Originally published In Press as [doi:10.1167/iovs.08-3035](http://www.iovs.org/cgi/content/abstract/iovs.08-3035v1) on August 6, 2009

(*Investigative Ophthalmology and Visual Science*. 2010;51:201-206.)

© 2010 [by The Association for Research in Vision and Ophthalmology, Inc.](http://www.iovs.org/misc/terms.shtml)

doi:10.1167/iovs.08-3035

**Relationship between Static Ocular Counterroll and Bielschowsky Head Tilt Phenomenon**

**Ichiro Hamasaki, Satoshi Hasebe, Takashi Furuse, and Hiroshi Ohtsuki**

From the Department of Ophthalmology, Okayama University Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences, Okayama, Japan.

Corresponding author: Ichiro Hamasaki, Department of Ophthalmology, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, 2-5-1 Shikata-cho Okayama 700-8558, Japan; hamaichi\_web\_play@yahoo.co.jp.

PURPOSE. This study was conducted to assess how hyperdeviation of a pareticeye during ipsilesional head tilt—the Bielschowsky headtilt phenomenon (BHP)—can be explained by decreased compensatoryocular counterrolling (OCR) due to the depressed torque of theparetic superior oblique (SO) muscle.

METHODS. Thirty-three patients with clinically diagnosed SO palsy and11 control subjects were studied. With a head-mounted videocamera, static ocular counterrolling (s-OCR) was determinedby measuring the inclination of a line connecting the two centroidsof the characteristic iris pattern and corneal reflex. The BHPwas measured with the alternate prism and cover test.

RESULTS. The mean (SD) amplitude of s-OCR in paretic eyes based on thefit of the regression sine curve against the ipsilesional headtilt angle was significantly decreased compared with that forcontralesional head tilt, 6.3 (3.5)° for ipsilesional and11.3 (3.9)° for contralesional (*P* < 0.001), and was significantlysmaller than that in normal subjects: 10.9 (2.6)° (*P* <0.001). No significant linear relation was noted between hyperdeviationon ipsilesional head tilt and the amplitude of s-OCR in pareticeyes (*r*2 = 0.04; *P* = 0.29). However, the differences betweenthe hyperdeviation with ipsilesional 30° head tilt and withhead-upright position correlated significantly with the amplitudesof s-OCR in paretic eyes (*r*2 = 0.19, *P* = 0.01).

CONCLUSIONS. The absolute value of the hypertropia on ipsilesional head tiltin clinically diagnosed SO palsy does not directly assess thefunction of the SO muscle. The difference in hypertropia betweenipsilesional head tilt and the upright position, however, maybe a better indicator of SO function.