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# **Role of Diuretics as a Risk Factor for Posterior Vitreous Detachment**

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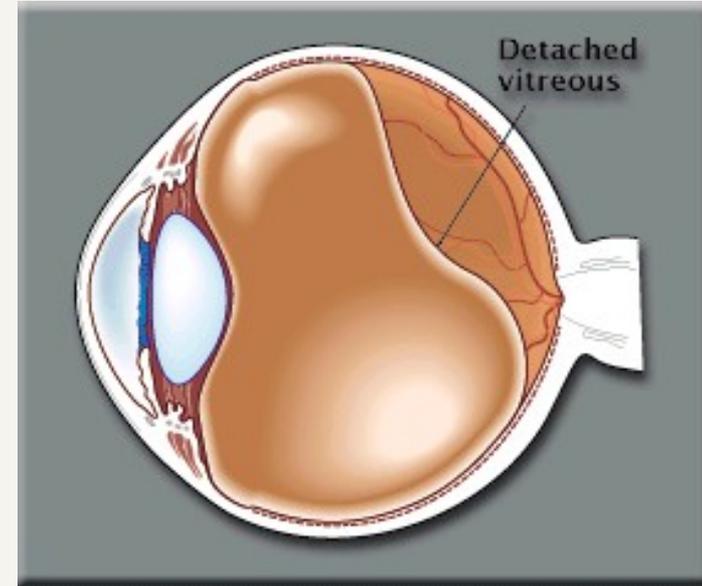
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# BACKGROUND

## Risk factors for PVD:

- Increasing age [Hayreh and Jonas, 2004]
- Increased bulbar axial length (myopia) [Morita, 1995]
- Female gender [Chuo, 2006]
- Pan-retinal photocoagulation [Sebag, 1990]
- Cataract surgery [Mirshahi, 2009]
- High intake of vitamin B6 [Chuo, 2006]
- Diabetic ketoacidosis [Chang, 1977]



# PURPOSE

Although dehydration is a known predisposing condition for posterior vitreous detachment (PVD), no literature data are available on the effect of systemic therapies that act on hydro-saline metabolism such as cardiovascular drugs, with particular regard to diuretics.

**The purpose of this investigation was to verify whether diuretic agents are a risk factor for PVD development.**

# METHODS

- A retrospective cross-sectional study was conducted.
- The clinical records of 300 consecutive patients suffering from high blood pressure who needed an eye examination were reviewed.
- INCLUSION CRITERIA:
  - antihypertensive treatment for over 3 years
  - All patients should be undergone to a complete ophthalmologic examination, including visual acuity test, slit lamp biomicroscopy, ophthalmoscopy (binocular and additional +90 diopter lens observation)
- Clinical data were gathered by means of a questionnaire

# QUESTIONNAIRE

**STUDIO PROGETTO DPV**

**Identificativo**  
 età \_\_\_\_\_ sesso  M  F  
 gruppo DPV   Senza colliriani  
 con minimo colliriani  
 con membrana apertivica

**Età di insorgenza del DPV**  
 Anamnesi fisiologica  
 fumo \_\_\_\_\_ (approx n. sigarette)  
 Attività fisica  sedentaria  
 moderata  
 intensa (sport)  
 Scarsa  
 sudorazione  normale  
 abbondante  
 Ingestione di liquidi \_\_\_\_\_ (approx in L)

**Anamnesi patologica**  
 ipertensione  No  \_\_\_\_\_ (diagnosi)  
 ipotensione  No  \_\_\_\_\_ (diagnosi)  
 diabete  No  \_\_\_\_\_ (diagnosi)  
 patologia renali  No  \_\_\_\_\_ (diagnosi)  
 Patologia cardiaca  No  \_\_\_\_\_ (diagnosi)  
 Patologia reumatica e osteo articolare  No  \_\_\_\_\_ (diagnosi)  
 Patologia endocrina  No  \_\_\_\_\_ (diagnosi)  
 Patologia neuropsichiatrica  No  \_\_\_\_\_ (diagnosi)  
 Altre patologie  No  \_\_\_\_\_ (diagnosi)  
 \_\_\_\_\_ (diagnosi)  
 \_\_\_\_\_ (diagnosi)  
 \_\_\_\_\_ (diagnosi)

