# Aktueller Stand der Glaukomchirurgie

Karsten Klabe

BREYER • KAYMAK • KLABE

PREMIUMEYES

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# Financial Disclosure

| | |
|---|---|
| Shareholder | No relevant conflicts of interest to declare. |
| Grant / Research Support | AbbVie, Glaukos, NovaEye |
| Consultant | AbbVie, Alcon, Carl Zeiss Meditec, ELIOS Vision, iStarMedical, Oertli, Santen, SightSciences, Vialase |
| Employee | No relevant conflicts of interest to declare. |
| Paid Instructor | Glaukos, Nova Eye, TheaPharm, Topcon |
| Speaker Bureau | No relevant conflicts of interest to declare. |
| Other | No relevant conflicts of interest to declare. |

# Why do some people go blind from glaucoma?


› Ophthalmology. 1982 Sep;89(9):991-8. doi: 10.1016/s0161-6420(82)34675-8.

## Why do some people go blind from glaucoma?

W M Grant, J F Burke Jr

tvst

DOI: 10.1167/tvst.4.2.1

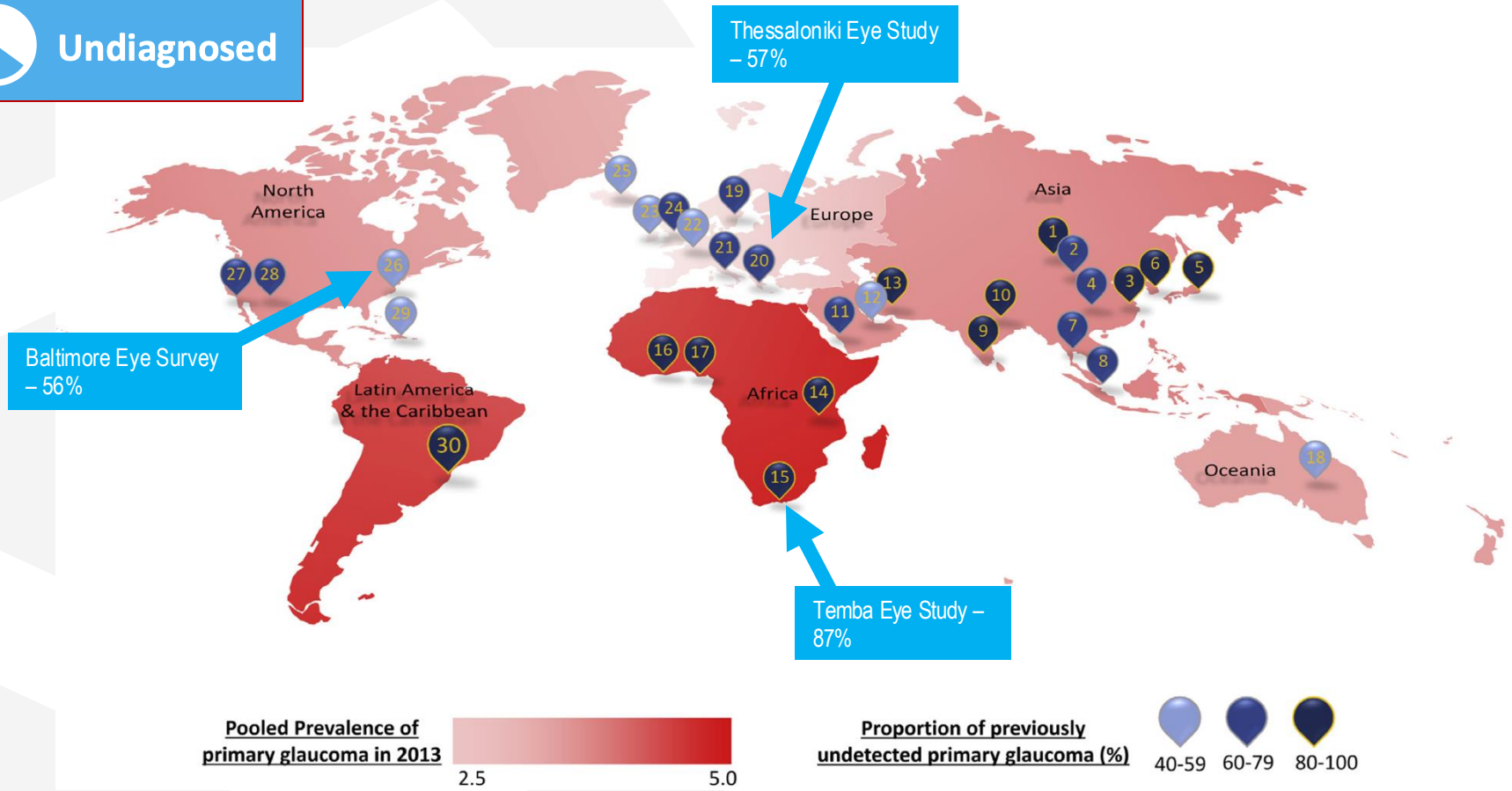
Perspective

## Why Do People (Still) Go Blind from Glaucoma?

Remo Susanna Jr.[1], Carlos Gustavo De Moraes[2], George A. Cioffi[2], and Robert Ritch[3]

[1] Department of Ophthalmology, University of Sao Paulo School of Medicine, Sao Paulo, SP, Brazil
[2] Department of Ophthalmology, Columbia University Medical Center, New York, NY, USA
[3] Einhorn Clinical Research Center, New York Eye & Ear Infirmary of Mount Sinai, New York, NY, USA

# Undiagnosed




1. Soh Z, Yu M, Betzler BK, Majithia S, Thakur S, Tham YC, Wong TY, Aung T, Friedman DS, Cheng CY. The Global Extent of Undetected Glaucoma in Adults: A Systematic Review and Meta-analysis. Ophthalmology. 2021 Oct;128(10):1393-1404. 2. Sommer A, Tielsch JM, Katz J, et al. Relation ship between intraocular pressure and primary open angle glaucoma among white and black Americans. The Batimore Eye Survey. Arch Ophthalmol. 1991;109:1090–1095.

# Not properly treated

tvst

DOI: 10.1167/tvst.4.2.1

Perspective

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Schwere-grad des Glaukoms unterschätzt → insuffizente IOD - Senkung → IOD – Spitzen und Mittelwerte nicht zuverlässig bestimmt → Schwierig-keiten bei der Bestimmung der Progression

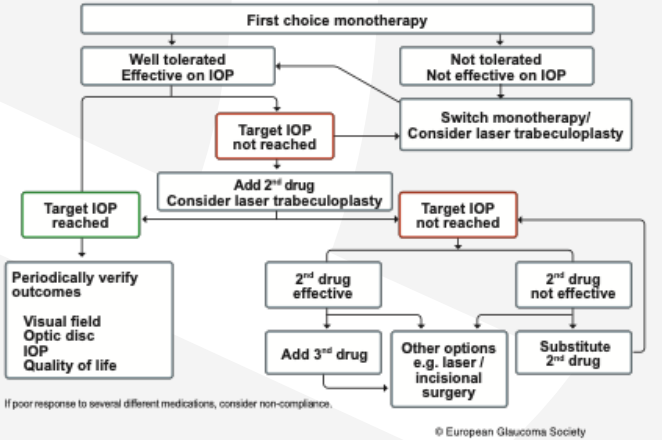
Susanna R Jr, De Moraes CG, Cioffi GA, Ritch R. Why Do People (Still) Go Blind from Glaucoma? Transl Vis Sci Technol. 2015 Mar 9;4(2):1. doi: 10.1167/tvst.4.2.1. PMID: 25767744; PMCID: PMC4354096.

# Weiter lokale Augentropfentherapie?

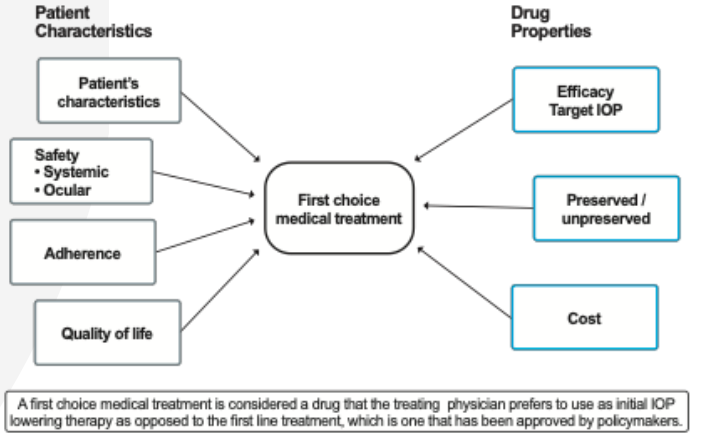
Monotherapie → Kombinations-therapie → SLT / ALT + Medikation → Trabekulektomie → 2. Trabekulektomie Glaucoma Drainage Device

**Invasivität** →

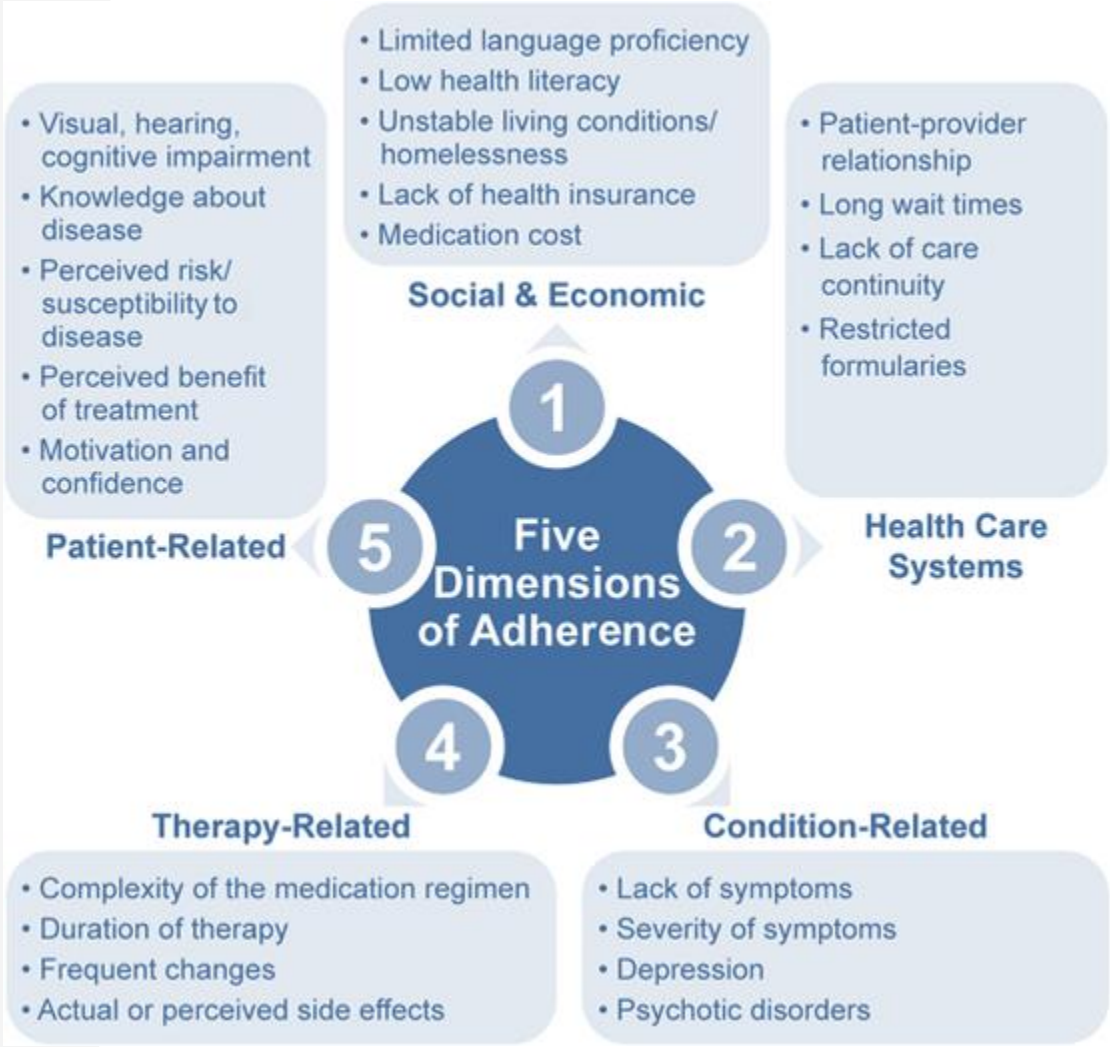
## FC XIV – Therapeutical algorithm in glaucoma topical therapy




## FC XII – Considerations on first choice medical treatment



# Grenzen der Adherenz bei medikamentöser Therapie




Zullig LL, Bosworth H. Engaging patients to optimize medication adherence. NEJM Catal. 2017.
Robin AL, et al. Medication adherence in patients with ocular hypertension or glaucoma. Expert Review of Ophthalmology 2019; 14:199-210.

# Noncomplaince bei Glaukompatienten

Table 6. Proportion of Noncompliant Patients: Results of Studies That Used an Unobtrusive Medication Monitor to Assess Noncompliance

| Authors | Definition of Noncompliance | Medication Regimen | Proportion of Noncompliers |
|---|---|---|---|
| Kass et al* | Several cutoff values described | Timolol, timolol + pilocarpine, timolol + other medication | 27.3% omitted >25% of timolol doses; 8.2% omitted >50% of timolol doses |
| Norell and Granström† | Several cutoff values described | Pilocarpine 3 times daily | 41% omitted 10% of doses; 20% omitted ≥20% of doses |
| Kass et al‡ (interview plus unobtrusive medication monitor) | Several cutoff values described | Pilocarpine 4 times daily | Interview: 2.9% of doses omitted; MEMS: 15.2% of patients omitted ≥50% of doses; 6% omitted ≥75% of doses |

MEMS = Medication-monitoring System.
*Kass MA, Gordon M, Morley RE Jr, et al. Compliance with topical timolol treatment. Am J Ophthalmol 1987;103:188–93.
†Norell SE, Granström PA. Self-medication with pilocarpine among outpatients in a glaucoma clinic. Br J Ophthalmol 1980;64:137–41.
‡Kass MA, Meltzer DW, Gordon M, et al. Compliance with topical pilocarpine treatment. Am J Ophthalmol 1986;101:515–23.

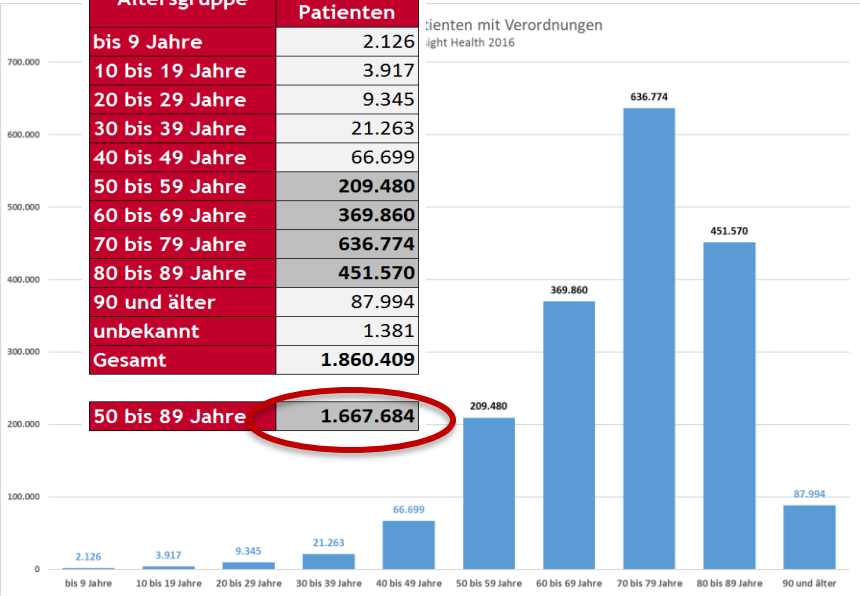
Nonadherenz variiert zwischen 5% to 80%
Zwischen 20 – 30% der Patienten versäumen 25% ihrer Dosen

Olthoff CM, Schouten JS, van de Borne BW, Webers CA. Noncompliance with ocular hypotensive treatment in patients with glaucoma or ocular hypertension an evidence-based review. Ophthalmology. 2005 Jun;112(6):953-61. doi: 10.1016/j.ophtha.2004.12.035. PMID: 15885795.

# Market Data Glaucoma - Insight Health – 2016

* Data source: Patient INSIGHTS (INSIGHT Health) 2016
- Data from 55% of public insured patients in Germany
- Patients from all states
- Representative Analysis

| Altersgruppe | Anzahl Patienten |
|---|---|
| bis 9 Jahre | 2.126 |
| 10 bis 19 Jahre | 3.917 |
| 20 bis 29 Jahre | 9.345 |
| 30 bis 39 Jahre | 21.263 |
| 40 bis 49 Jahre | 66.699 |
| 50 bis 59 Jahre | 209.480 |
| 60 bis 69 Jahre | 369.860 |
| 70 bis 79 Jahre | 636.774 |
| 80 bis 89 Jahre | 451.570 |
| 90 und älter | 87.994 |
| unbekannt | 1.381 |
| Gesamt | 1.860.409 |
| 50 bis 89 Jahre | 1.667.684 |

