

出國報告(出國類別：參加會議)

主題：Annual Meeting of the Association
for Research in Vision and
Ophthalmology 2016
(ARVO 2016)

服務機關：台北榮民總醫院眼科部青光眼科

姓名職稱：鄭冬梅主治醫師

派赴國家：Seattle, USA

出國期間：2016/5/1 - 2016/5/5

報告日期：2016/7/1

摘要

ARVO 是最具權威的國際眼科會議之一，今年會議舉辦的地點是美國西雅圖，以往 ARVO 會議以基礎研究為主，近年來也較重視臨床研究的論文發表。本次參加會議發表互動式的壁報論文 Association between driving performance under simulated fog conditions and PERCEPT in glaucoma。根據以往研究發現青光眼病人對於汽車碰撞有較高的危險性，在具挑戰性的情況下如在霧中更增加開車的危險性，PERformance-CEntered Portable Test (PERCEPT)是一個新的軟體可以測試與視覺有關的時間空間感以及專注度，此測試可以用 iPad 進行，極具方便性而且相較於傳統的 white on white standard automated perimeter 更接近日常生活情況。結果發現青光眼病人的 PERCEPT 反應時間比對照組慢，而且 PERCEPT 反應時間與模擬駕駛器在霧中駕駛的表現有相關。除了 PERCEPT 以外亦有很多研究團隊結合高科技技術應用在臨床上如 Smartphone Virtual Reality Goggle 及 nGoggle。此外有一些新的物藥臨床試驗發表以及新的技術如 aqueous angiography 的探討，實在獲益良多。參加本次會議除了得到一些新的知識以外，還碰到在美國進修時 UCSD 的 Professor Felipe Medeiros 及進修時的舊同事。本次報告後獲得國際學者的熱烈迴響，在會議中討論一些議題，增加很多知識及思考廣度。

關鍵字: 青光眼、PERCEPT、simulated fog conditions

目次

摘要	-----	2
目的	-----	4
過程	-----	4
心得	-----	5
建議	-----	5
附錄	-----	6

目的:

本次 ARVO 年會是最具權威的國際眼科會議之一，參加的目的第一為發表研究成果 Association between driving performance under simulated fog conditions and PERCEPT in glaucoma。根據以往研究發現青光眼病人對於汽車碰撞有較高的危險性，在具挑戰性的情況下如在霧中更增加開車的危險性，PERformance-CEntered Portable Test (PERCEPT)是一個新的軟體可以測試與視覺有關的時間空間感以及專注度，此測試可以用 iPad 進行，極具方便性而且相較於傳統的 white on white standard automated perimeter 更接近日常生活情況。參加本次會議的另一目的是溫故知新，如一些流行病學的發現，隅角閉鎖研究的發表, laser peripheral iridectomy 的 indication 及 fellow eye 的 natural history 等，又如一些較新的藥物臨床試驗結果，此外，參加此次會議的目的是跟以前在美國 university of California, San Diego 的導師及同事碰面及交換心得和意見。

過程：

5月1日下午參加了一個 symposium, the mixed blessing of biomarker and surrogate end points in ophthalmic clinical research。5月2日是 poster presentation day 早上十一時至十二時四十五分是 presentation time, presentation session Vision Performance in Everyday Life Activities 的時段必須站在 poster 旁向人 audience present 並且回答聽眾的問題，下午二時四十五分至三時四十五分是 all poster session 所有當天展示 poster 的 first author 都必須在 poster 旁回答問題。

同時參加了一個 symposium Retinal ganglion cell dendrite pathology and synapse loss: Implications for glaucoma 一直以來的觀念是在 glaucoma 的 pathology，是 axon 先被破壞，之後是 cell body，最後才是 dendrite loss，但後來發現其實 dendrites 是非常特殊的構造，影響 neurons 如何收集及 process information，而 retinal ganglion cell dendrites 從 bipolar and amacrine cells 收集 synaptic input，使細胞之間可以 communication 及 flow of visual information，最近的 data 顯示 axonal injury triggers retinal ganglion cell dendrites 的結構上的改變，在 axonal loss 之前就有這現象，導致 synaptic rearrangement 及 functional deficits, 有人提出 proximal 及 distal program 是否 dynamic。