**Anamnesi specialistica**  
 miopia  No  \_\_\_\_\_ (diagnosi)  
 Astigmatismo  No  \_\_\_\_\_ (diagnosi)  
 Distacco retina reprotogeno  No  \_\_\_\_\_ (diagnosi)  
 Occlusioni vascolari  No  \_\_\_\_\_ (diagnosi)  
 Scure retiniche  No  [ laser si  no  ]  
 Intervento di cataratta  No  \_\_\_\_\_ (diagnosi)  
 Glaucoma  No  \_\_\_\_\_ (diagnosi)  
 beta bloccanti  
 CAJ Topici  
 CAJ SISTEMICI  
 PG  
 Adrenergici  
 Pilocarpina  
 chirurgia  
 Patologia cervice  No  \_\_\_\_\_ (diagnosi)

**TRATTAMENTI FARMACOLOGICI**

antipertensivi  No  \_\_\_\_\_ (quali)  
 diuretici  No  \_\_\_\_\_ (quali)  
 anestetici/anti depressivi  No  \_\_\_\_\_ (quali)  
 Altri neurologici  No  \_\_\_\_\_ (quali)  
 gastroenterici  No  \_\_\_\_\_ (quali)  
 cardiocostanti  No  \_\_\_\_\_ (quali)  
 Antiinfiammatori/analgesici  No  \_\_\_\_\_ (quali)  
 antipiretici  No  \_\_\_\_\_ (quali)  
 altri  No  \_\_\_\_\_ (quali)  
 No  \_\_\_\_\_ (quali)

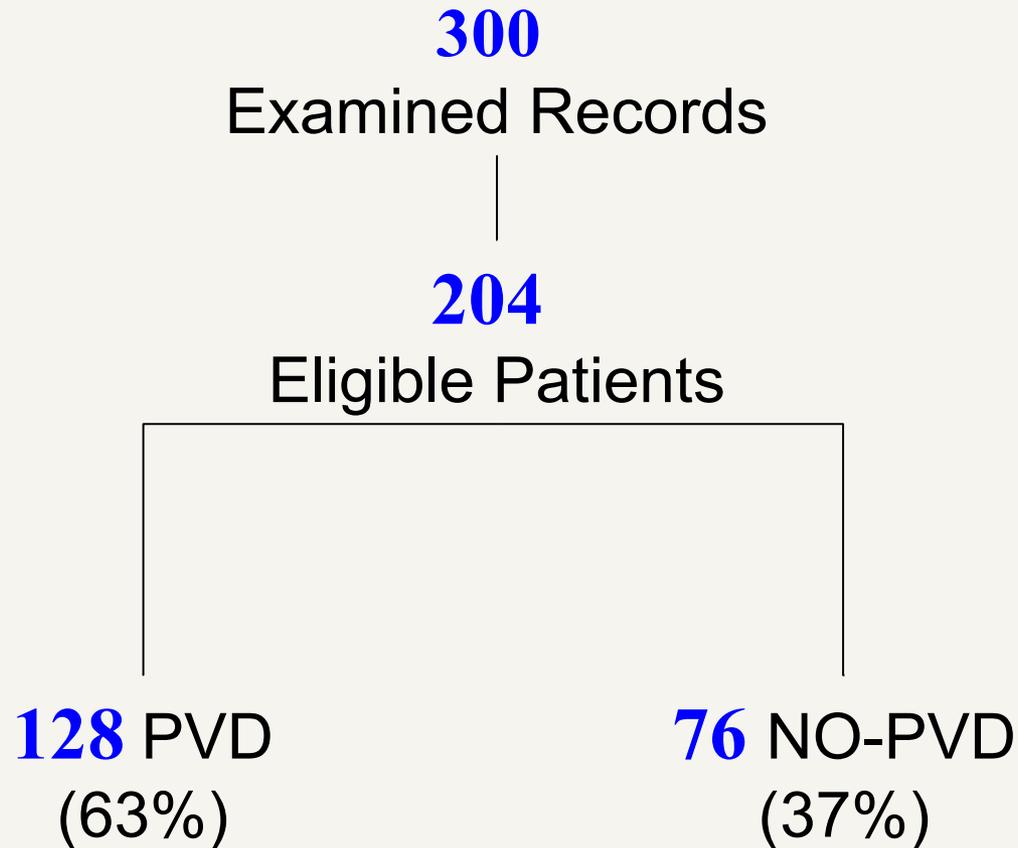
# EXCLUSION CRITERIA

- Alcoholism
- Kidney diseases
- Neuroendocrine diseases
- Retinal detachment
- Osmotic therapies
- Significant refractive errors (not higher than 2 diopters as a spherical equivalent).
- Previous ocular surgery
- Previous uveitis.
- Predisposing habits to dehydration
  - poor daily water intake
  - sauna
  - Turkish bath
  - endurance sports

