**Anterior cingulate serotonin 1B receptor binding is associated with emotional response inhibition**

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**Conclusion** We find that men with high anterior cingulate serotonin 1B receptor binding have difficulties withholding their responses to neutral ‘nogo’ stimuli when ‘go’ stimuli are angry faces.

Our findings suggest that serotonergic modulation of anterior cingulate function is involved in response inhibition in the context of emotional stimuli.

**Introduction** Serotonin has a well-established role in emotional processing and is a key neurotransmitter in impulsive aggression, presumably by facilitating response inhibition and regulating subcortical reactivity to aversive stimuli.

However, the lack of receptor-specific investigating response inhibition in the context of emotional stimuli precipitate a need for further examination of serotonin function in emotional control mechanisms. Preclinical [1] and human [2] studies provide evidence for specific involvement of serotonin 1B receptors (5-HT1B) in behaviours related to aggression and impulsivity.

In view of the theory that serotonin regulates aggression by prefrontal serotonergic inhibition of emotions triggered by aversive stimuli, we hypothesized that 5-HT1B binding within the anterior cingulate and frontal cortex would be associated with false alarms.

We also hypothesized that relative to non-offender controls, violent offenders exhibit more failures to inhibit prepotent responses (more false alarms) in the context of angry and fearful faces.

**Methods** Nineteen male incarcerated violent offenders with a documented history of severe violent crimes (e.g. homicide, rape, aggravated assault) and 25 male non-offender controls were examined with positron emission tomography for assessment of cerebral 5-HT1B (figure 1). The groups were matched on age.

All participants completed an emotional Go/NoGo task requiring inhibition of prepotent motor responses to emotional facial expressions (figure 2). False alarms were defined as failures to inhibit nogo responses.

We evaluated associations between 5-HT1B binding and false alarms in multiple linear regression analyses, adjusting for group, age, intelligence quotient, injected mass/kg and mean reaction times for go responses.

**Results** Contrary to our hypothesis, we found no evidence for group differences in Go/NoGo task performance, p>0.5.

Across groups anterior cingulate 5-HT1B binding was positively correlated with false alarms when angry faces were go stimuli and neutral faces were nogo stimuli (slope estimate 23.8, std. error: 8.1, 95% CI: [7.5 ; 40.1], p=0.006, p_corrected=0.05 (figure 3). △ = healthy controls, ● = violent offenders

**Figure 1** [11C]AZ10419369 PET image

**Figure 2** The Emotional Go/NoGo task

500 msec stimulus duration

700 msec inter-stimulus interval

Figure 2: The emotional subtask contains 8 blocks pairing emotional with neutral faces and vice versa. Participants were instructed to respond as fast as possible to go stimuli, while withholding their responses to nogo stimuli and to complete the task with as few errors as possible.

**Figure 3**

Anterior Cingulate 5-HT1B

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