5月4日參加了 Glaucoma Clinical studies 的 presentation, 有兩個新藥，其中一個是評估 dual EP3/FP receptor agonist ONO-9054, 使用在正常眼壓的人點藥後 9 小時可降 28.23%眼壓，結膜充血的比例 (19.4%) 比 xalatan 高 (8.2%)，此藥把眼壓降到 15mmHg 或以下的比例是 xalatan 的 2.4 倍。

另外一個新藥 AR-13324 在高眼壓病人以及隅角開放性病人的安全性及有效性,AR-13324 inhibits Rho kinase 及 norepinephrine transporter, 增加 trabecular outflow, 減少 aqueous humor formation 及減少 episcleral venous pressure。結果發現 AR-13324 0.2 % 一天一次或一天兩次的效果在眼壓低於 25 mmHg 的人皆不差於 timolol 0.5 %而且較安全。

此外還有 NEI Audacious Goals Initiative Update, 發現 NEI grant 的優先重點是 regenerating neurons and neural connections in the eye and visual system, 另外 photoreceptors 及 retinal ganglion cells 被選定為兩個 target tissues。由此可知 photoreceptors 及 retinal ganglion cells 在未來研究的重要性。當天還有參加了 OCT angiography of the eye 的 symposium, 不需用 dye, 而且可以看得到深層構造。最後還參加了 Heidelberg Engineering Research Award 的 meeting, 今年得獎的是 aqueous angiography。

實質影響或心得：

這次會議收穫很多, 其中發表研究結果跟學者討論以後有更深更廣的思考方向, 這次會議亦矯正我們以前的觀念, 一直以來的觀念是在 glaucoma 的 pathology, 是 axon 先被破壞, 之後是 cell body, 最近的 data 顯示 axonal injury triggers retinal ganglion cell dendrites 的結構上的改變, 在 axonal loss 之前就有這現象, 導致 synaptic rearrangement 及 functional deficits。此外也可以得知以後重點研究方向, 還有一些受關注的議題如 The Singapore Asymptomatic Narrow Angles Laser Iridotomy Study: 5-year results, 結果發現要治療 20.7 eyes 才能 prevent 1 eye from progression, 雖然有很多問題仍有待更多的追蹤以及分析, 但亦解答了一部分的問題。除了我們的 software 以外, 有些其他研究團隊也結合高科技技術如 virtual reality 及 nGoggle 輕便型機器評估青光眼視覺功能障礙的方法。這次的會議除了發表研究結果, 跟專家學者交流意見以外, 更學到許多新的知識, 亦碰到很多舊同事, 收穫良多。

建議事項：

建議眼科可以多與科技業合作, 以最新的科技結合醫學, 研發一些 user friendly 及較符合日常生活另一方面的儀器及軟體, 另一方面可攜帶性也很重要, 可以在偏遠地區使用。眼科醫師亦應多參加國際會議, 可增進自己的知識, 亦可增進思考的廣度, 尤其是國外的人較勇於提問, 回答的完整性及涵蓋層面可以在這會議提供一個很好的訓練機會, 而且還可以激發一些新的思考方向及研究題材。


附錄

2016年5月1日-5月5日眼科部青光眼科鄭冬梅赴 Seattle 參加 ARVO 2016，發表一篇壁報論文。

Picture 1. 大會正門




Picture 2. 壁報展示



Association between Driving Performance under Simulated Fog Conditions and PERCEPT in Glaucoma

Visual Performance Laboratory, Department of Ophthalmology, University of California San Diego, La Jolla, California.
*Department of Ophthalmology, Taipei Veterans General Hospital, Taipei, Taiwan

1988 - A0771



Tung-Mei Kuang^{1,2}
Alberto Diniz-Filho¹
Erwin R. Boer¹
Ahmad Elhossainy¹
Masaki Nakanishi¹
Felipe A. Medeiros¹

Background: Previous studies have shown glaucoma patients to be at higher risk for motor vehicle crashes.^{1,4} Driving under challenging conditions with decreased contrast such as fog may be associated with increased driving risk.⁴ The Performance-Oriented Portable Test (PERCEPT) is a portable visual performance test investigating spatiotemporal and attentional mechanisms relevant to vision.⁵ PERCEPT is based on the concept of increasing visual task difficulty to improve the sensitivity for uncovering visual deficits in glaucoma. Improving visual performance level is accomplished by varying spatial, temporal, and contrast components into a single test, requiring subjects to perform a demanding, time-constrained, dual visual task at the contrast, by tapping into the low-level mechanisms of attention and visual perception, the test may predict performance decrements by some component such as driving under fog.

