Enhancement of electrically evoked startle-like

Medical Sciences (Beijing, China). The rats were anesthetized deeply with 10% chloral hydrate (400 mg/kg, i.p.) and placed in a Kopf stereotaxic head holder. A state of areflexia was maintained throughout the experiment by supplemental injection of the same anesthetic. Flexible wire electrodes were implanted into the hindlimb anterior biceps femoris muscles for measuring EMG responses. A midline incision

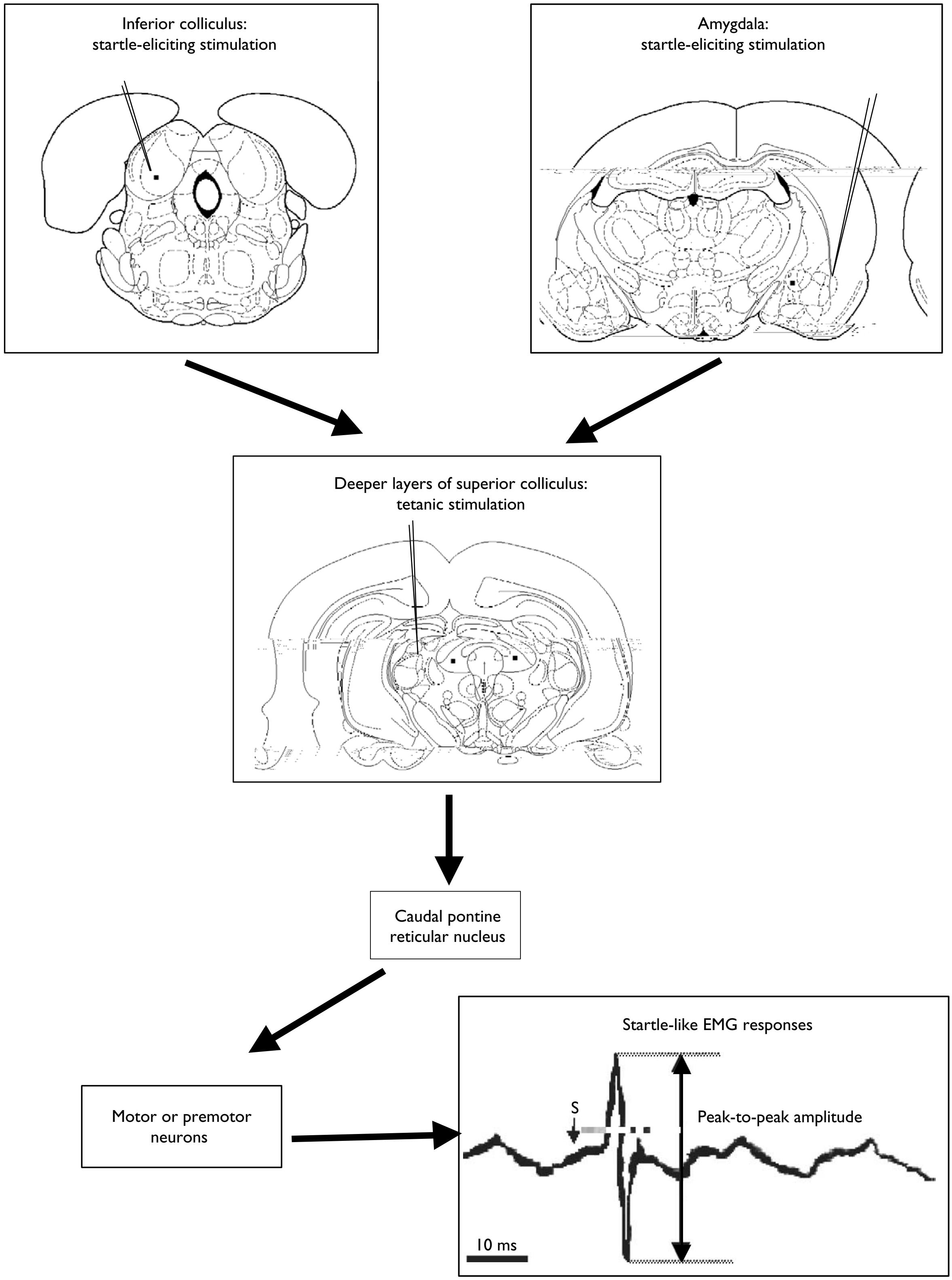

Fig. 1. Sche a ic diag a ill(. a i g a del f e(al ci c(i. edia i g fea e ia i f he. a le e e , a d. h i g he e h d (. ed i he e e i (d. A c f EMG a ef f he . cill . c e. c ee i di la ed i he b a el, i hich he . e f. i (l(. (S) i i dica ed b a a i i g d a d he eak- - eak a li (de i i dica ed b a d (ble-headed a .

EMG responses to ipsilateral IC stimulation only to a small degree, and did not significantly change the responses to contralateral IC stimulation. Although the DpSC receives direct axonal projections from the ipsilateral external cortex of the IC [14], the present results suggest that the circuits by which IC outputs facilitate startle are not the same as those from the amygdala.

The most striking finding of the present study is that the Ce-induced startle-like responses can be markedly enhanced by tetanic stimulation of the ipsilateral DpSC. This mesencephalic synaptic relay station in the descending pathway from the amygdala to the primary startle circuit may allow for further interactions between fear outputs mediated by the amygdala and approach/avoidance outputs mediated by the DpSC. Investigation of the plasticity of this relay station would be important for understanding the dynamic processes of fear-modulated orientation and startle responses.

CONCLUSION

Unilateral electrical stimulation of either the Ce or the IC evoked unconditional startle-like responses at short latencies, suggesting functional connections of these two structures with the startle circuits. High-frequency unilateral tetanic stimulation of the DpSC had a strong enhancing effect on the startle-like EMG responses to ipsilateral Ce stimulation, but a smaller enhancing effect on the responses to contralateral Ce stimulation and those to ipsilateral IC stimulation, and even less effect on the responses to contralateral IC stimulation. The functional plasticity in the startle-like EMG responses to ipsilateral Ce stimulation following tetanic DpSC stimulation, therefore, provides a model for studying the neural substrates of emotional expression and learning.

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Ack ledge e : The a(h ha k Ma k(Fe d f hi hel f(l c e a ea l d af f he a(c i . Thi (d a (ed b he '985' P g a f Peki g U i e i , he Scie ce a d Tech l g Ke P jec (02170) f he Mi i f Ed(ca i f Chi a, a d he Na(al Scie ce a d E gi ee i g Re ea ch C(cil f Ca ada.