cornea | Lens | Retina |
|---|---|---|---|---|
| Aminoacidurias | Cystinosis Fanconi | + | | |
| | Homocystinuria | | Ectopia | |
| | Lowe oculo-cerebro-renal | | + | |
| Sugar metabolism | Galactosaemia | | + | |
| | Glycogen deposit | + | + | |
| | Hurler – Gargoylism | + | | |
| | Diabetes mellitus | | + | + |
| Lipidosis | Tay – Sachs | | | + |
| | Niemann – Pick | | | + |
| | Fabry | + | + | |
| | Refsum | | + | + |
| Various causes | Wilson hepato-lentic. | + | + | |
| | ? dystrophia myotonica | + | + | + |

E. Goldschmidt & G. Pallisgaard: *The Oculo-cerebro-renal Syndrome of Lowe in Four Generations of One Family.* Publ. Acta paediat. (Uppsala) 1971.

Discussion: *N. J. Brandt, J. Melchior, S. Ry Andersen, A. Øther.*

F. Kruse: *Ocular Changes in Homocystinuria.* Publ. Acta ophthal. (Kbh.).

S. Kessing: *Infantile Cystinosis.*

Cystinosis is a rare disease, transmitted by autosomal recessive inheritance, showing typical crystals of cystine in the cornea, conjunctiva, uvea, and bone marrow as well as in phagocytes in numerous organs.

Cystinosis occurs in an infantile, malignant form which usually leads to death before the age of 10, and in an adult form which is benign, without subjective symptoms. The poor prognosis of infantile cystinosis is due to a renal lesion of the Fanconi type causing renal rickets. The renal lesion is not a link in adult cystinosis in which, incidentally, the above-mentioned deposits of cystine are also present.

The underlying biochemical defect has not yet been discovered, but recent investigations indicate that it is located in the organelles of the individual cells, accumulations of cystine crystals having been found in lysosomes in histiocytes and fibroblasts from the conjunctiva of children and adults with cystinosis.

Typical infantile cystinosis in 2 brothers was reported. The diagnosis was based upon

microscopic examination of unstained conjunctival biopsies by the method of Brændstrup. Renal biopsies had suggested the diagnosis nephronophthisis. The peripheral pigmented retinopathy, said to be the first sign of infantile cystinosis, could not be definitely demonstrated.

A diagnosis of cystinosis should be called to mind by the named ocular findings and may be confirmed by examination of the bone marrow for crystals and determination of the cystine content in peripheral leukocytes.

Discussion on the last two papers: *M. Warburg, N. J. Brandt, J. Melchior, N. Ehlers, S. Ry Andersen, P. M. Møller, E. Gregersen, O. A. Jensen.*

N. Tygstrup, S. Keiding & L. Mellemgaard: *Cataractogenic Effect of Combined Galactose-ethanol Administration in Rats.* Publ. Acta ophthal. (Kbh.).

Discussion: *N. J. Brandt, H. H. Seedorff, E. Godtfredsen, H. Ehlers, O. A. Jensen.*

E. Østerby: *Ocular Changes in Wilson's Disease.*

After a brief review of Wilson's disease, a family of 6 siblings was demonstrated, 2 or perhaps 3 affected. It is important to demonstrate Kaiser-Fleischer's ring which is pathognomonic of the disease, but which is present in only 60–90 per cent of the cases.

Discussion: *N. J. Brandt, O. A. Jensen, E. Godtfredsen, S. Ry Andersen.*

N. Ehlers & F. Kruse: *Corneal and Conjunctival Changes in Chronic Renal Failure.* Publ. Acta ophthal. (Kbh.).

Discussion: *O. Hartkopp, N. Rosenberg, S. Ry Andersen, O. A. Jensen, N. Willumsen, E. Godtfredsen, A. Øther, J. Melchior, N. J. Brandt.*

---

## *General Assembly on May 2, 1970*
## *(Scanticon near Århus)*

Chairman: K. Rasmussen.
President's and treasurer's reports.
Election of president: Jens Edmund was elected and expressed thanks to the retiring president, S. Ry Andersen. The Committee now consists of: Jens Edmund (President), Mette Warburg (Vice President), E. Goldschmidt (Secretary).
Report from the Committee for the Prevention of Blindness. Election of members: E. Gregersen, P. M. Møller, and S. Ry Andersen.
Discussion on postgraduate training.