Purpose: The purpose of this study was to investigate driving performance of glaucoma patients under simulated fog conditions and the ability of PERCEPT to predict driving performance in this situation.

Methods: All subjects underwent high-fidelity driving simulation using a 5.8-litre Ford Fusion cab (Realtime Technologies, Royal Oak, MI) equipped with realistic force feedback steering and motion platform (Figure 1, top). The tests consisted of a curve negotiation task under a fog preview at 30 meters of distance (Figure 1, bottom). Time to line crossing (TLC) used as a metric of driving performance (Figure 2). This metric quantifies a safety margin measuring the time available to the driver before the car would leave the lane. Higher TLC values mean higher risk.

PERCEPT was performed sequentially on an iPad (Apple Inc.). The test consists in recognizing the orientation of a central target (Figure 3, top). Duration of stimulus presentation was progressively decreased until a reliable threshold for task performance was obtained and measured in milliseconds (ms).

Linear regression models were used to evaluate the association between results from PERCEPT and driving performance under fog conditions.

The study included 19 patients with glaucoma (mean age 68.1 years) and 16 control subjects (Table 1). PERCEPT PS was significantly higher in glaucoma patients than controls (70.7 ± 20.1 ms vs. 17.5 ± 3.1 ms, respectively, P<0.001) (Table 1). Slower PERCEPT PS was significantly associated with worse driving performance under fog in slow (P=0.017) and fast (P=0.018) (Table 2) conditions. The associations were of significant after controlling for age, gender, race, cognitive impairment using the Montreal Cognitive Assessment (MoCA), and driving experience (average mileage above). Table 2 and Figure 3 show results for the fast velocity.

Parameter	Glaucoma (n=19)	Control (n=16)	P-value
Age (years)	68.1 ± 12.5	64.1 ± 13.5	0.308
Sex (M/F)	13/6	8/8	0.532
Years of driving experience	31.1	30.2	0.907
Yearly total of driving miles	4241 ± 1.1	4241 ± 1.1	0.908
Yearly total of driving miles per hour	46.1 ± 1.1	46.1 ± 1.1	0.908
PERCEPT processing speed, ms	70.7 ± 20.1	17.5 ± 3.1	<0.001
MoCA score	27.2 ± 2.2	28.1 ± 2.1	0.330
Driving experience (years above 1000 miles)	14.7 ± 10.8	15.1 ± 10.5	0.948

Results: Table 2 illustrates and statistically significant associations between the perceptual threshold driving performance and driving performance under fog conditions. PERCEPT PS per hour was significantly associated with driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions. Driving performance was significantly associated with driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions. Driving performance was significantly associated with driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions.

Figure 1: High-fidelity driving simulation (top) and curve negotiation task under a fog preview (bottom).

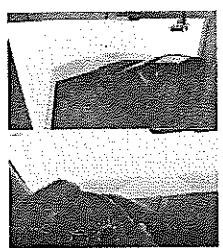


Figure 2: PERCEPT processing speed under a dual visual task (top) and response screen in which the subject had to identify the orientation of central target and the location of peripheral target (bottom).

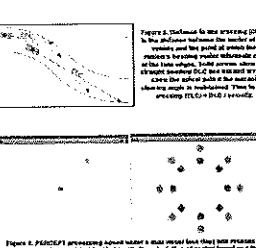
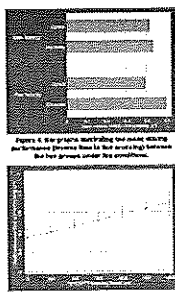


Figure 3: The graphs illustrating the association between driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions. The graphs illustrate the association between driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions. The graphs illustrate the association between driving performance under fog in slow (P=0.017) and fast (P=0.018) conditions.



