Online supplementary video legends

Video 1

Normal visual suppression of normal caloric vestibular nystagmus. A normal subject (LAM) has had his right ear irrigated with water at 44°C, which elicits right-beating nystagmus. The nystagmus is almost totally suppressed when a fixation LED appears (its reflection is visible in the centre of the cornea) and reappears when the LED disappears. This is normal visual suppression of normal caloric nystagmus.

Video 2

Normal visual suppression of normal rotational vestibular nystagmus. A normal subject (GMH) sits on a rotatable chair and wears monocular infrared video nystagmus goggles (figure 4A). The left socket of the goggles houses an infrared video camera recording the movements of the left eye. The right socket of the goggles is covered so that the subject sees only a green LED fixation light, just above the camera lens (figure 4B), and sees it only with his left eye. A similar green LED on the camera's outer casing indicates to the examiner when the patient's fixation light is on or off (figure 4A). A small black button at the top of the camera casing toggles the fixation LED the patient sees and the indicator LED the examiner sees (figures 4B, C), on and off together. When the cover is in the right socket and the LED is turned off the subject sees nothing (figure 4C). When either the camera is removed from the left socket (figure 4D, E) or the cover is removed from the right socket (figure 4F, G) the subject is able to see the room.

Section 1. Sinusoidal oscillation while viewing the room. The camera is in the left socket of the goggles, the right socket is uncovered (figure 4F, G) so that the subject can see the room, with his right eye. The chair is now slowly oscillated left-right-left-right. When the chair is turned leftwards, there is left-beating nystagmus (ie, compensatory slow phases to the right, anti-compensatory fast phases to the left); as the chair is turned rightwards there is right-beating nystagmus. The camera records only the left eye but of course the right eye is doing exactly the same thing as the left. This nystagmus is due to combined vestibular stimulation (of the lateral semicircular canals) and visual (optokinetic) stimulation. In other words, the nystagmus is a sum of vestibular and optokinetic nystagmus. The nystagmus would be just the same in a patient without any vestibular function at all, from optokinetic visual stimulation alone.

Section 2. (0.20) Sinusoidal oscillation without fixation in total darkness. The subject covers the right socket (figure 4A) so that he now sees nothing at all with either eye (figure 4C). Nonetheless, the nystagmus continues. This is purely vestibular nystagmus—a patient without any semicircular function would now have no nystagmus in this condition.

Section 3. (0.36) Sinusoidal oscillation with fixation. Now the fixation LED within the recording socket of the goggles is turned on (figure 4A, B), see its reflection in the centre of the cornea and the nystagmus disappears. This is normal visual suppression of normal vestibular nystagmus.

Section 4. (0.47) Sinusoidal oscillation without fixation. The fixation light is turned off again and the nystagmus reappears.

Section 5. (1.02) Leftward rotation. The chair is rotated (accelerated) to the left to (approximately) constant angular velocity. The camera has been removed from the left socket (figure 4D) so that the camera cable does not to garrotte the subject.

Section 6. (1:36) Rightward acceleration step without fixation. The subject quickly places the recording camera with fixation light off (figure 4C), into the left socket of the goggles and the chair is now brought to an abrupt halt (1:38)—a deceleration that is equivalent to a pulse of rightward angular acceleration; there is, as expected, brisk right-beating vestibular nystagmus in response.

Section 7 (1:47) After rightward acceleration with fixation. When the subject turns on the fixation light (figure 4A, B)—its reflection is in the centre of the cornea, the nystagmus is attenuated, not totally abolished. This is visual suppression of peripheral vestibular nystagmus.

Section 8 (1:57) After rightward acceleration without fixation. The subject again turns off the fixation light (1:57) and the peripheral vestibular nystagmus re-emerges. (*) Visual suppression of peripheral vestibular nystagmus is effective only up to a peak head velocity of about 80 deg/s and a frequency of 0.8 Hz. It is mediated by the cerebellum and is defective in patients with cerebellar flocculus disorders (7).

Video 3

Loss of normal visual suppression of normal vestibular nystagmus in cerebellar disease. A patient with spinocerebellar ataxia trying to keep looking at his own outstretched thumbs while turning from side to -side. His normal vestibular nystagmus becomes immediately evident. A normal subject would be able to keep his eyes fixed; there would be no nystagmus. Every type of peripheral vestibular nystagmus, whatever the cause, is to some extent suppressed by vision (8). Horizontal peripheral vestibular nystagmus is suppressed more than vertical; vertical is suppressed more than torsional.

*Technical note. Even a tiny spot of light inadvertently sneaking through the nystagmus goggles used for caloric or rotational testing will suppress the vestibular nystagmus and falsely suggest that the subject has severe bilateral impairment of semicircular canal function.