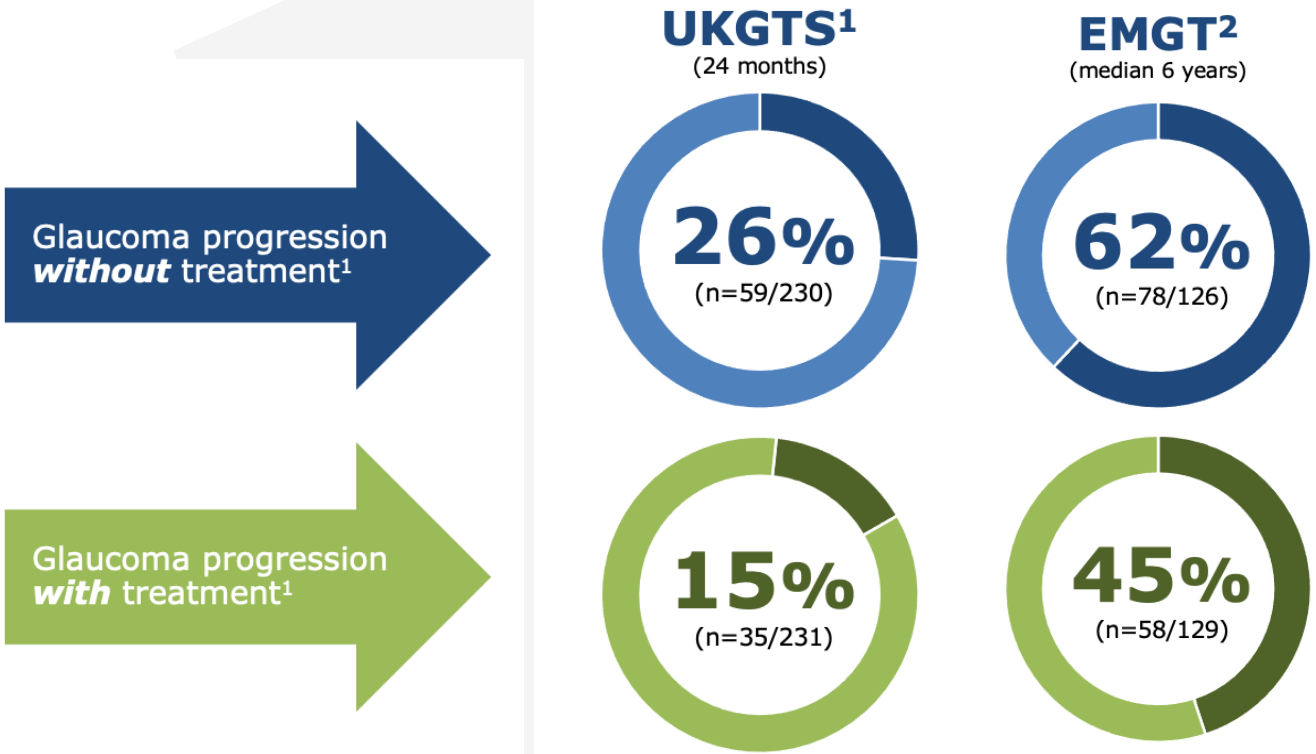



| Produktname | Anzahl Patienten | Summe Verordnungen | Durchschnitt VO/Jahr |
|---|---|---|---|
| Dorzocomp Vision | 115.714 | 277.571 | 2,4 |
| Ganfort | 112.325 | 311.400 | 2,8 |
| Dorzolamid AL comp | 103.471 | 210.356 | 2,0 |
| Azarga | 77.906 | 242.580 | 3,1 |
| Duotrav | 67.633 | 202.229 | 3,0 |
| Tavu | 65.526 | 170.059 | 2,6 |
| Simbrinza | 48.438 | 124.815 | 2,6 |
| Cosopt S | 31.461 | 79.706 | 2,5 |
| Cosopt | 29.678 | 86.901 | 2,9 |
| Combigan | 27.033 | 83.893 | 3,1 |
| Xalacom | 26.034 | 72.275 | 2,8 |
| LatanoTim Vision | 24.060 | 58.665 | 2,4 |
| Fotil | 6.942 | 23.637 | 3,4 |
| Arulatan | 4.455 | 12.389 | 2,8 |
| Dorzolamid comp 1A Pharma | 3.384 | 6.058 | 1,8 |
| | 744.060 | 1.962.534 | 2,6 |

# Lokale Nebenwirkungen

# Lokale Nebenwirkungen

# Progression trotz medikamentöser Therapie





1. Garway-Heath DF, et al. Lancet 2015;385:1295-304.
2. Heijl A et al. Arch Ophthalmol 2002;120:1268–1279.

# Konventionelle Glaukomchirurgie –Trabekulektomie
## *Empfehlung EGS*

- Welches ist die empfohlene chirurgische Gehandlung des Offenwinkelglaukoms?
- Empfehlung: Die Trabekulektomie mit Anwendung antifibrotischer Mittel (MMC, 5-FU) wir als Erstoperation beim Offenwinkelglaukom empfohlen.
- Evidenzniveau: gering
- Stärke der Empfehlung: stark

Terminologie und Leitlinien für das Glaukom, 5. Auflage, Publicomm ,Savonna – Italy, July 2021, ISBN 978-88-98320-46-2

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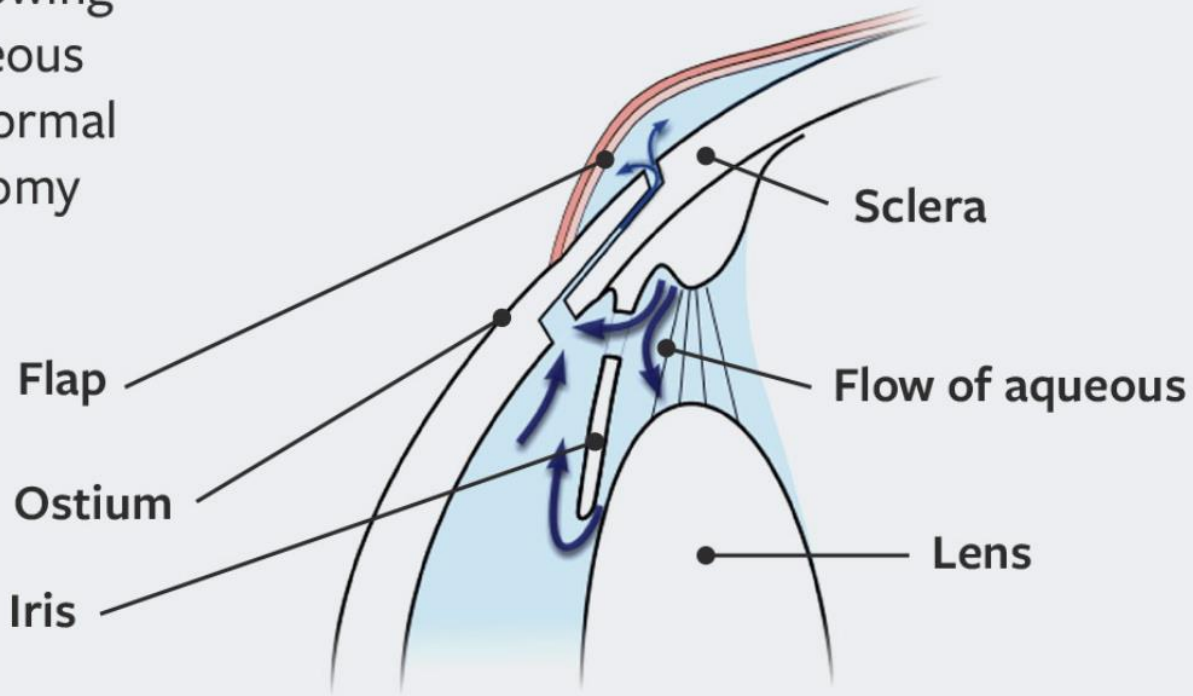
# OP-Methode

Diagram showing flow of aqueous through a normal trabeculectomy

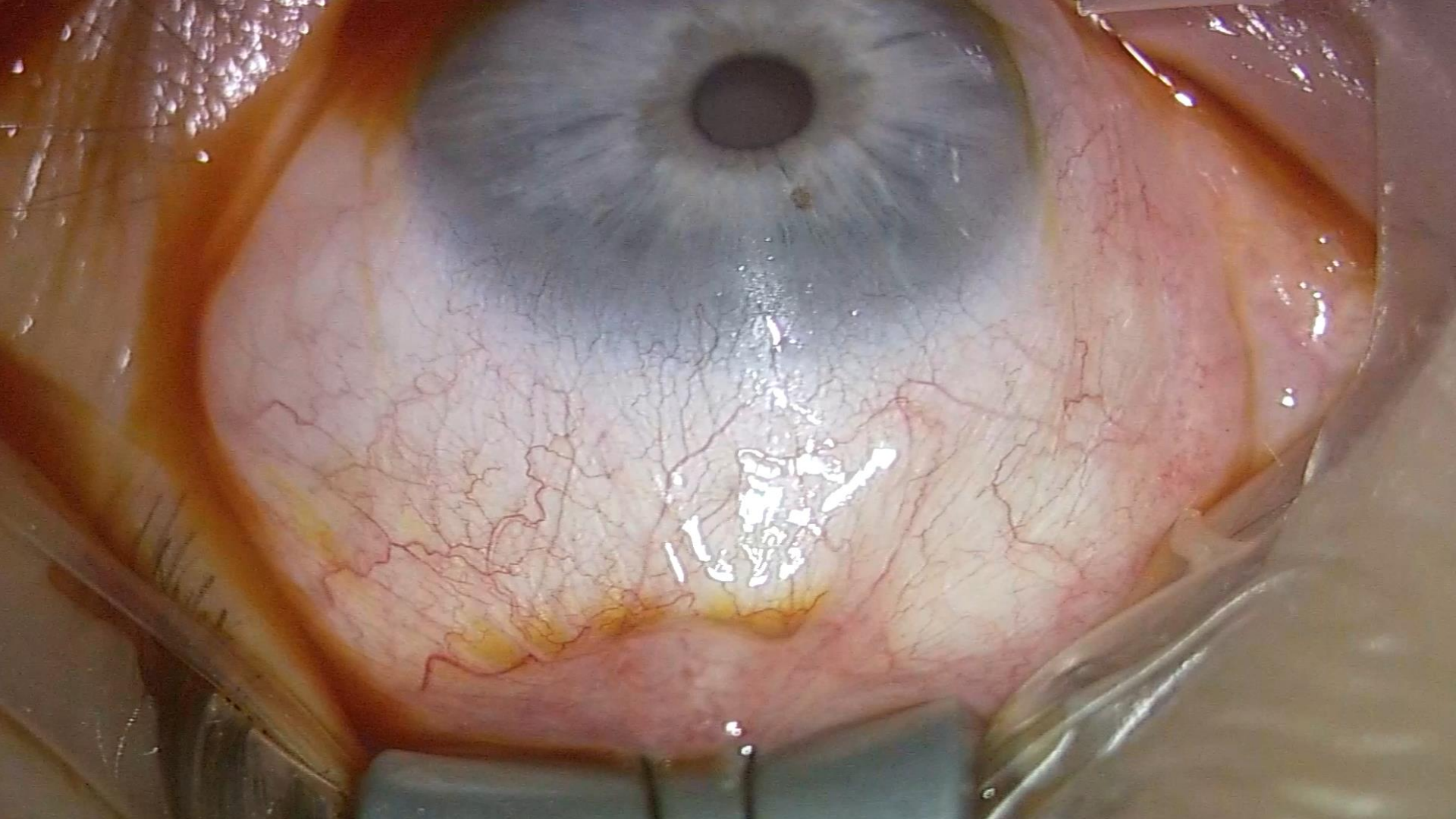


Erstbeschreibung 1968 :

**Cairns JE. 1968**
**Trabeculectomy. Preliminary Report of a new Technique**

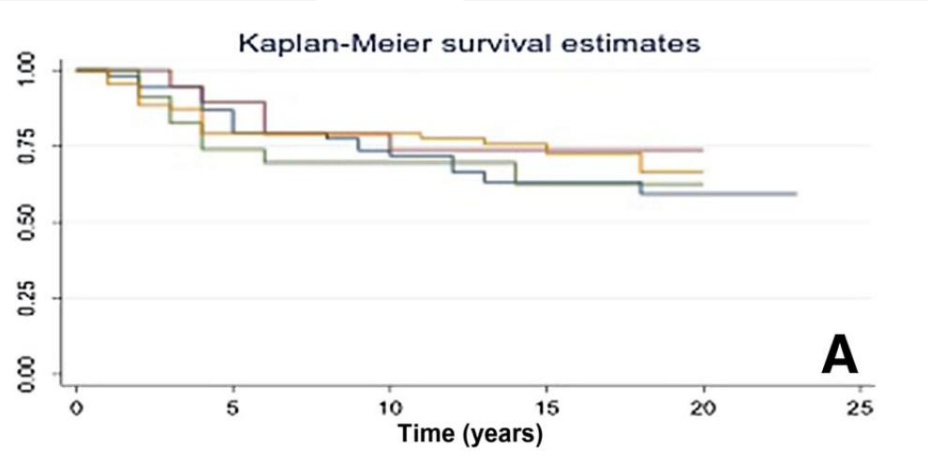
## Results

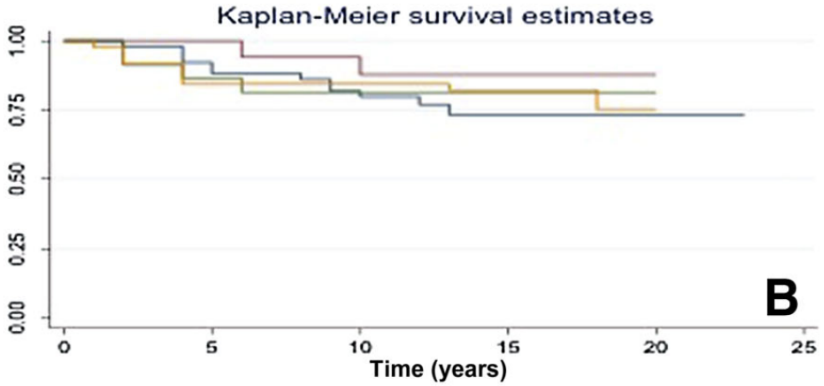
The results are summarized in Table 1. The operation was followed by normal intraocular pressures without miotic or other additional therapy in all 17 cases. In 11 cases this was evidently not due to subconjunctival drainage. In six cases a bleb appeared. These may be regarded as failures in that the effect intended was not produced.

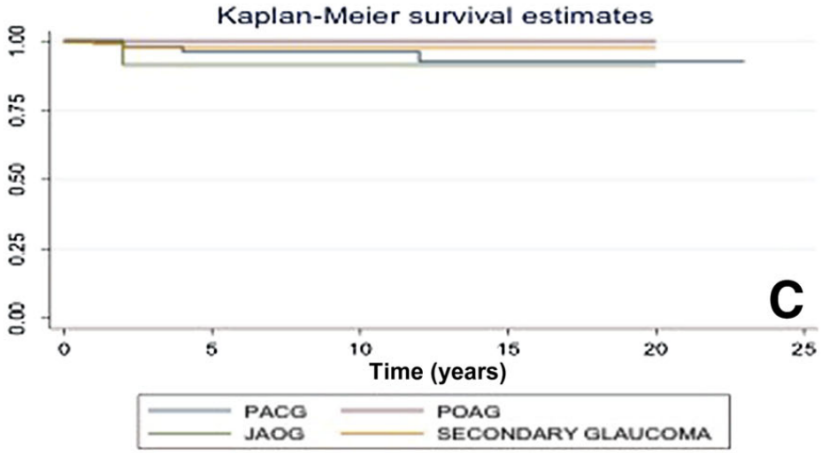


# Langzeitergebnisse Trabekulektomie

- Dauerhafte Langzeitkontrolle des Augeninnendrucks unterschiedlicher Glaukomformen
- 10 – 10 – 10 Challenge

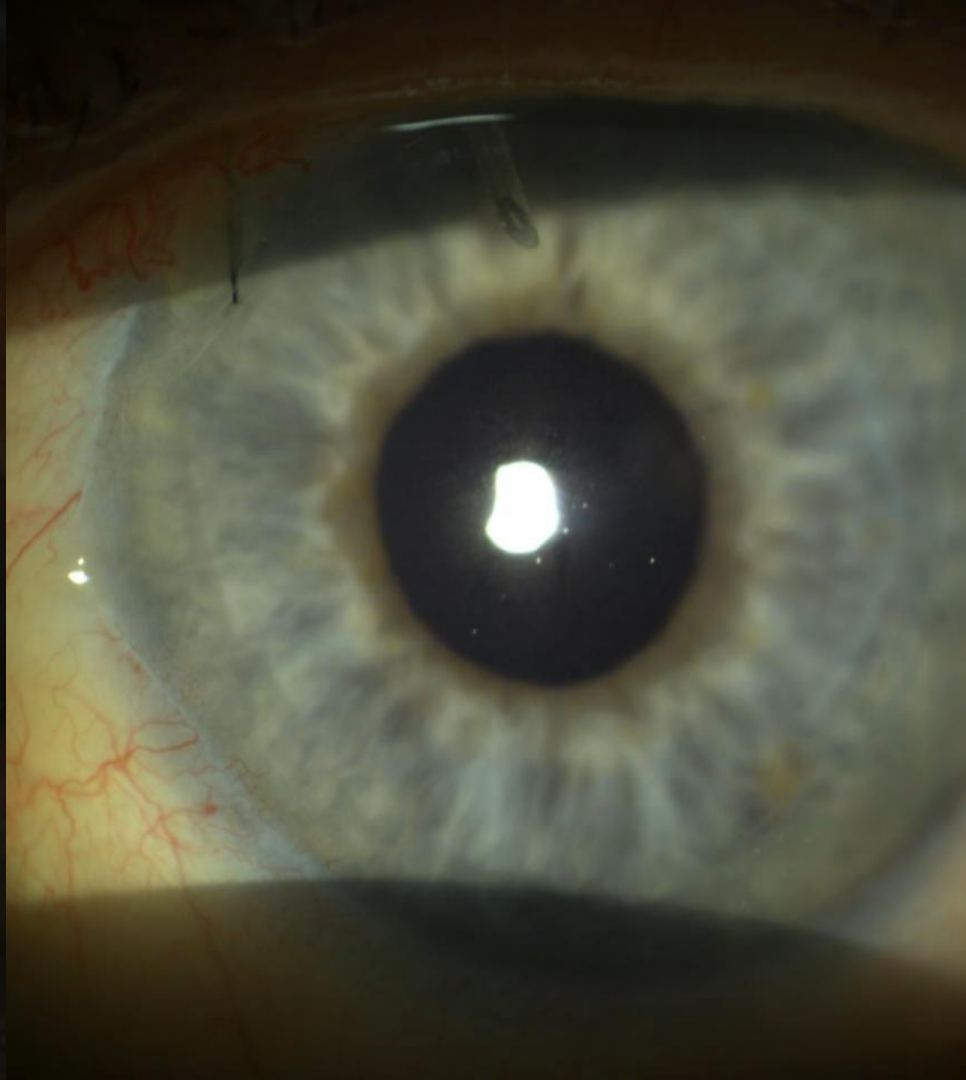



Sihota R, Shakrawal J, Sidhu T, Sharma AK, Dada T, Pandey V. Does TRABECULECTOMY meet the 10-10-10 challenge in PACG, POAG, JOAG and Secondary glaucomas? Int Ophthalmol. 2020 May;40(5):1233-1243

Was wir sehen wollen.



Was wir manchmal bekommen...