DISCUSSION: Glaucoma patients had significantly worse scores of PERCEPT PS compared to controls. PERCEPT measurements were significantly associated with simulated driving performance under fog. Presence of fog reduced visibility effectively and made it a high-demand driving requirement. In a previous work, we showed that glaucoma patients experience a sharper degradation of driving performance under fog conditions compared to control subjects.⁴ Due to its characteristics, PERCEPT may be a suitable test to evaluate the impact of functional deficits on the ability to perform daily activities.

CONCLUSION: PERCEPT results were significantly associated with worse driving performance under simulated fog conditions in glaucoma.

REFERENCES: 1. Quigley HA. Glaucoma worldwide. *BMJ*. 1996;313:1042-1043. 2. Quigley HA, Broman H. The number of people with glaucoma worldwide in 2010 and 2020. *BMJ*. 2013;346:f1212. 3. Quigley HA, Broman H. The number of people with glaucoma worldwide in 2010 and 2020. *BMJ*. 2013;346:f1212. 4. Kuang TM, et al. Driving performance under simulated fog conditions in glaucoma. *Invest Ophthalmol Vis Sci*. 2015;56:1011-1018. 5. Medeiros FA, et al. The Performance-Oriented Portable Test (PERCEPT): a portable visual performance test. *Invest Ophthalmol Vis Sci*. 2014;55:1011-1018.

Picture 3. 壁報展示

Figure 3. PERCEPT processing speed under a dual visual task (top) and response screen in which the subject had to identify the orientation of central target and the location of peripheral target (bottom).

