

Poster presentation

Fear-inhibited light reflex: effects of peripheral sympathetic blockade with dapiprazole eye-drops

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Background

Fear conditioning (e.g., by the threat of an electric shock) causes an increase in initial pupil diameter, and a decrease in the amplitude of the light reflex response ("fear-inhibited light reflex"). There is evidence for dissociation between the two responses to threat, suggesting that while the effect on the light reflex response involves central inhibition of the parasympathetic, the effect on initial pupil diameter may reflect more preferentially, the activation of the sympathetic. We examined the effects of peripheral sympathetic blockade with the α_1 -antagonist dapiprazole on both responses to threat on the basis of the hypothesis that only the response of the initial pupil diameter will be affected, while the response of the light reflex will remain unaffected.

Material and Methods

12 healthy volunteers (6 male, 6 female) aged 20–25 years participated in one experimental session. Dapiprazole ($2 \times 20 \mu\text{l}$ of a 0.5% solution, repeated 3 times at 5 min intervals) was instilled in subjects' right or left eye while the contra lateral eye was treated with placebo eye drops (artificial tears) according to a single blind, balanced, cross over design. Pupil diameter was monitored in the dark, in dark-adapted eyes by an infrared binocular television pupillometer (PROCYON 2000D). During the 105–120 min window following instillation, the light reflex was elicited with weak (0.35 cd/m^2 , 200 msec) light stimuli on the placebo-treated eye only, and the response was recorded from both eyes. There was a total of 6 blocks of 3 light stimuli each, and the average of the 3 elicited light reflexes was taken as the response of a block. Responses in each block were recorded under either safe (S) or threat (T) condition; the two conditions alternated regularly. "T"

blocks were associated with the anticipation of an electric shock, although no such shock was in fact administered at any point during the session. At the end of each S and T block, subjects self-rated their mood and feelings on Visual Analogue Scales.

Results

Dapiprazole caused a significant miosis evident at 30 min from instillation and reaching its peak at 90 to 105 min. Threat of shock was associated with significant increases in subjectively rated "anxiety" and "alertness", significant increase in initial pupil diameter in both eyes and a significant decrease in the amplitude of the pupillary light reflex response in both eyes. The dapiprazole- and placebo-treated eyes differed significantly only in the levels of initial pupil diameter in the safe as well as the threat conditions. Between-eye comparisons (dapiprazole- vs placebo-treated) of the effect of threat (Safe-Threat subtractions) on the pupillary measures, showed that dapiprazole treatment did not change the effect of threat on any of the two pupillary measures.

Discussion

The effect of threat on the light reflex response is unlikely to involve the peripheral sympathetic innervation of the iris. Although it is possible that the effect of threat on initial pupil diameter was reduced by dapiprazole, this effect might have been masked by the removal of a ceiling effect due to reduction in baseline pupil diameter.