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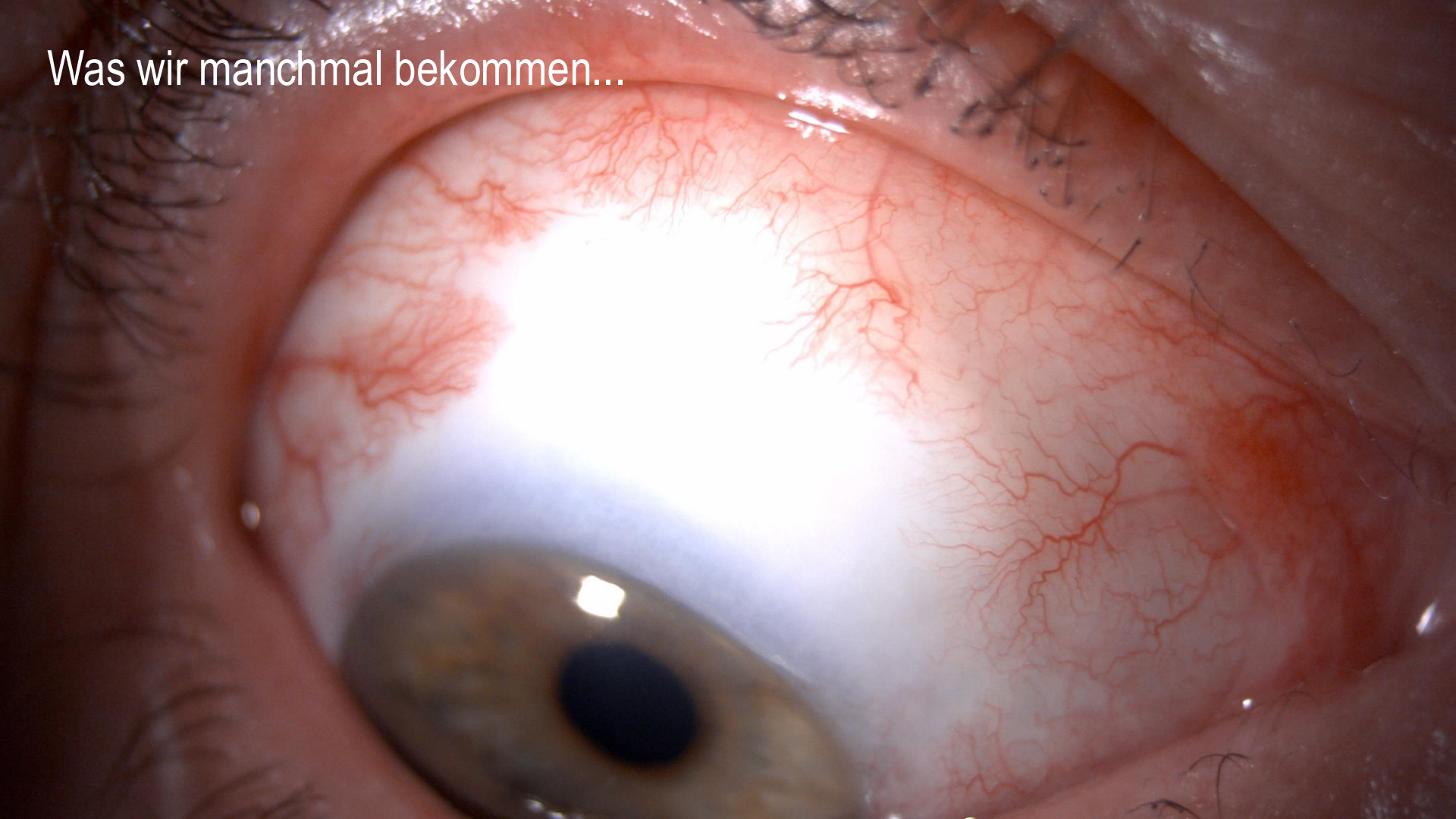
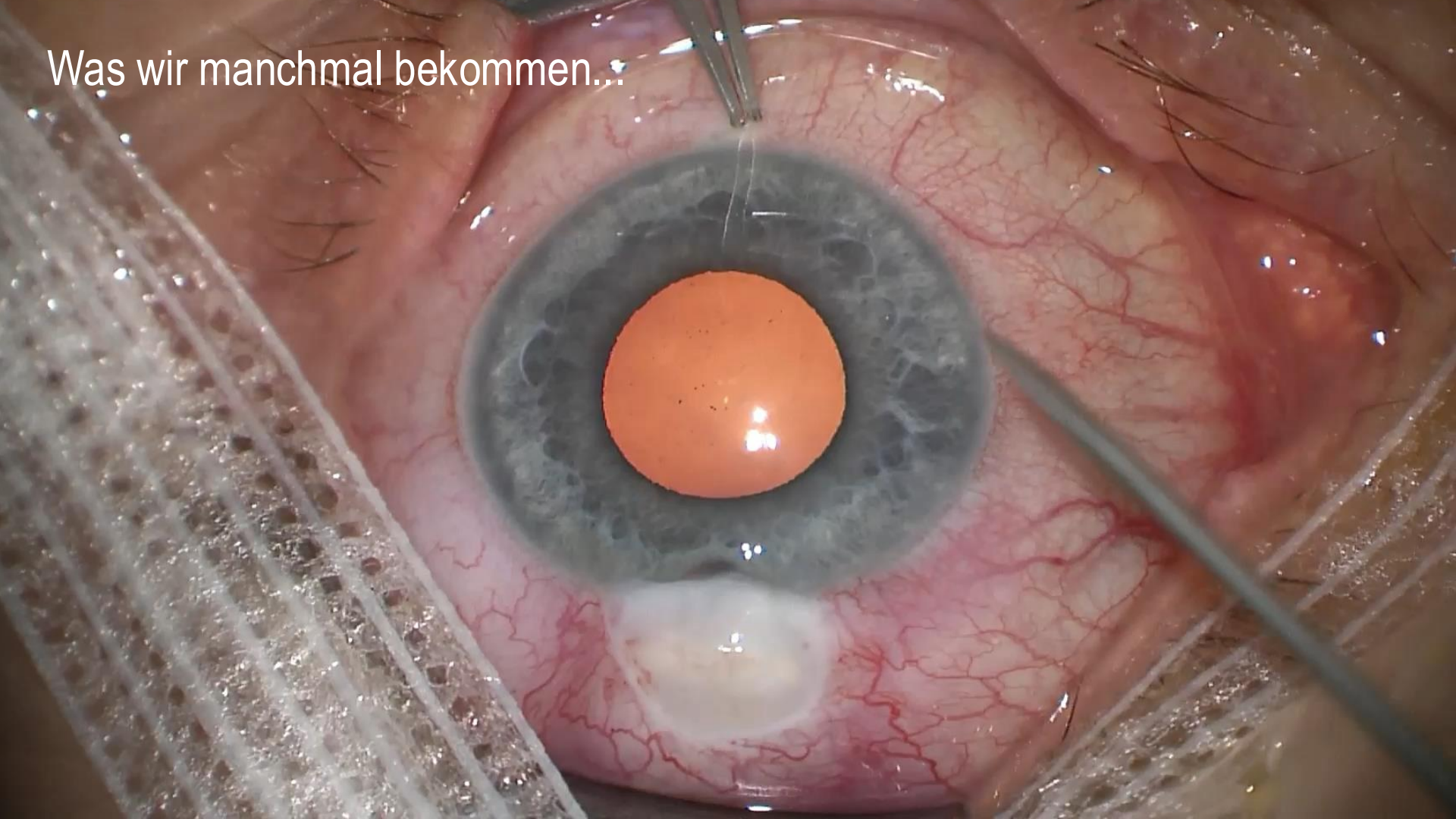


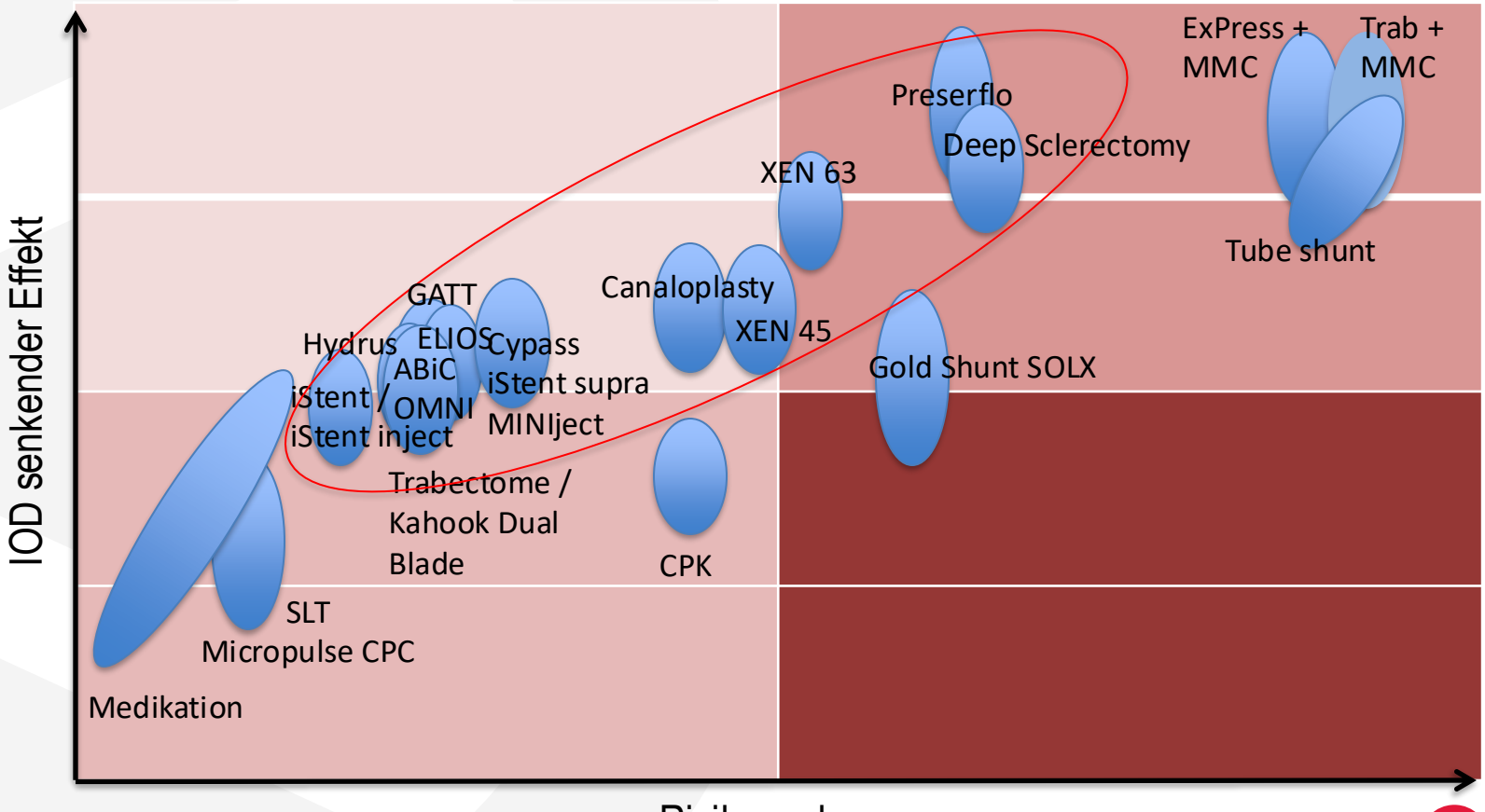

Was wir manchmal bekommen...

# Definition MIGS

- MIGS - Minimally Invasive Glaucoma Surgery
- schließt glaukomchirurgische Eingriffe mit folgenden Eigenschaften ein:
  - ab interno Zugang
  - minimales chirurgisches Trauma
  - effiziente IOD - Senkung
  - hohes Sicherheitsprofil
  - schnelle Heilung

Reference: Saheb H, Ahmed I. Micro-invasive glaucoma surgery: current perspectives and future directions. Curr Opin Ophthalmol. 2012;23(2):96-104

# Risikoprofil versus IOD - Senkung

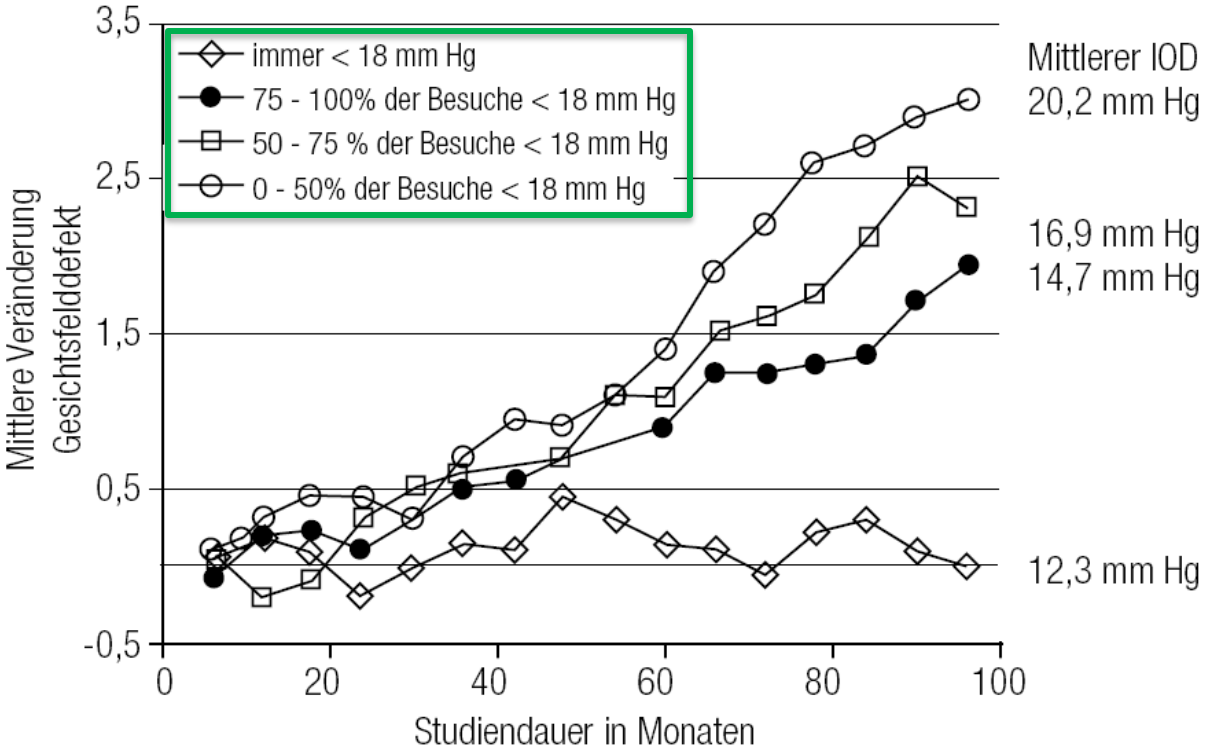



modified after Samuelson und Ahmed, 2015

# MIGS / MIBS Ansätze

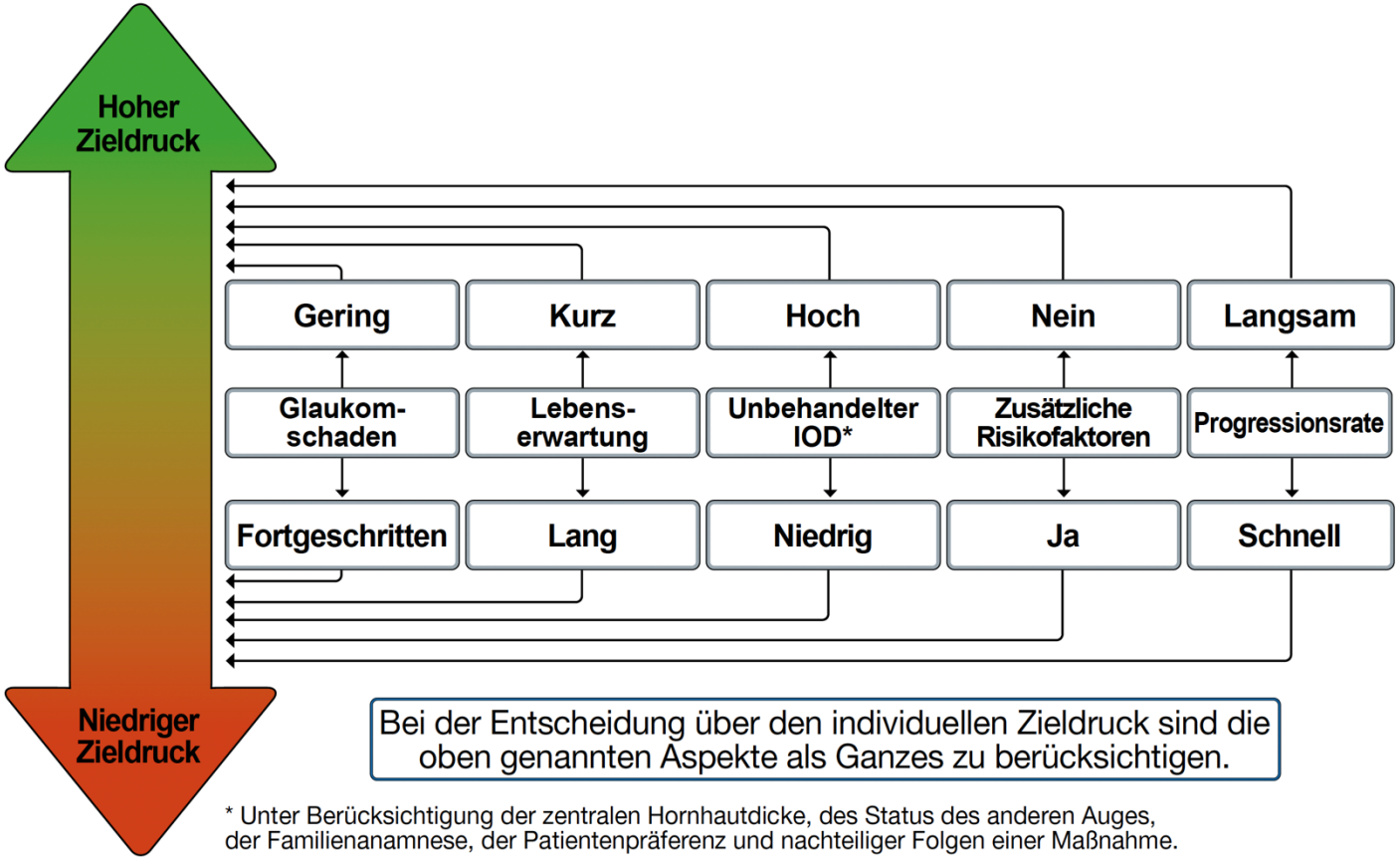
| | Subkonjunktival | Schlemmscher Kanal | Suprachoroidal |
|---|---|---|---|
| IOD senkender Effekt | höchste Drucksenkung | moderate Drucksenkung | mittlere Drucksenkung |
| Risiken | höher | gering bis moderat | gering |
| ease of use | Kann sehr anspruchsvoll sein | Einfach bis kompliziert | anspruchsvoller |
| Potentielle Komplikationen | - Filterkissen-komplikationen<br>- Fibrose | - Fehlpositionierung<br>- Zustand des distalen Abflusses oft unklar | - Besonderheiten des suprachoroidalen Raums<br>- Fibrose<br>- Blutungen |
| Postoperative Nachsorge | engmaschig, Zeiteingriff, Zytostatika | Vergleichbar mit Phako | Etwas mehr als Phako |

# Advanced Glaucoma Intervention Study (AGIS)




The Advanced Glaucoma Intervention Study (AGIS): 7. The relationship between control of intraocular pressure and visual field deterioration.The AGIS Investigators. Am J Ophthalmol. 2000 Oct;130(4):429-40. doi: 10.1016/s0002-9394(00)00538-9. PMID: 11024415.

