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Institutionen för Klinisk Neurovetenskap

Visually Induced Ocular Torsion

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Abstract

There has been some controversy whether ocular torsion (eye rotation around the line of sight) is induced in response to a tilted visual scene. The aim of this thesis was to investigate if ocular torsion can be induced by viewing a tilted visual scene and to evaluate the effect of different stimuli parameters on the torsional response. In three different studies, eye movements were recorded binocularly with a modern head mounted video system on healthy individuals. The stimuli (photos with spatial clues and abstract images) where displayed on a screen or a LCD in front of the test subjects.

All subjects responded with a torsional movement in the same direction as a static tilted stimulus. The response amplitude was small, only compensating for a minor portion of the stimuli tilt. The response was well conjugate for the right and left eye. In the first study, a visual scene enriched with spatial clues important for maintaining posture was found to induce significantly more torsion compared to a scene without spatial clues. The degree of stimuli tilt had no significant effect, nor the stimuli periphery. In the second study, torsional response was shown to decay and return towards the initial baseline, similar to an adaptation, when a tilted stimulus was viewed for several minutes. In the third study, subjects were presented with a stimulus that was alternatively tilted (position change) or turned (motion change) in conflicting directions. The response varied depending on which stimulus was presented first. When starting with stimulus motion the position stimulus was neglected. When starting with a position stimulus the stimulus motion was neglected.

In conclusion, a tilted visual scene does induce ocular torsion. The response is conjugate and it rotates the eyes in a compensatory direction. The torsional amplitude is small but becomes larger if the stimulus has spatial clues. The response is not maintained over time and it can be cancelled by a previous response.

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