7

Picture 4. 壁報展示

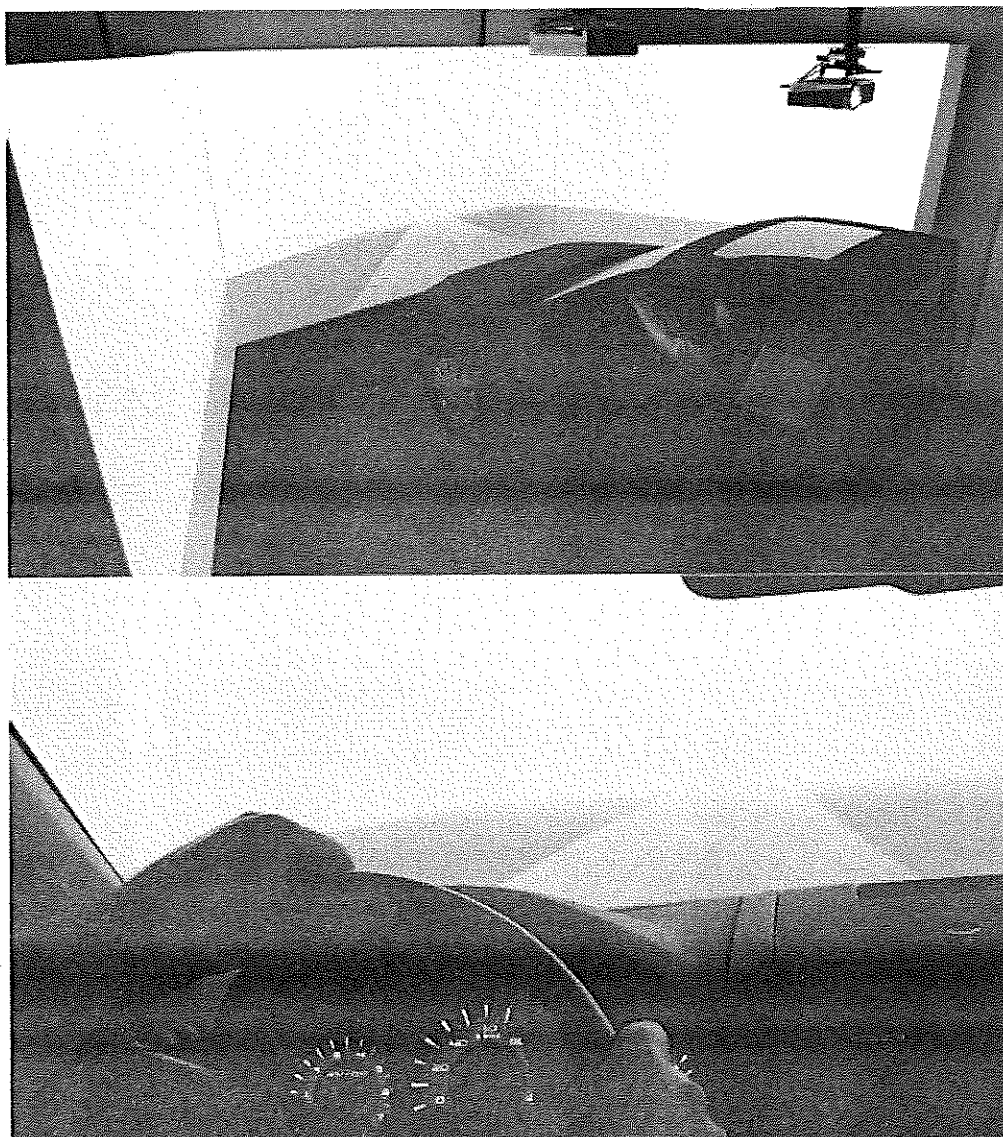
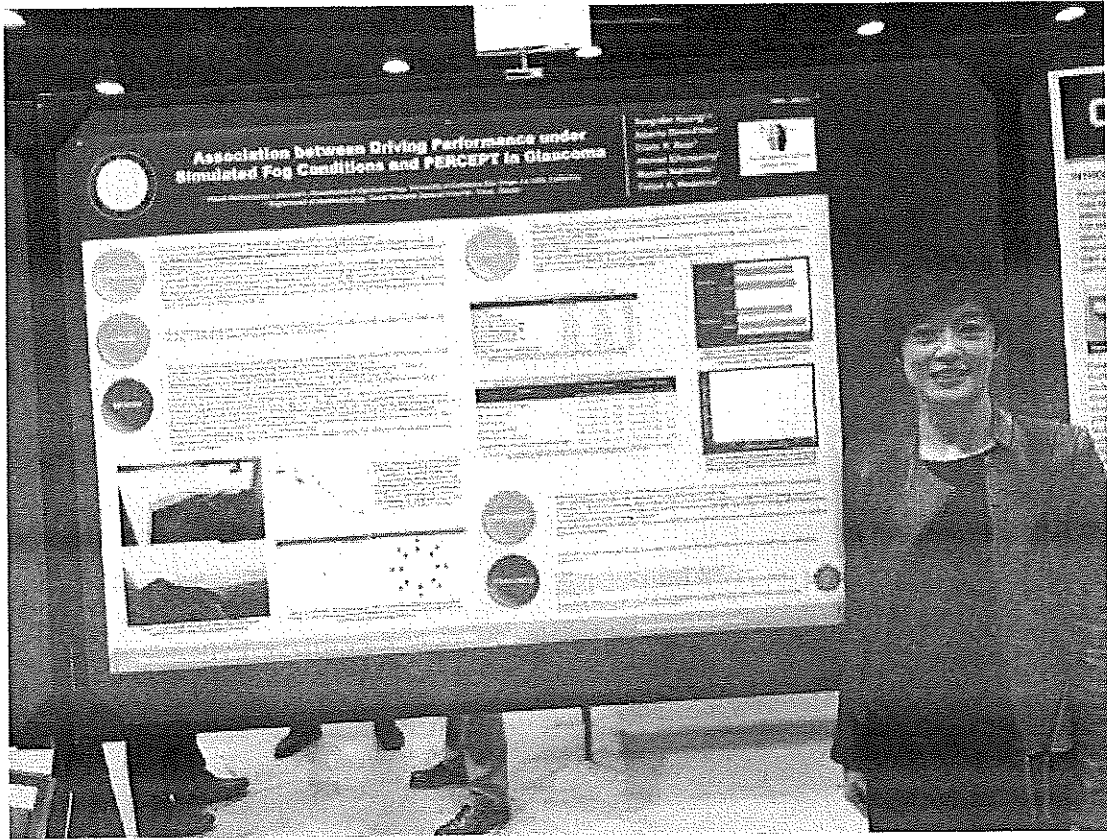


Figure 1. High-fidelity driving simulator (top) and curve negotiation task under fog condition (bottom).

Picture 5. 論文發表獲得熱烈迴響



Picture 6. 舊同事亦發表壁報論文