# Also zurück auf Anfang: Festlegung des Zieldruckes

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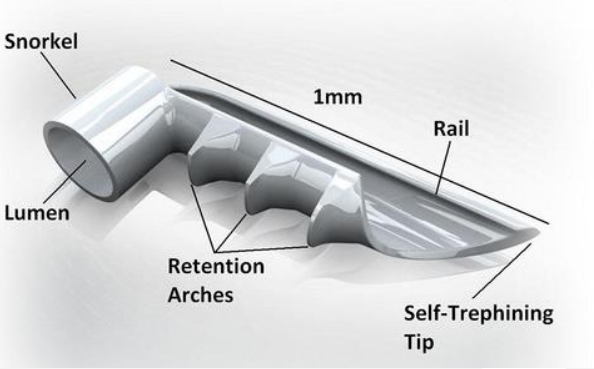
# iStent

- Firma Glaukos
- non-ferromagnetisches  Titan
- Heparinbeschichtet

- iStent G1
  - Length = 1 mm
  - Height = 0,33 mm
- iStent inject
  - Diameter = 230 µm
  - Hight = 360 µm
- iStent W
  - Diameter = 360 µm
  - Hight = 360 µm




# iStent *inject*® + Phako – Patientenpopulation (eigene Ergebnisse)

- Retrospektive Analyse der 7 Jahresergebnisse bei kombinierter Kataraktchirurgie und iStent inject® Implantation bei Patienten mit Offenwinkelglaukom

- **Phaco + iStent inject Gruppe**
- *164 Augen von 103 103 Patienten*
- Mean Age 75,4 Jahre (±9,4)
- Geschlecht : 90 männl. / 74 weiblich
- PCOWG n = 135, PEX n = 29
- Baseline medicated IOP 19.6 mmHg
- Baseline Visual field defect - 6,19 dB MD
- Baseline cup / disc ratio 0,59

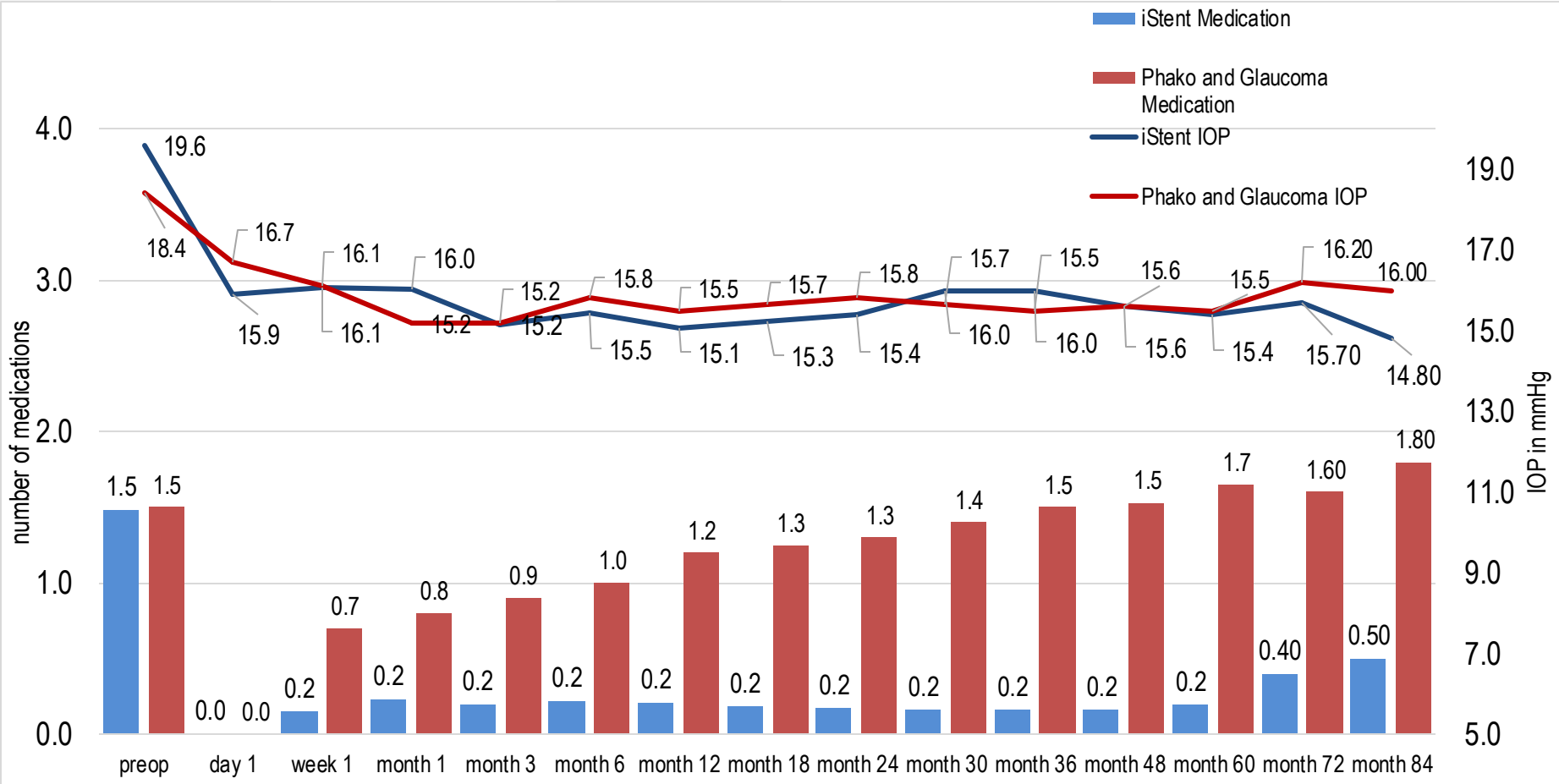
- **Kontrollgruppe( Phaco alone)**
- *90 Augen von 56 Patienten*
- *Mean Age 77,95 Jahre*
- *Geschelcht: 22 männl. / 34 weiblich*
- *PCOWG n = 66, PEX n = 24*
- *Baseline medicated IOP 18.4 mmHg*
- *Baseline Visual field defect - 3,5 dB MD*
- *Baseline cup / disc ratio 0,6*

# iStent *inject*® + Kataraktchirurgie – Präoperative Interventionen

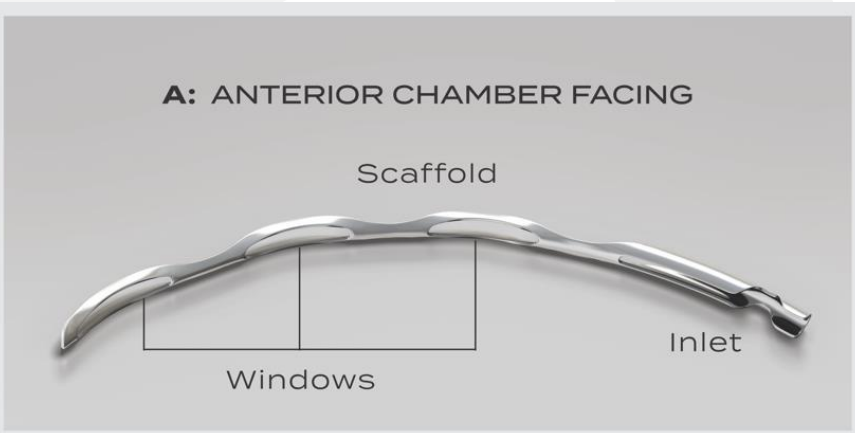
| Intervention | n (%) |
|---|---|
| SLT | 29 (17,7%) |
| XEN - Gelstent | 1 (0,6%) |
| Kanaloplastik | 3 (1,8%) |
| Trabekulektomie | 2 (1,2%) |
| Iridotomie | 2 (1,2%) |

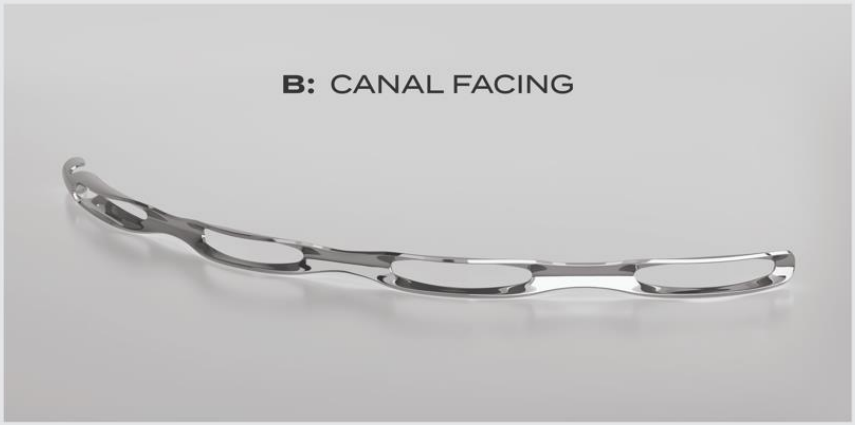
* alle präoperativen Glaukominterventionen wurden länger als 3 Monate vor der iStentimplantation durchgeführt

# iStent *inject*® + Phako versus Phako stand alone – IOD Senkung und Medikamentenreduktion



# Hydrus® Microstent

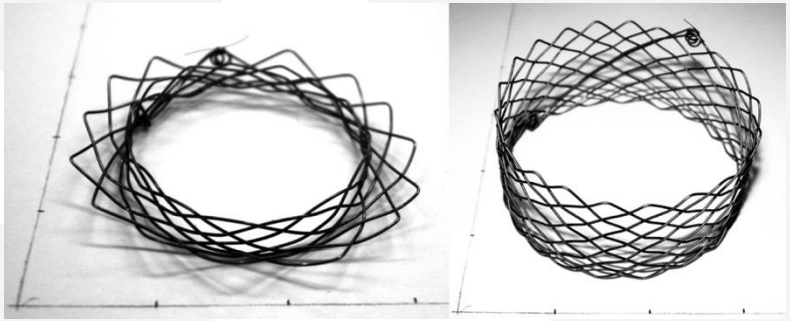


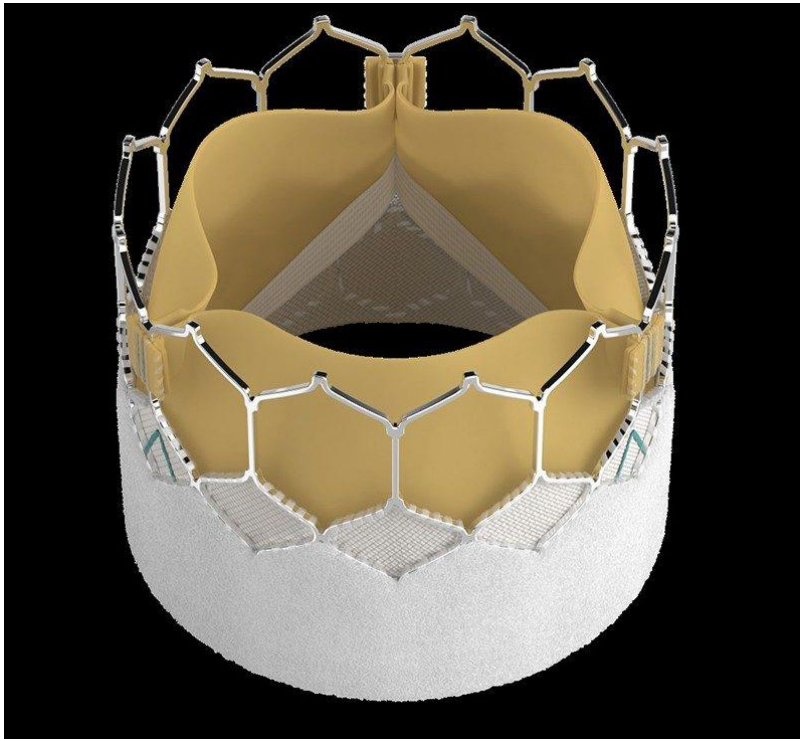




- flexibler, biokompatibler Microstent
- 8 mm length
- Nitinol (Legierung mit Formgedächtnis)
- Erstnutzung in der Herzchirurgie
- (künstliche Herzklappe)
- Kurvatur des Schlemmschen Kanals angepasst
- 3 Fensteröffnung zum Trabekelmaschenwerk
- Rückseite offen zu besseren Exposition der Kollektorgefäße

# Nitinol

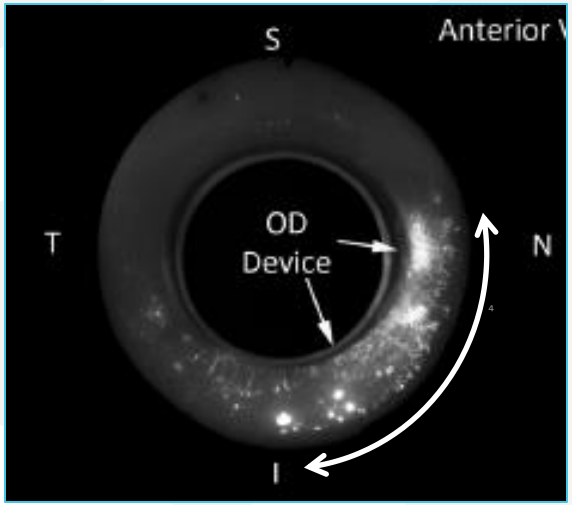
- Legierung aus Nickel und Titan
- Electropolished to creat a Titandioxid - Oberfläche
  - Verhinder Freisetzung freien Nickels
- Nickel Titanium Naval Ordnance Laboratory
- Herzklappen



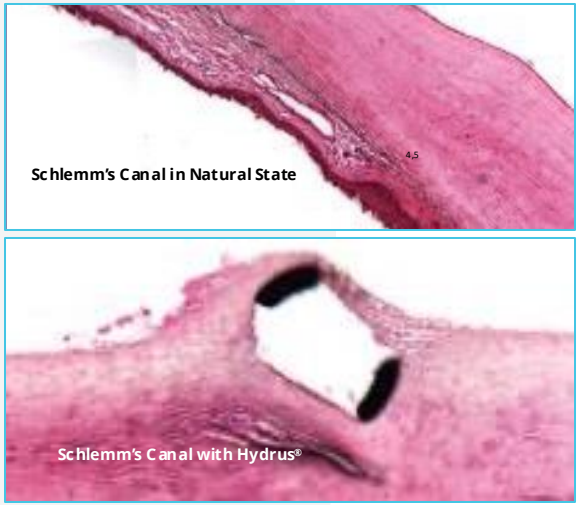


Marchand C, Heim F, Durand B. Heart valve stent for percutaneous implantation: design optimization. J Biomed Mater Res B Appl Biomater. 2010 Jan;92(1):138-48. doi: 10.1002/jbm.b.31499. PMID: 19802832.

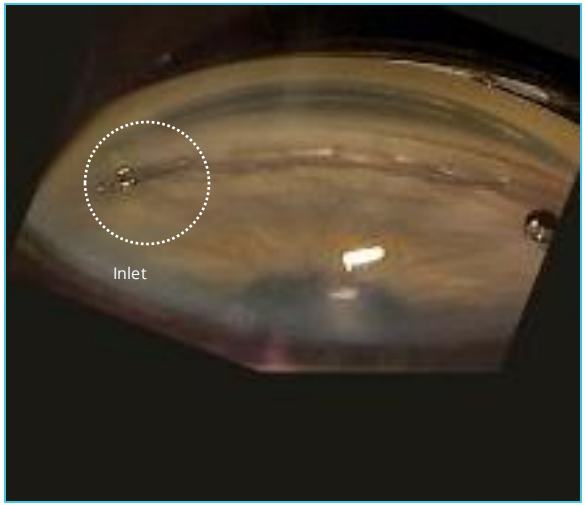
# Hydrus® Microstent – Tri Modal Mechanism of Action




- Span: Only MIGS implant to span 90 degrees of canal, providing access to multiple collector channels over time[1]



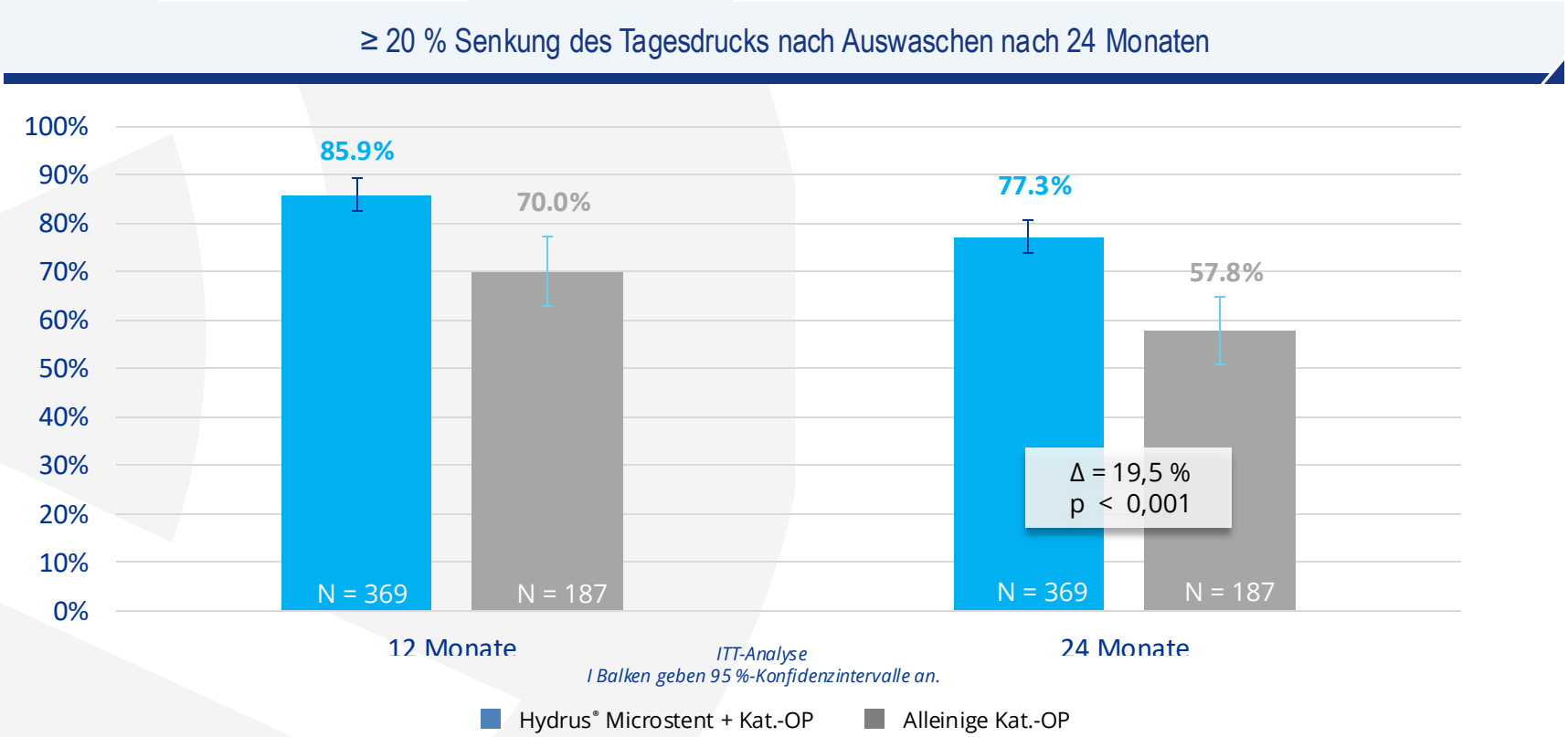

- Scaffold: Dilates and scaffolds Schlemm's Canal - provides a permanent scaffold in the canal to augment flow[2]




- Bypass: Hydrus bypasses the TM through the inlet of the device to allow fluid to pass from the anterior chamber into Schlemm's canal[3]