# STATISTICS

- Odds Ratio calculated by means of contingency tables ( $\chi^2$  test)
- Logistic multiple regression
- Significance level:  $P < 0.05$
- $P$  given 2-tailed

# STUDY POPULATION



# DEMOGRAPHICS

	PVD group	NO-DPV group	P
N. (*)	128	76	-
Gender, M/F	54/74	33/43	ns
Age, years(SD)	67.6 (11.2)	66.8 (11.0)	ns
Duration of treatment, years(SD)	10.8 (5.5)	13.6 (10.1)	ns
Number of drugs (SD)	1.52 (1.17)	1.66 (0.95)	ns

(\*) all caucasians

# RESULTS: Odds Ratios

factors	PVD	No-PVD	OR	95% CI	P
Diabetes	12% (16/128)	5% (4/76)	<b>2.5</b>	0.76 to 9.5	ns
Argon laser	9% (11/128)	1% (1/76)	<b>7.0</b>	0.91 to 42.5	<b>0.07</b>
Glaucoma	32% (41/128)	24% (18/76)	<b>1.5</b>	0,75 to 3,05	ns
Furosemide	31% (40/128)	5% (4/76)	<b>8.2</b>	2.6 to 28.3	<b>&lt;0.001</b>
Alpha-blockers	5% (6/128)	10% (8/76)	<b>0.4</b>	0.12 to 1.4	ns
ACE inhibitors	28% (36/128)	39% (30/76)	<b>0.6</b>	0.31 to 1.14	ns
Sartans	37% (48/128)	29% (22/76)	<b>1.5</b>	0.76 to 2.84	ns
Ca <sup>++</sup> channel blockers	12% (16/128)	29% (22/76)	<b>0.3</b>	0.16 to 0.76	<b>0.006</b>
Beta-blockers	19% (21/128)	24% (18/76)	<b>0.6</b>	0.29 to 1.35	ns
Nitrates	4% (5/128)	0% (0/76)	-	-	ns

# RESULTS: logistic multiple regression

factors	r	95% CI	P<0.05
diabetes	0.17	-0.039 to 0.386	no
Argon laser	0.27	-0.003 to 0.534	no
Glaucoma	0.09	-0,048 to 0,228	no
Diuretics	0.24	0,105 to 0,374	yes
Other anti-hypertensives	-0.42	-0,595 to -0,245	yes

# RESULTS: logistic multiple regression

factors	r	95% CI	P<0.05
Furosemide	0,33	0,171 to 0,489	yes
Thiazides	-0,11	-0.283 to 0.049	no
Alpha-blockers	-0,21	-0,471 to 0,045	no
ACE inhibitors	-0,14	-0,297 to 0,004	no
Sartans	0,02	-0,125 to 0.169	no
Ca <sup>++</sup> channel blockers	-0,24	-0,412 to -0,077	yes
Nitrates	0,32	-0.989 to 0.741	no
Beta-blockers	-0,09	-0,265 to 0,068	no

# CONCLUSIONS

- Furosemide, that is one of the most effective agents in increasing urine volume, showed a strong association (**OR = 8.2; 95%CI: 2.6 to 28.3**) and could be considered a relevant risk factor for developing PVD.
- Therefore, in patients at risk of PVD or retinal detachment or other posterior retina diseases, particular attention should be focused on the choice of anti-hypertensive therapy, avoiding the use of furosemide unless absolutely necessary

# CONCLUSIONS

The protective effect (OR = 0.3; 95%CI: 0.16 to 0.76) of Ca<sup>++</sup> channel blockers can be matter of speculation:

- It could be merely a bias of the study, due to the lack of furosemide assumption by those patients,  
or
- It could be attributed to the hydro-retentive effect of this class of drugs (*Dibona et al, Renal tubular site of action of Felodipine. J Pharmacol Exp Therap 1984*).

# CONCLUSIONS

The recommendations coming from these results are two:

- since furosemide is a widely prescribed diuretic, cardiologists and general practitioners should consider also the risk of PVD along with its other undesirable effects, before of prescribing furosemide to their patients.
- the risk/benefit ratio of furosemide, contraindications and precautions for the use might be revised, whether further data confirm this finding.