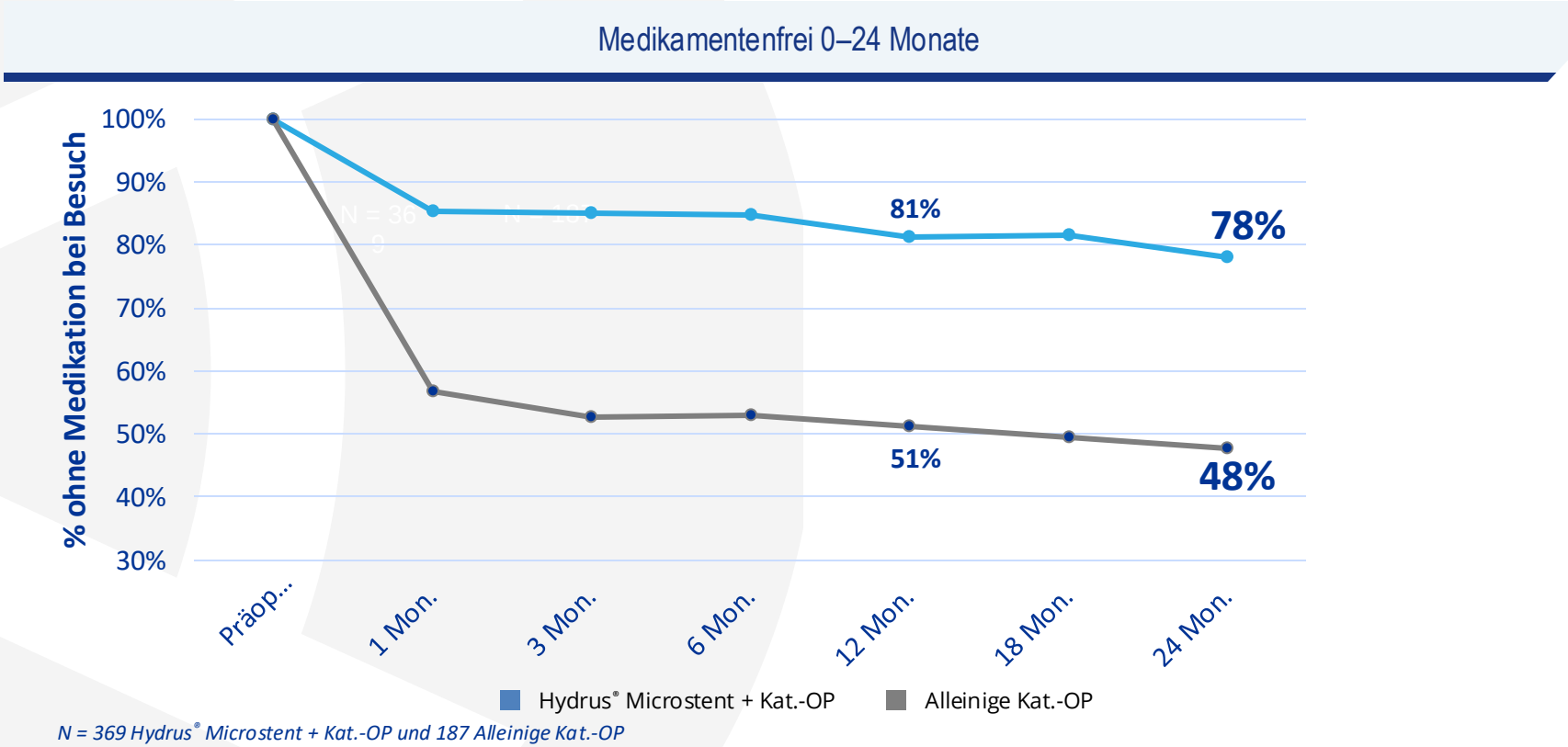

1. Gong H, Johnstone M, et al. Poster #115 American Glaucoma Society, New York 2012.
2. Hays CL, Toris CB, et al. Invest Ophthalmol Vis Sci. 2014;55:1893-1900.
3. Pfeiffer N, Samuelson TW, et al. Ophthalmology 2015;122:1283-1293

# HORIZON: Primärer Endpunkt[1]




1. Samuelson TW, Chang DF, Marquis R, et al. A Schlemm canal Hydrus Microstent for intraocular pressure reduction in primary open-angle glaucoma and cataract: The HORIZON Study. Ophthalmology 2019;126:29-37.

# HORIZON: Medikamentenfrei[1]



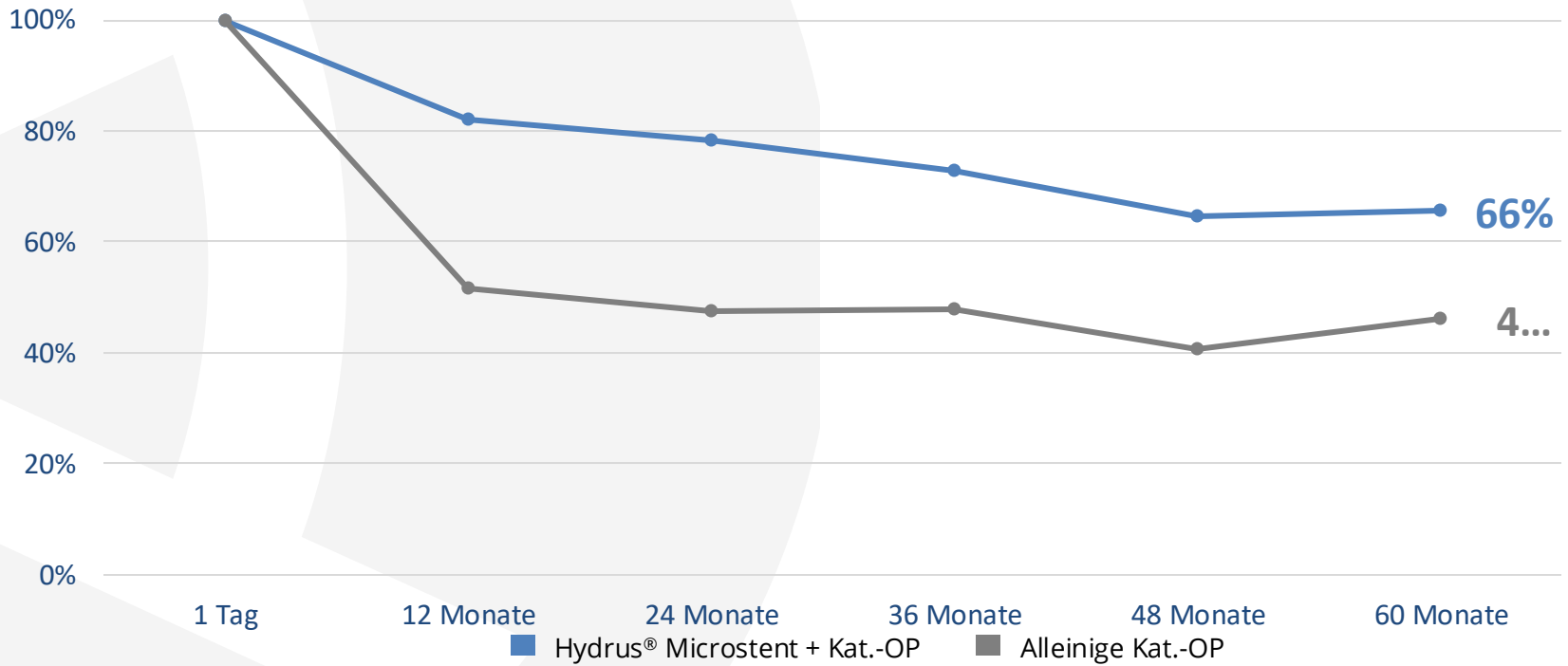

*N = 369 Hydrus® Microstent + Kat.-OP und 187 Alleinige Kat.-OP*

1. Samuelson T, Chang D, Marquis R, et al; HORIZON Investigators. A Schlemm canal Hydrus Microstent for intraocular pressure reduction in primary open-angle glaucoma and cataract: The HORIZON Study. Ophthalmology. 2019;126:29-37.

# HORIZON: Medikamentenfrei[1]

## Medikamentenfrei 0–60 Monate

An der 5-jährigen Nachkontrolle der Zulassungsstudie nahmen 308 Patienten aus der Hydrus-Gruppe und 134 aus der Kontrollgruppe teil.




1. Ahmed I, et al; HORIZON Investigators. Long-term Outcomes from the HORIZON Randomized Trial for a Schlemm's Canal Hydrus Microstent in Combination Cataract and Glaucoma Surgery. https://www.aaojournal.org/article/S0161-6420(22)00160-9/fulltext

**Ab interno trabecular bypass surgery with Schlemm´s canal microstent (Hydrus) for open angle glaucoma (Review)**

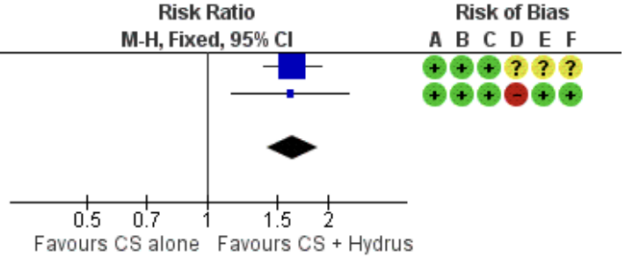
Otarola F, Virgili G, Shah A, Hu K, Bunce C, Gazzard G

Cochrane Library
Cochrane Database of Systematic Reviews

# Anteil ohne Medikation

| Study or Subgroup | Hydrus + CS Events | Total | Cataract surgery (CS) Events | Total | Weight | Risk Ratio M-H, Fixed, 95% CI |
|---|---|---|---|---|---|---|
| HORIZON 2018 | 273 | 351 | 85 | 178 | 83.7% | 1.63 [1.38, 1.92] |
| Pfeiffer 2015 | 37 | 47 | 21 | 43 | 16.3% | 1.61 [1.15, 2.26] |
| **Total (95% CI)** | | **398** | | **221** | **100.0%** | **1.63 [1.40, 1.88]** |
| Total events | 310 | | 106 | | | |

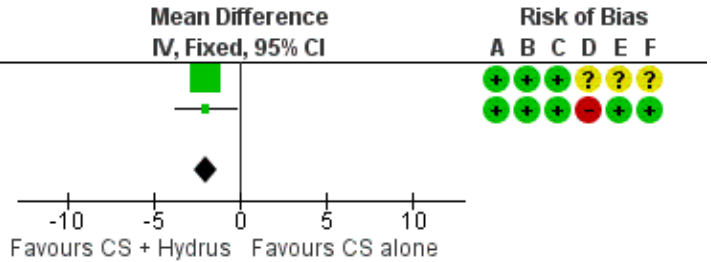
Heterogeneity: Chi² = 0.00, df = 1 (P = 0.96); I² = 0%
Test for overall effect: Z = 6.45 (P < 0.00001)




# IOD - Senkung

| Study or Subgroup | Hydrus + CS Mean | SD | Total | Cataract surgery (CS) Mean | SD | Total | Weight | Mean Difference IV, Fixed, 95% CI |
|---|---|---|---|---|---|---|---|---|
| HORIZON 2018 | -7.6 | 4.2 | 351 | -5.6 | 4.2 | 178 | 84.0% | -2.00 [-2.76, -1.24] |
| Pfeiffer 2015 | -9.4 | 4.2 | 47 | -7.4 | 4.2 | 43 | 16.0% | -2.00 [-3.74, -0.26] |
| **Total (95% CI)** | | | **398** | | | **221** | **100.0%** | **-2.00 [-2.69, -1.31]** |

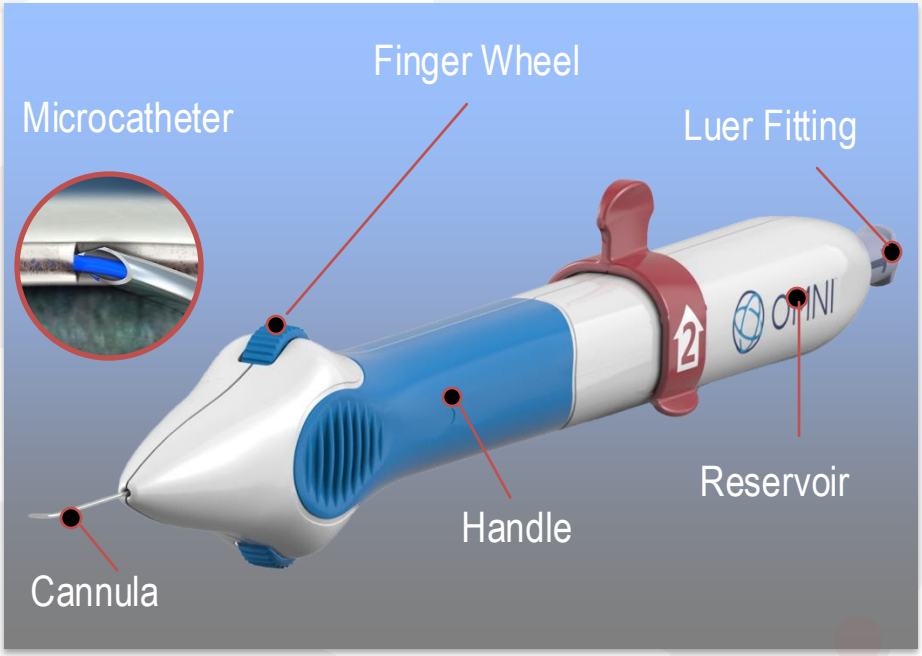
Heterogeneity: Chi² = 0.00, df = 1 (P = 1.00); I² = 0%
Test for overall effect: Z = 5.65 (P < 0.00001)



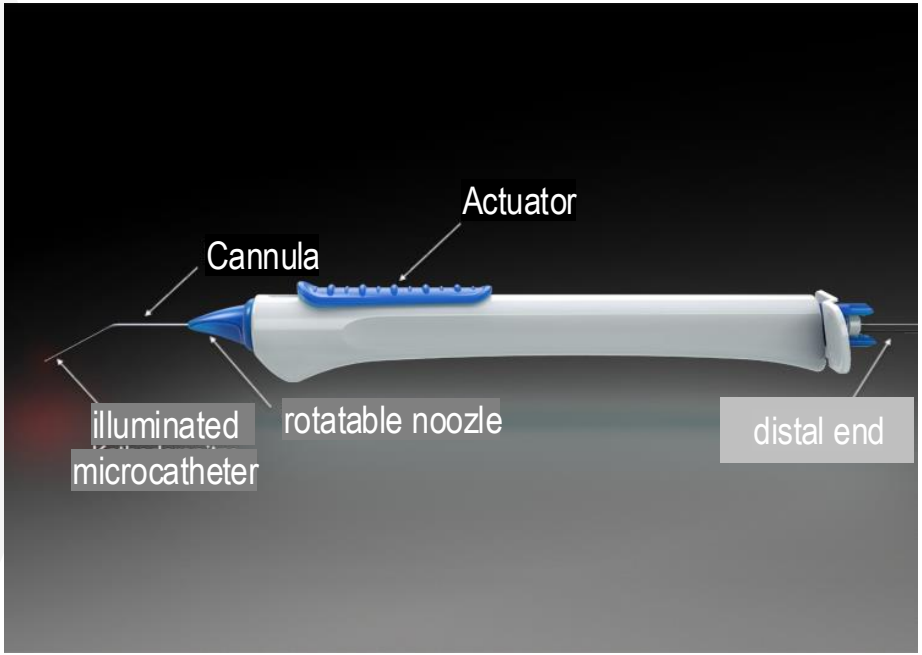

Moderate-certainty evidence that adding the Hydrus microstent to cataract surgery increased the proportion of participants who were medication-free from about half to more than three quarters at 12-months

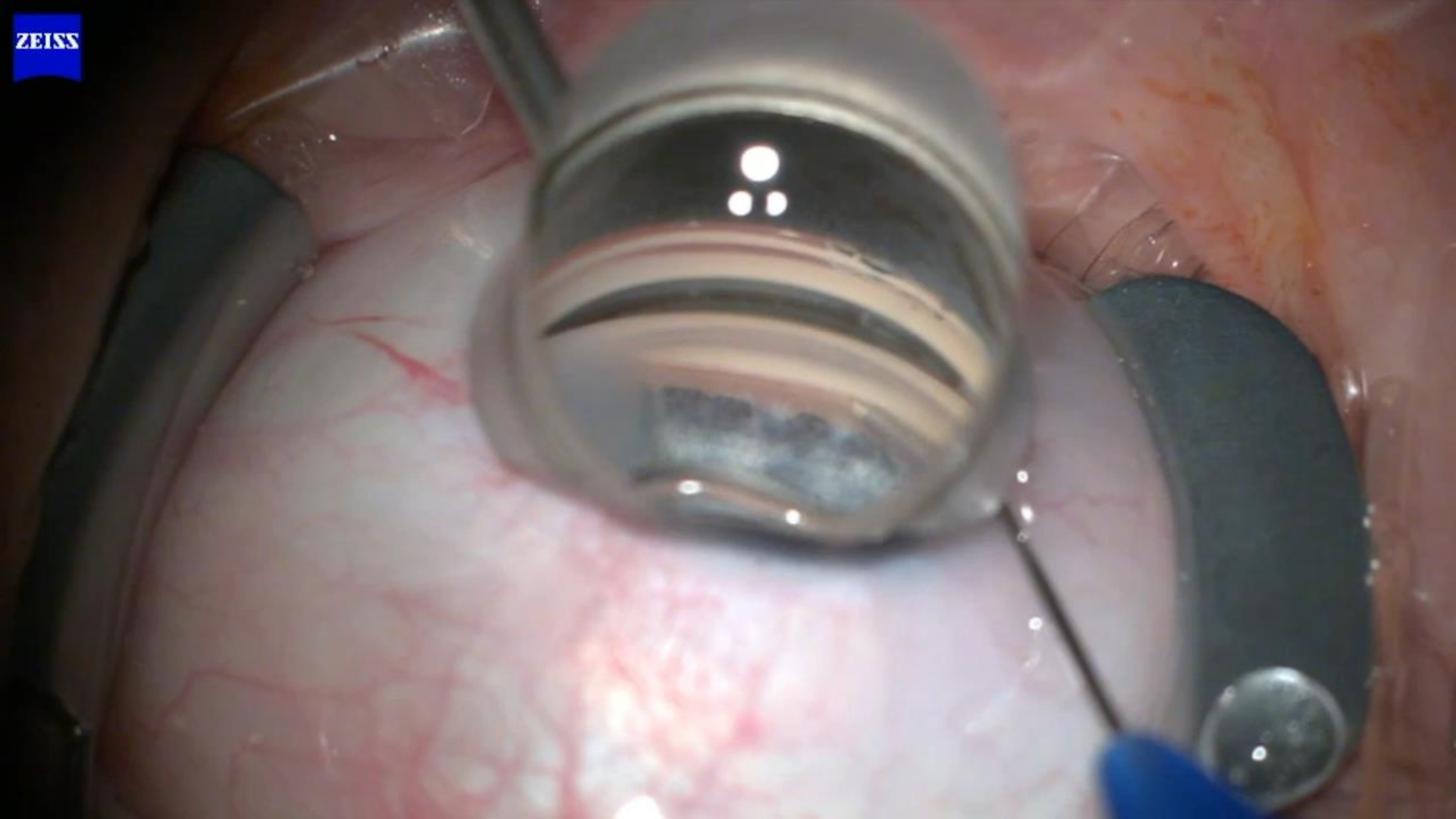
# Ab interno Canaloplasty

## OMNI Surgical System



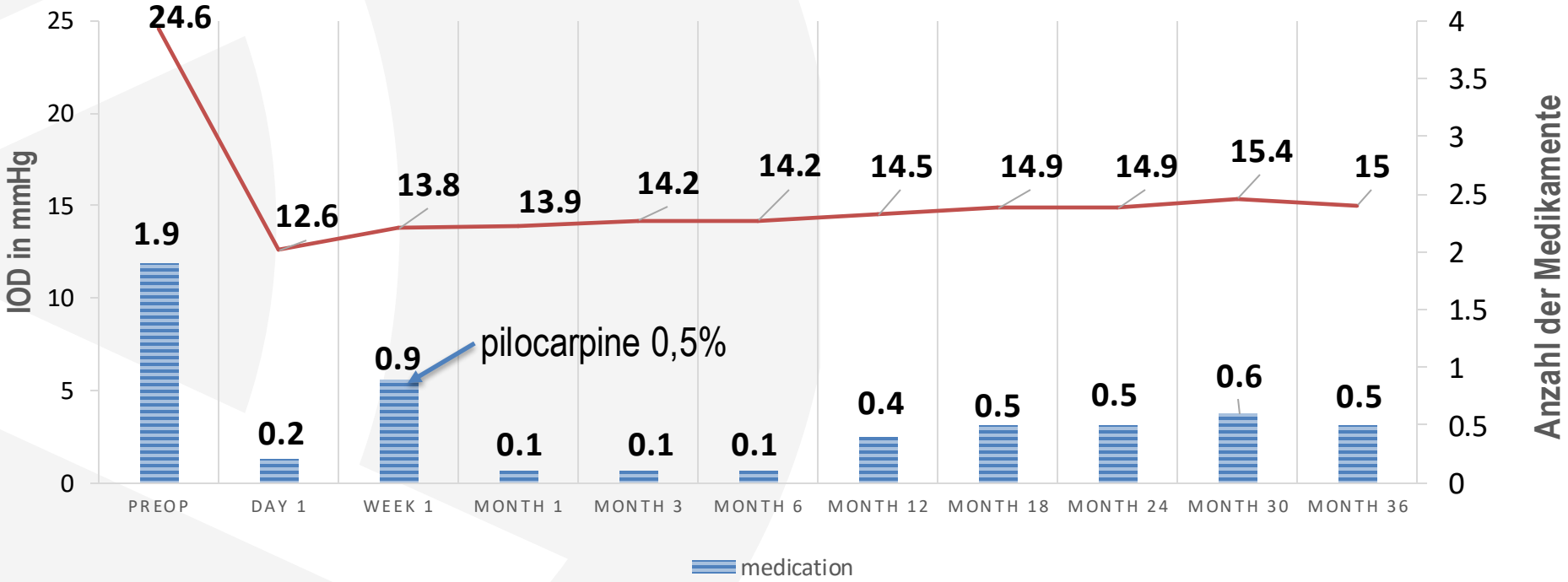

## iTrack Advance




ZEISS

# OMNI® Surgical System – 3 Jahresergebnisse

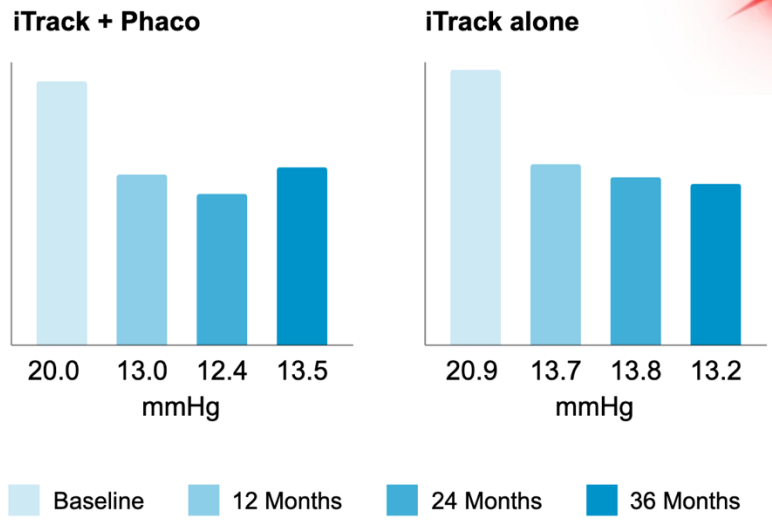
## IOD – Senkung und Medikamentenreduktion



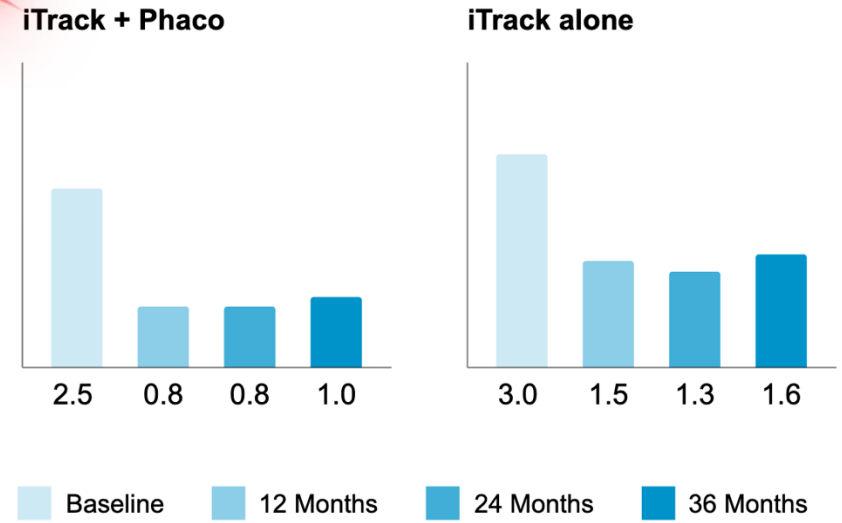

1Klabe K, Kaymak H. Standalone Trabeculotomy and Viscodilation of Schlemm's Canal and Collector Channels in Open-Angle Glaucoma Using the OMNI Surgical System: 24-Month Outcomes. Clin Ophthalmol. 2021;15:3121-3129. Published 2021 Jul 20. doi:10.2147/OPTH.S325394

# iTrack (Advance)

## Mean IOP (mmHg), 36 Months




## Mean Medications (n), 36 Months




Gallardo MJ. 36-Month Effectiveness of Ab-Interno Canaloplasty Standalone versus Combined with Cataract Surgery for the Treatment of Open-Angle Glaucoma. Ophthalmol Glaucoma. 2022 Sep-Oct;5(5):476-482. doi: 10.1016/j.ogla.2022.02.007. Epub 2022 Feb 17. PMID: 35183815.

# ELIOS - Excimer Laser Trabekulotomy

- Elios Laser Konsole
  - XeCl Excimer Laser
  - Wellenlänge 308 nm (Hornhaut Excimer Laser 193 nm)
  - Laser Klasse 4
  - Energiedichte am distalen Austrittspunkt 1,3 mJ
  - Repititionsrate 20 Hz

- FIDO Laserfaser
  - Kanüle
    - Länge 3,5 cm
    - Durchmesser 0,5 mm
    - Anschliff distal 25°
  - Faserkerndurchmesser 210 µm
  - Nummerische Apertur 220 µm

# ELIOS Excimer Laser Trabeculotomy

- Excimer Technologie

**TABLE**

**EXCIMER LASER WAVELENGTHS**

| Laser Medium | Wavelength (nm) |
|---|---|
| Fluorine | 157 |
| Argon fluoride | 193 |
| Krypton chloride | 222 |
| Krypton fluoride | 248 |
| Xenon chloride | 308 |
| Nitrogen | 337 |
| Xenon fluoride | 351 |
| Carbon dioxide | 10,600 |

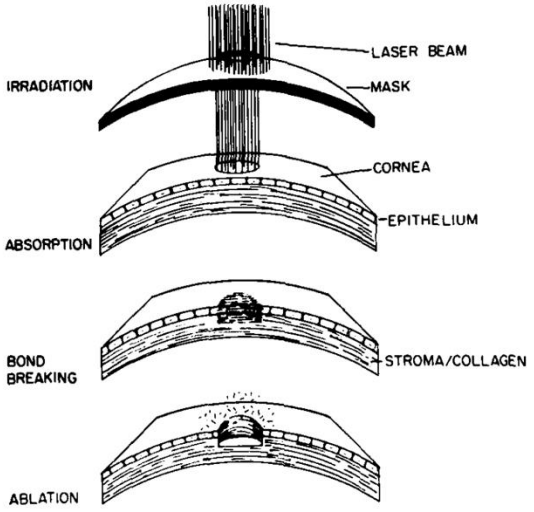



Fig. 3 (Trokel, Srinivasan, and Braren). Schema shows controlled ablation through the opening in a mask. We believe that the combination of absorption, bond breakage, and ablation produces the desired effect.

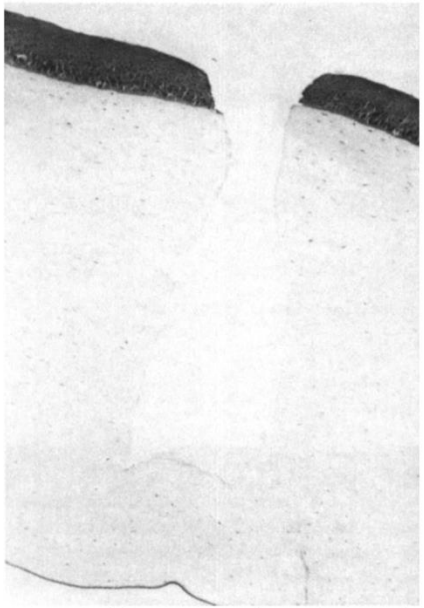
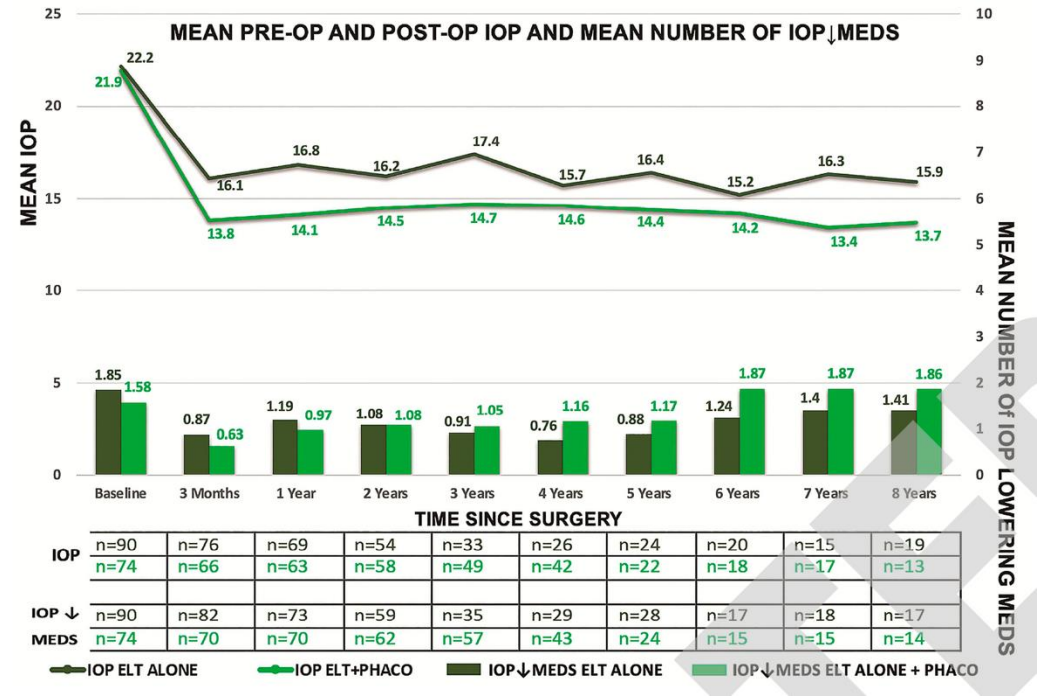


Fig. 4 (Trokel, Srinivasan, and Braren). Histopathologic studies confirmed that the edges of the groove shown in Figure 2 were parallel and straight (hematoxylin and eosin, × 24).

Trokel SL, Srinivasan R, Braren B. Excimer laser surgery of the cornea. Am J Ophthalmol. 1983 Dec;96(6):710-5. doi: 10.1016/s0002-9394(14)71911-7. PMID: 6660257.

# ELIOS Ergebnisse - Phako-ELT verglichen mit ELT allein[1]



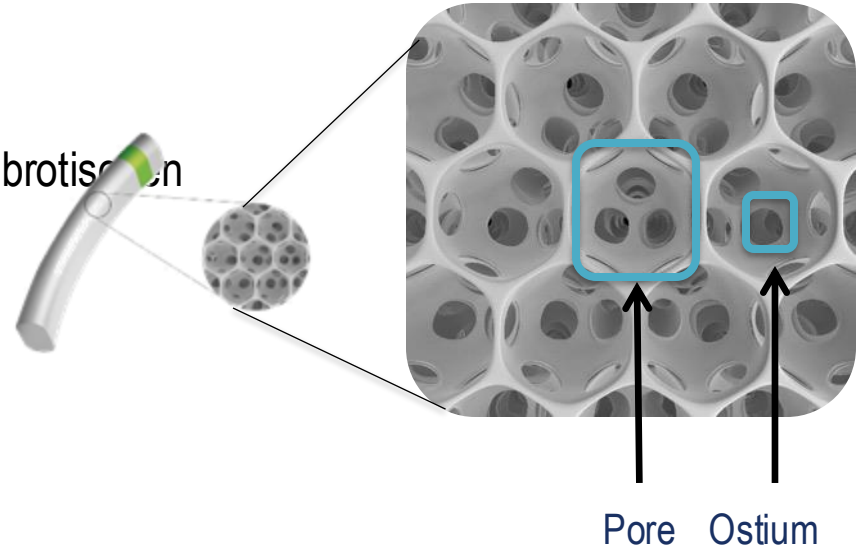

- Anzahl Augen =164
- Offenwinkelglaukom
- Phako-ELT(74) und
- ELT alone (90)
- Anhaltende IOD – Senkung in beiden Gruppe
- Medikamentenreduktion bis zu 5 Jahre

1. Berlin MS, Shakibkhou J, Tilakaratna N, Giers U, Groth SL. 8-year follow-up of Excimer Laser Trabeculostomy Alone and Combined With Phacoemulsification in Patients with Open Angle Glaucoma. J Cataract Refract Surg. 2021 Nov 3.

# MINIject

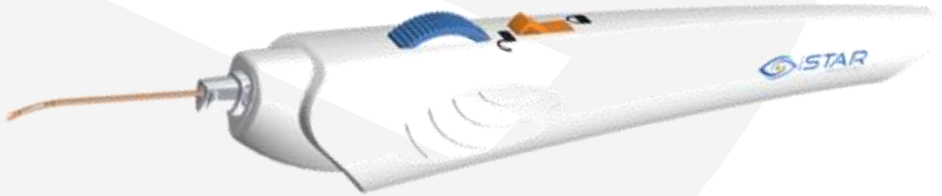
MINIJECT®

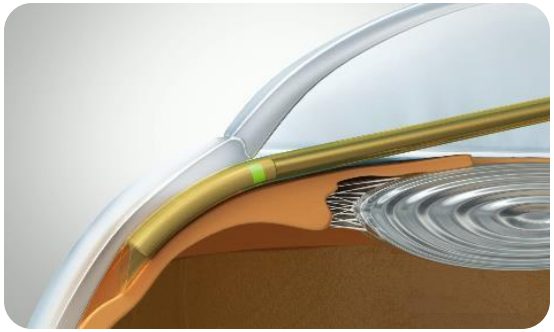
- Weiches, flexibeles Silikonmaterial und mit antifibrotischen Eigenschaften
- Mikroporen ermöglichen eine natürliche Flussgeschwindigkeit des Kammerwassers



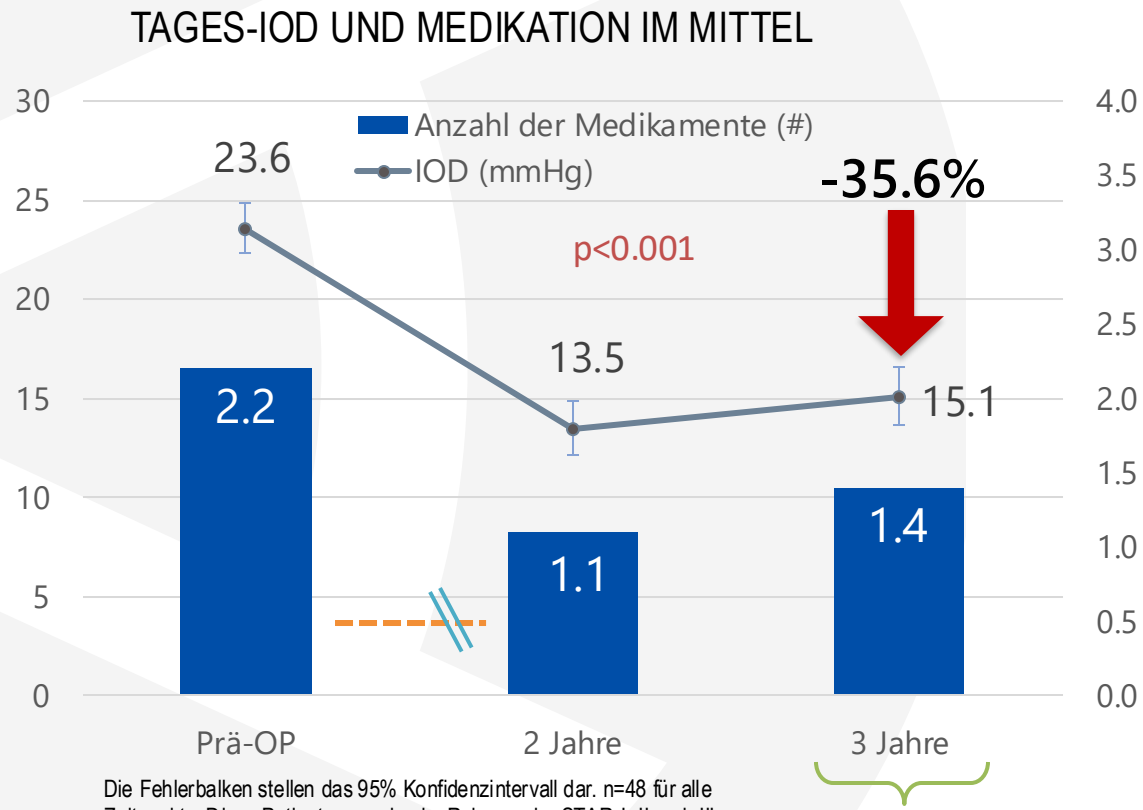

OPERATIONSVERFAHREN

- Einzeleingriff, Supraziliarraum
- Ab interno Zugang, corneale Inzision ≤ 2.2mm
- Sickerkissenfreie OP, kein MMC oder 5-FU nötig
- Nur 0.5mm des Implantats ragen in die Vorderkammer



# STAR-GLOBAL – Ergebnisse bis zu 3 Jahren (n=48)




Die Fehlerbalken stellen das 95% Konfidenzintervall dar. n=48 für alle Zeitpunkte. Diese Patienten wurden im Rahmen der STAR-I,-II und -III Studien behandelt. Die Daten sind vorläufig. Es handelt sich um Zwischenergebnisse nach 3 Jahren.

| Ergebnisse 3 Jahre postoperativ | |
|---|---|
| Patienten mit IOD-Senkung ≥20% im Vergleich zum Ausgangswert | 90% |
| Patienten mit IOD ≤18mmHg | 85% |
| Patienten ohne Medikation | 42% |

HINWEIS:

Kein Auswaschen der Medikation beim Studienstart

# MIBS – Minimally Invasive Bleb Surgery

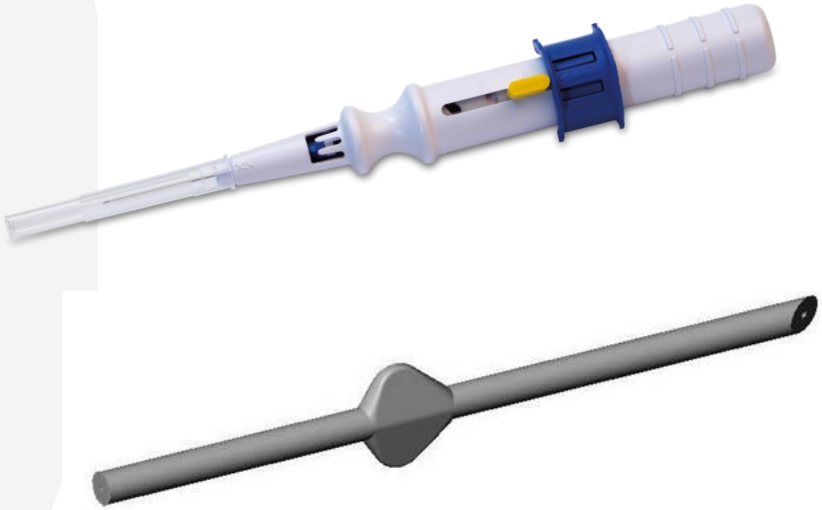
- Therapieansatz und prä- sowie postoperatives Management vergleichbar der Trabekulektomie
- Subconjunctivaler Abflussweg / Filterkissenoperation
- Maximale Drucksenkung möglich ( ≤ 14 mmHg)

- Präoperative Entzündungshemmung
  - Lokaltherapie absetzen / reduzieren
  - Lokale Steroide

- Intraoperative Zytostatikagabe (MMC)
  - Injektion oder Schwammapplikation

- Postoperativ langfristige Fibrosehemmung
  - 3 Monate + locale Stroide
  - ggf. MMC oder 5-FU postoperative

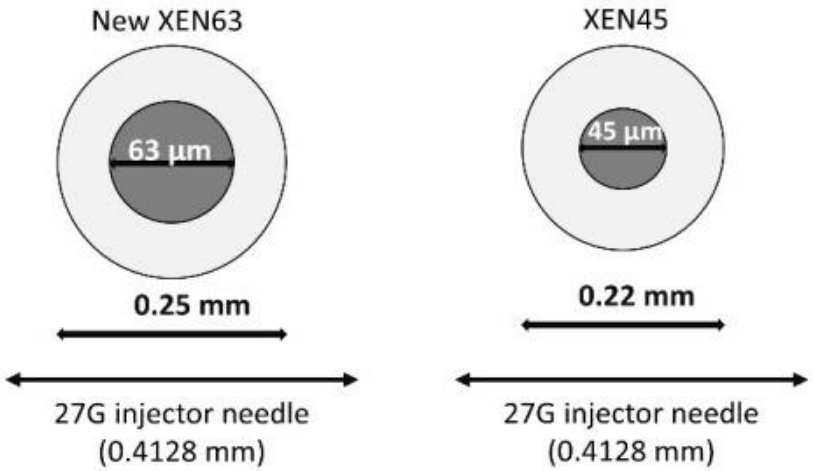
- Zur Zeit zwei Systeme
  - XEN Gelsten 45 und 63
  - Preserflo Microshunt



# MIBS - XEN Gelstent

- hydrophiler Stent
- Länge 6 mm
- quervernetzte porcine Gelatine

- 2 verschiedene Modelle mit unterschiedlichen Lumen und Innenwiderstand
  - XEN 63 2 – 3 mmHg
  - XEN 45 6 – 8 mmHg



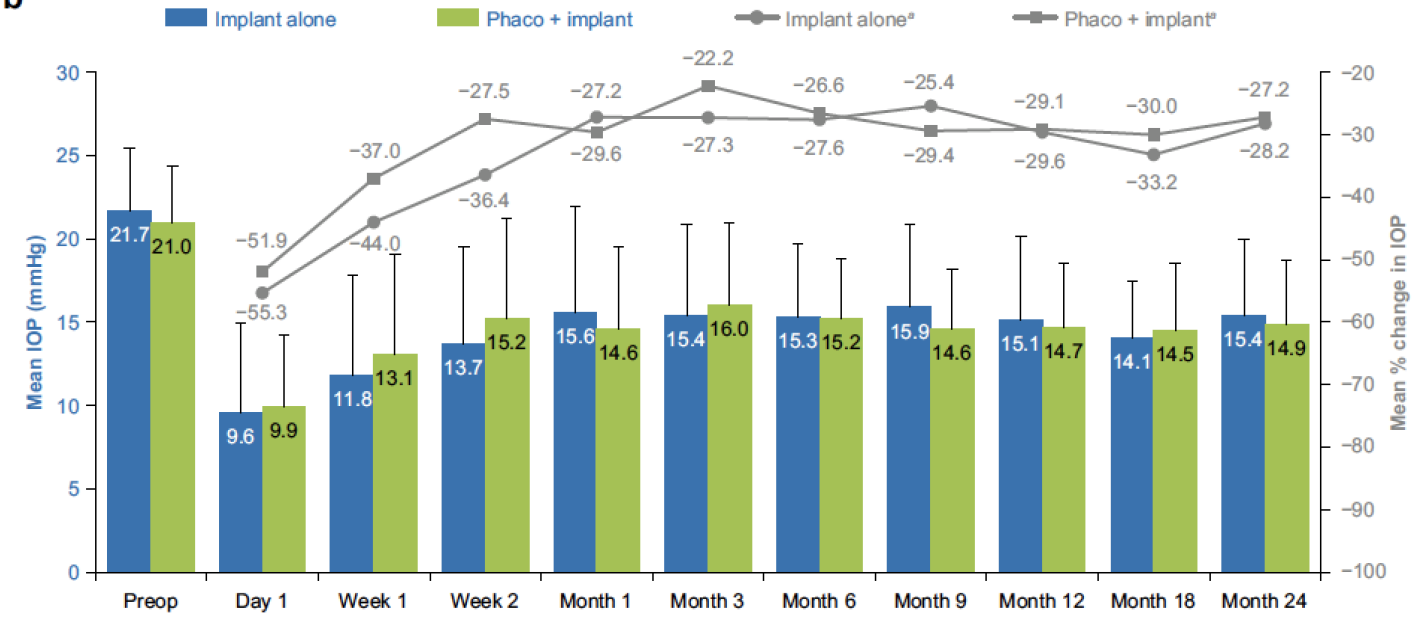


Sheybani A, Lenzhofer M, Hohensinn M, Reitsamer H, Ahmed II. Phacoemulsification combined with a new ab interno gel stent to treat open-angle glaucoma: Pilot study. J Cataract Refract Surg. 2015 Sep;41(9):1905-9.

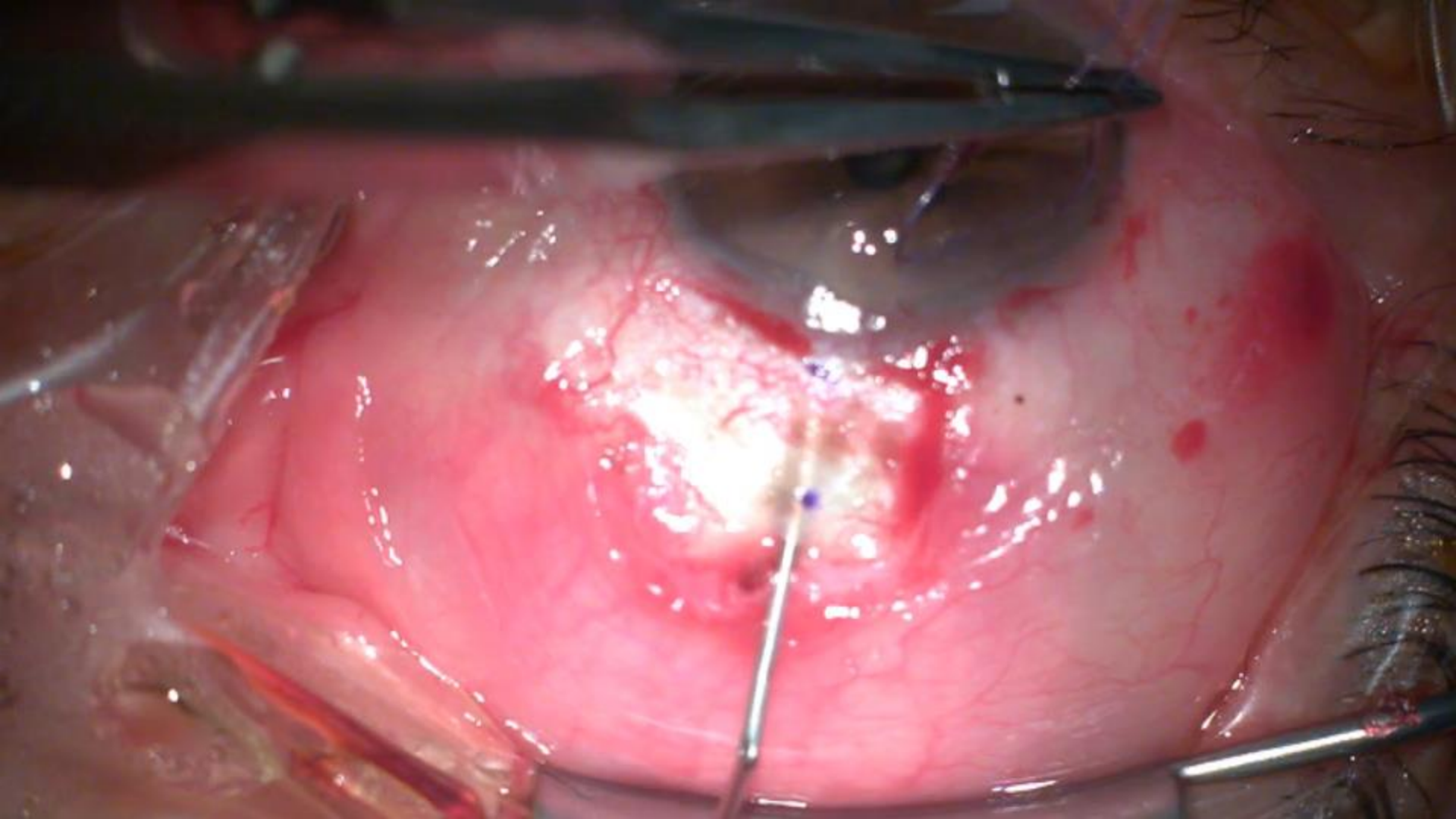
# Two-year results of a multicenter study of the ab interno gelatin implant in medically uncontrolled primary open-angle glaucoma

Herbert Reitsamer[1] · Chelvin Sng[2,3,4] · Vanessa Vera[5] · Markus Lenzhofer[1] · Keith Barton[2,3] · Ingeborg Stalmans[6] · For The Apex Study Group

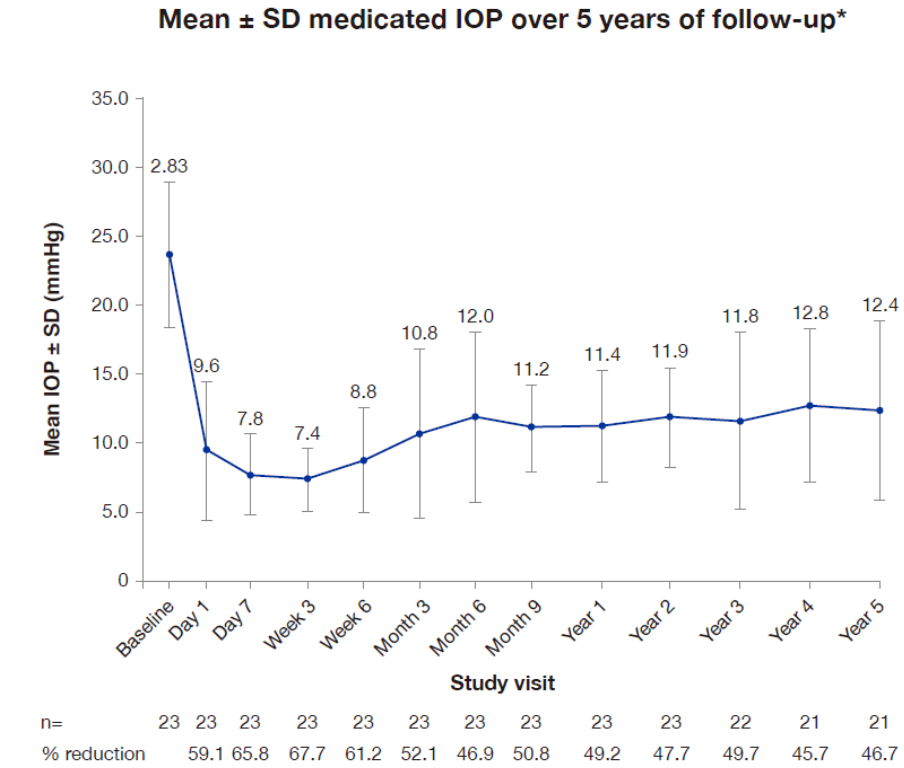
**b**




| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eyes, *n* | 114 | 88 | 114 | 88 | 108 | 85 | 97 | 72 | 105 | 82 | 101 | 83 | 105 | 81 | 77 | 71 | 97 | 81 | 84 | 79 | 86 | 75 |
| Mean meds | 2.7 | 2.5 | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 | 0.8 | 0.7 | 0.9 | 0.6 | 0.9 | 0.9 | 1.1 | 0.9 | 1.2 | 1.0 |
| (SD) | 0.9 | 0.9 | 0.3 | 0.1 | 0.4 | 0.4 | 0.5 | 0.7 | 0.9 | 0.7 | 1.0 | 0.9 | 1.2 | 1.0 | 1.2 | 0.9 | 1.1 | 1.0 | 1.3 | 1.0 | 1.2 | 1.0 |
| Mean med change[a] | | | −2.7 | −2.5 | −2.7 | −2.4 | −2.6 | −2.2 | −2.5 | −2.2 | −2.2 | −2.0 | −2.0 | −1.8 | −1.8 | −1.9 | −1.8 | −1.6 | −1.6 | −1.7 | −1.5 | −1.5 |
| (SD) | | | 0.9 | 0.9 | 1.0 | 0.9 | 1.0 | 1.0 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.1 | 1.3 | 1.2 | 1.4 | 1.2 | 1.5 | 1.2 |



# PRESERFLO™ MicroShunt




The **reduction in mean IOP** observed at Year 3 was **sustained** over **Years 4 and 5**

**12.4 mmHg**

Average IOP at 5 years

**↓~47%**

Mean **reduction in IOP** from pre-op baseline at 5 years

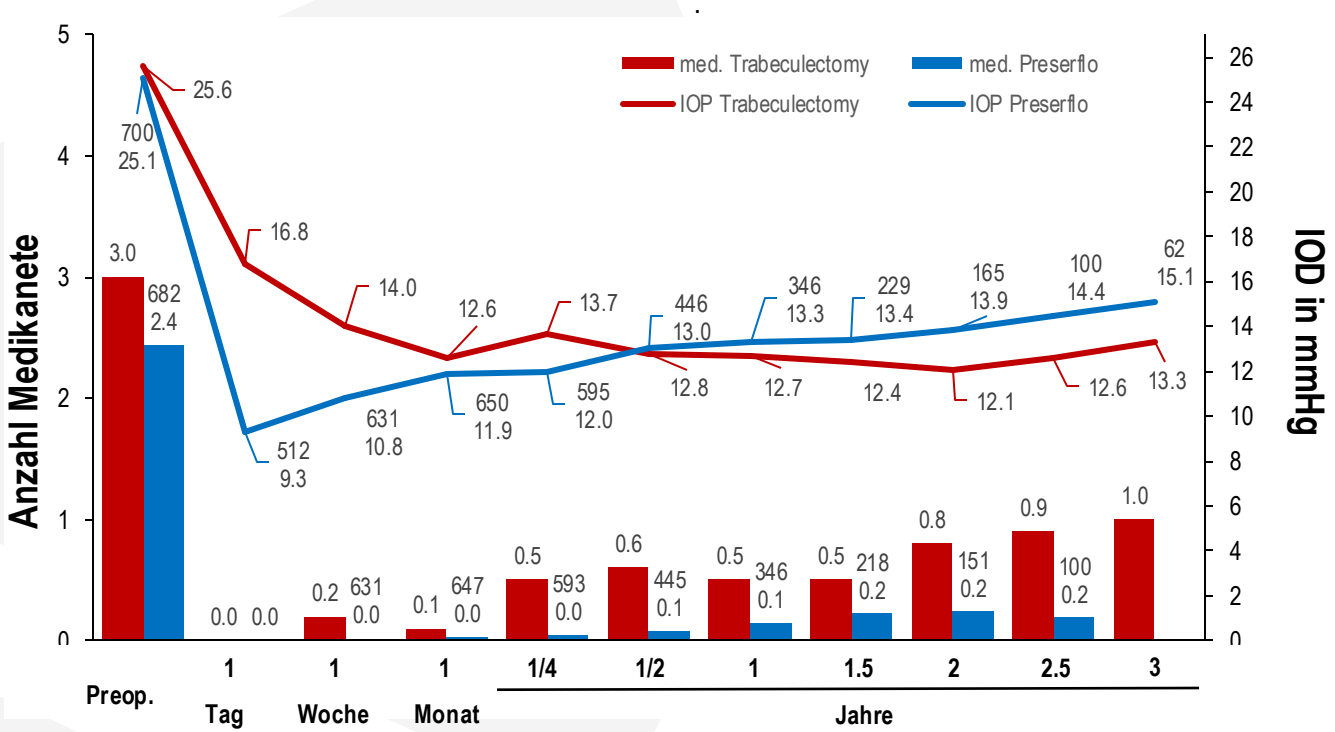
*Missing IOP scores were imputed using the last observed IOP score; IOP scores collected after reoperation are excluded.

IOP, intraocular pressure; POAG, primary open-angle glaucoma; SD, standard deviation.

Batlle JF et al. *J Glaucoma* 2021;30:281–286.

# Preserflo® MicroShunt – eigene 3 Jahresergebnisse vs. Trabekulektomie *

IOD- Senkung und Medikamentenreduktion




* Gedde SJ, Schiffman JC, Feuer WJ, Herndon LW, Brandt JD, Budenz DL; Tube Versus Trabeculectomy Study Group. Three-year follow-up of the tube versus trabeculectomy study. Am J Ophthalmol. 2009 Nov;148(5):670-84. doi: 10.1016/j.ajo.2009.06.018. Epub 2009 Aug 11. PMID: 19674729.

# Preserflo® MicroShunt – Komplikationen versus Trabekulektomie

| Complications | Preserflo ( n = 335)<br>n (%) | Trabekulektomie ($n_{max}$= 1240)<br>n (%) ✻ |
|---|---|---|
| Hyphäma | 22 (6,6%) | 304 (24,6%) |
| Flache Vorderkammer | 12 (3,6%) | 296 (23,9%) |
| Hypotonie (<6mmHg) | 16 (4,8%) | 296 (24,3%) |
| Leckage | 5 (1,5%) | 216 (17,6%) |
| Aderhautabhebung | 36 (10,7%) | 175 (14,1%) |
| Aufgehobene Vorderkammer | 2 (0,6%) | 3 (0,2%) |
| Malignes Glaukom | 1 (0,3 %) | 2 (0,2%) |
| Whipe out | 0 (0%) | 5 (0,4%) |
| Endophthalitis | 1 (0,3 %) | 3 (0,2%) |

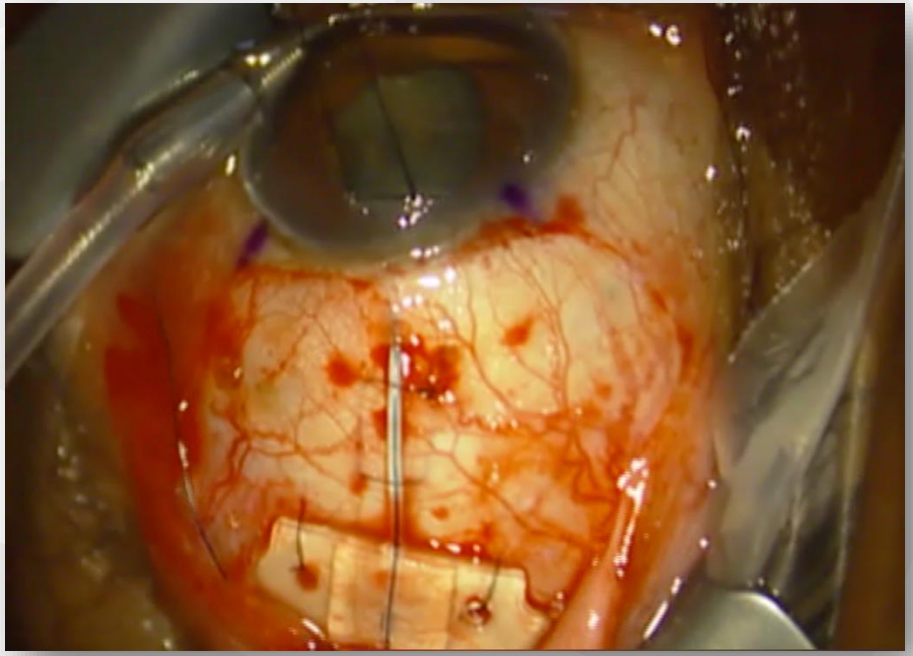
✻Data from: B.Edmungs et al, The National Survey of Trabeculectomy III, Eye 2002

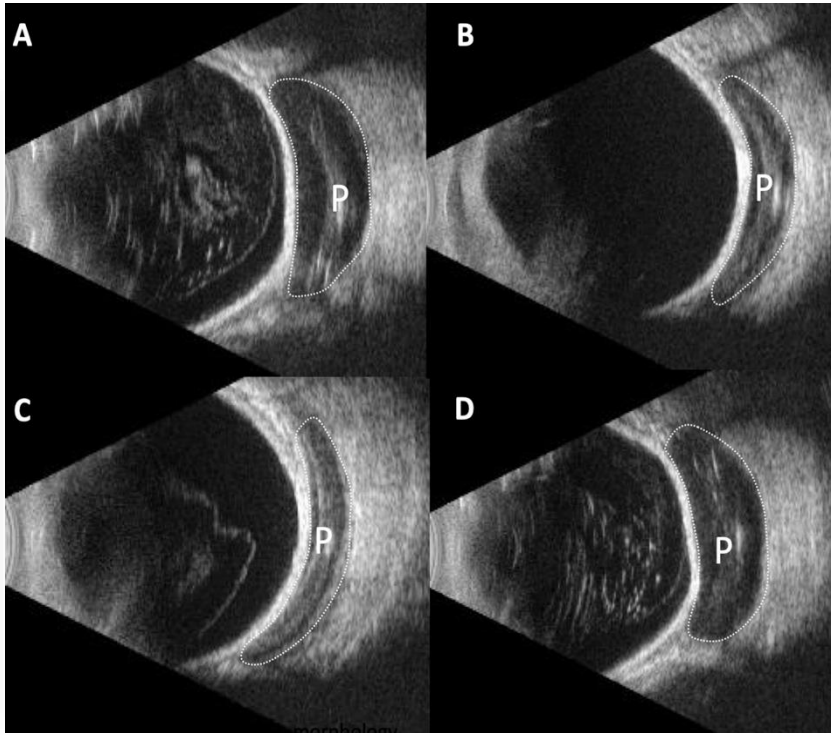
# Glaukom Drainage Implantate

- Glaukomimplantate zur posterioren Drainage
  - Schlauch (Tube) kommuniziert mit der VK
  - Drainageplatte mit oder ohne Ventil
  - Zum Teil Flussregulation (EyeWatch)

# Glaukom Drainage Implantate

- Postäquatoriale Drainage



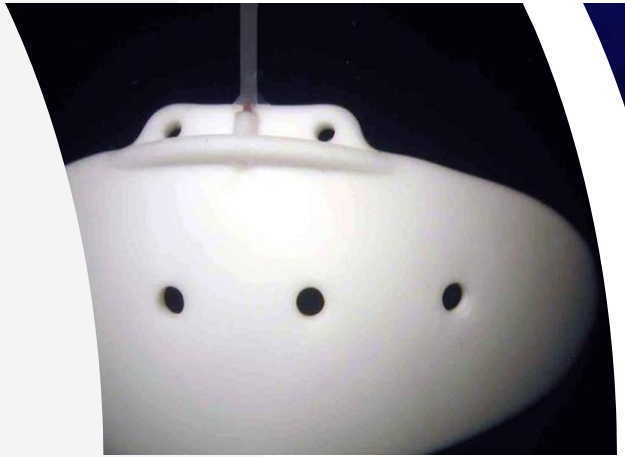


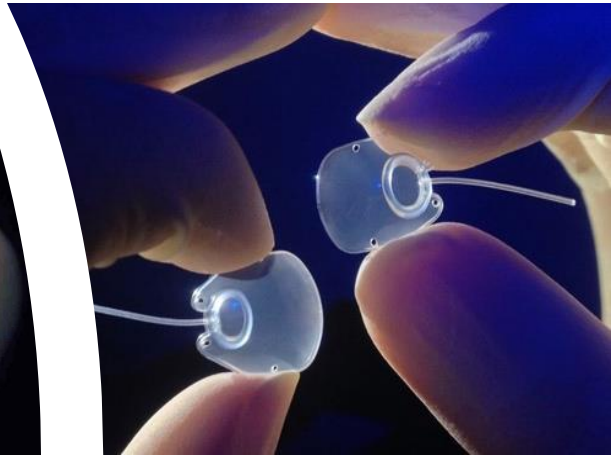

Vallabh N, Mason F, Yu J, Yau K, Fenerty C, Mercieca K, Au L. Surgical technique, perioperative management and early outcome data of the PAUL® glaucoma drainage device. *Eye* (2021)

Iwasaki K et al. Evaluation of Bleb Fluid After Baerveldt Glaucoma Implantation Using Magnetic Resonance Imaging. *Scientific Reports* (2017)

# Glaukom Drainage Implantate - Indikationen

- Hoher IOD trotz vorheriger Op
- Vorherige Netzhautoperation
- Kongenitales Galukom
- Neovaskuläres Glaukom
- Uveiitisches Glaukom
- ASD (Anterior Segment Dystrophie)
- ICE (Irido – Corneale- Endotheliale ) Syndrome
- Vernarbte Bindehaut
- Aphakie
- Z.n. Keratoplastik, Keratoprothese





# Tube-Shunt Surgery versus Repeat Trabeculectomy as Second Line Management After Failed Primary Trabeculectomy

Shiwani H, Prokosch V, Fenerty C, Pfeiffer N, Mercieca K.

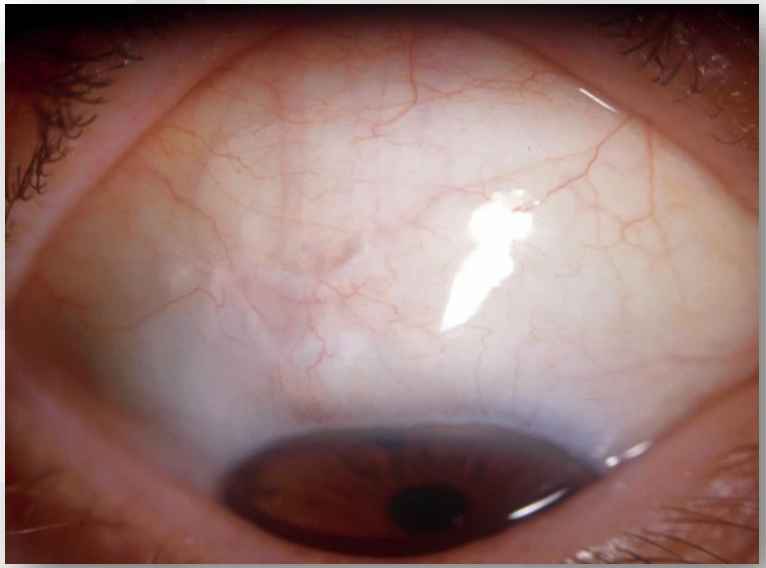
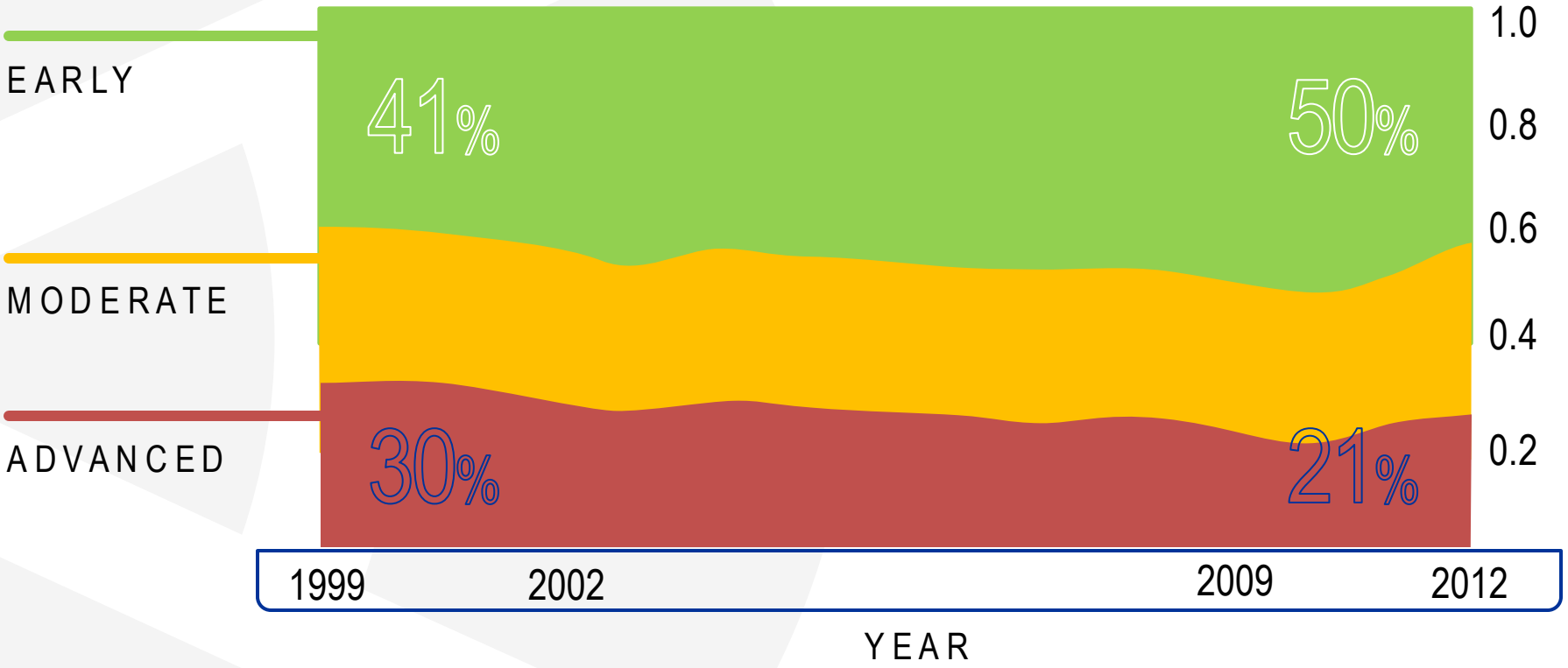


**TABLE 1.** Demographic and Ocular Characteristics

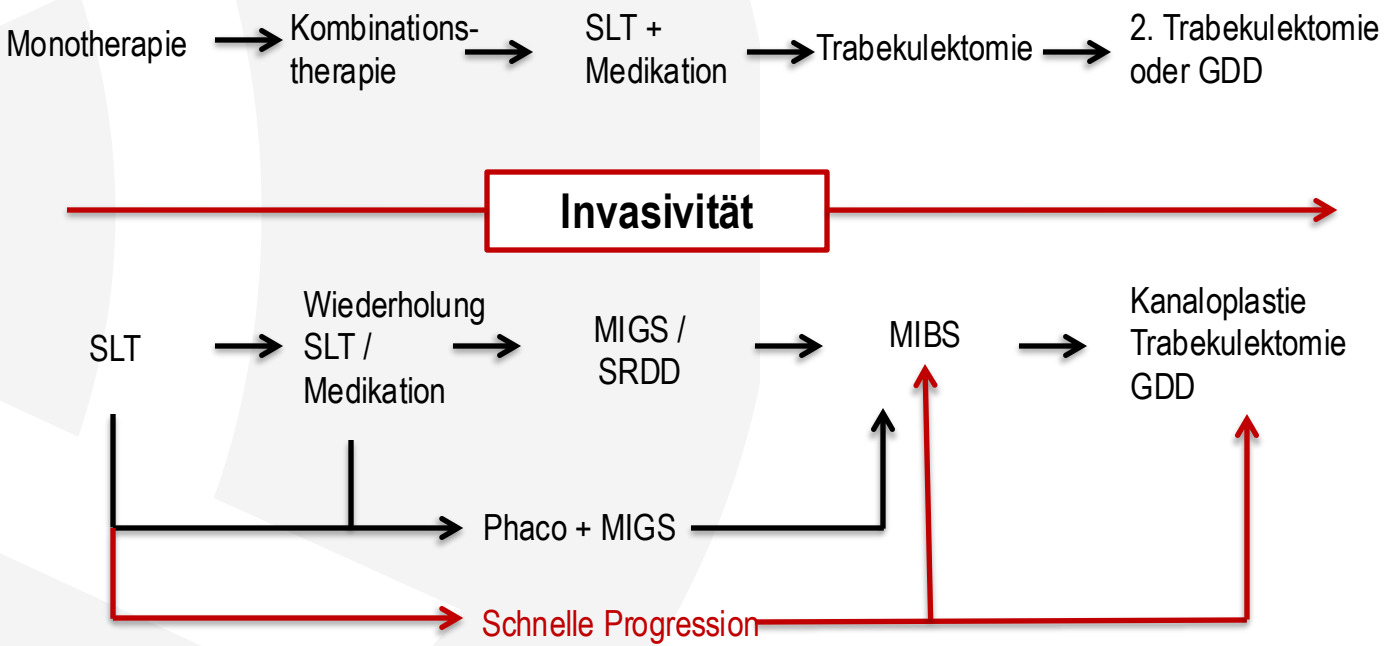
| | Combined Cohorts (n = 137) | Tube Cohort (n = 64) | Trabeculectomy Cohort (n = 73) | P-Value |
|---|---|---|---|---|
| **Age,** years | | | | |
| Mean ± SD | 64 ± 16 | 63 ± 19 | 66 ± 13 | 0.99[§] |
| Range | 13-89 | 13-86 | 23-89 | |
| **Gender,** n (%) | | | | |
| Male | 70 (51%) | 28 (44%) | 42 (58%) | 0.15[†] |
| Female | 67 (49%) | 36 (56%) | 31 (42%) | |
| **Ethnicity,** n (%) | | | | |
| White | 120 (88%) | 49 (77%) | 71 (97%) | **0.0004**[¥] |
| Black | 2 (1%) | 2 (3%) | 0 (0%) | |
| Asian (Indian Subcontinent) | 7 (5%) | 7 (11%) | 0 (0%) | |
| Asian (East/South-East) | 2 (1%) | 0 (0%) | 2 (3%) | |
| Unknown | 6 (4%) | 6 (9%) | 0 (0%) | |
| **Diagnosis,** n (%) | | | | |
| POAG | 79 (58%) | 44 (69%) | 35 (48%) | **<0.0001**[¥] |
| NTG | 4 (3%) | 2 (3%) | 2 (3%) | |
| PXFG | 24 (18%) | 4 (6%) | 20 (27%) | |
| PDS | 6 (4%) | 1 (2%) | 5 (7%) | |
| NAG | 3 (2%) | 3 (5%) | 0 (0%) | |
| Uveitic | 3 (2%) | 3 (5%) | 0 (0%) | |
| Juvenile | 4 (3%) | 0 (0%) | 4 (5%) | |
| Congenital | 6 (4%) | 5 (8%) | 1 (1%) | |
| Other | 3 (2%) | 0 (0%) | 3 (4%)[£] | |
| **Pre-op IOP**[‡], mmHg | | | | |
| Mean ± SD | 25 ± 8 | 25 ± 7 | 26 ± 8 | 0.71[§] |
| Range | 11-50 | 11-43 | 13-50 | |
| **Pre-Op Visual Acuity**[Þ], LogMAR | | | | |
| Mean ± SD | 0.414 ± 0.438 | 0.363 ± 0.320 | 0.455 ± 0.513 | 0.33[§] |
| Range | -0.079-2.8 | -0.079-1.301 | 0-2.8 | |
| **Previous Surgery,** n (%) | | | | |
| Cataract | 51 (37%) | 8 (13%) | 43 (59%) | **<0.0001**[†] |
| Laser | 29 (21%) | 5 (8%) | 24 (33%) | **0.0006**[†] |
| Iridectomy | 3 (2%) | 0 (0%) | 3 (4%) | 0.25[¥] |
| Vitreo-Retinal | 1 (1%) | 1 (2%) | 0 (0%) | 0.47[¥] |
| Other | 21 (15%) | 4 (6%) | 17 (23%) | **0.01**[†] |

# Schweregrad der Erkrankung




Boodhna T, Crabb DP. Disease severity in newly diagnosed glaucoma patients with visual field loss: trends from more than a decade of data. Ophthalmic Physiol Opt. 2015 Mar;35(2):225-30. doi: 10.1111/opo.12187. Epub 2014 Dec 29. PMID: 25545852

# Glaukom – Paradigmenwechsel mit MIGS / MIBS




Danke, dass Sie sich für die MIGS / MIBS entscheiden!