fMRI study of response inhibition in autism
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Methods

Enrollment:
- Target: 16 ASD, 16 healthy volunteers, matched for age & IQ
- Currently: 10 ASD, 10 healthy volunteers

Inclusion Criteria
- Diagnosis:
  - DSM IV, ADI-R, ADOS-G
  - Age 18-45
  - IQ >80

Exclusion Criteria
- Pregnancy, Epilepsy, Axis I disorders
- Psychoactive drugs in the past 5 months
- Hx of PKU, TS, Duchene’s MD, Hypomelanosis
- Maternal rubella, hypothyroidism, perinatal asphyxia

Task:
- Subjects are shown a series of faces with happy or sad expressions in random order and asked to press the button when they identify one emotion but not the other.

Results

Baseline Characteristics:

<table>
<thead>
<tr>
<th>Age</th>
<th>IQ</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.83</td>
<td>108.6</td>
<td>4F, 6M</td>
</tr>
</tbody>
</table>

No financial disclosure

No financial disclosure

Introduction / Abstract

Background / Objective

The symptom domain in autism, behavioral defensiveness: Repetitive behaviors are the third sore symptom domain in autism. Although it is the domain that shows the least improvement with age, very little has been done in understanding its phenomenology and neurobiology. The goals of this study are to explore abnormalities in activation of the fronto-striatal circuitry involved in response inhibition in autism. We are recruiting adult subjects age 18-45 with high-functioning autism or Asperger syndrome, and compare them to a group of healthy volunteers matched for age and IQ. Subjects must meet diagnostic criteria for autism or Asperger’s syndrome by DSM-IV, ADI-R, and ADOS-G, have IQ over 80, outpatient status and sign informed consent. Exclusion criteria include: subjects with epilepsy, subjects with history of schizophrenia, schizoaffective disorder or other Axis I mental disorders, such as bipolar disorder, subjects reporting history of encephalitis, tuberous sclerosis, fragile X syndrome, anosmia during birth, neurofibromatosis, hypothyroidism, and maternal rubella, and subjects who have received depot neuroleptic medication, or other psychoactive drugs within the past 5 weeks. The paradigm is designed to test response inhibition, and it includes a go-nogo task. The subjects are shown a series of faces with happy or sad expressions in random order and asked to press the button when they identify one emotion but not the other. The fMRI study will be performed using a gradient echo-planar (GE-EPI) sequence on a Siemens 3T Allegra system using the following protocol: 32 axial slices 3mm thick and skip=1mm, TR=2s, TE=40ms, Flip angle = 90°, FOV=210mm, matrix=64x64. System linearity is monitored daily using a cylindrical uniform phantom and intensity noise and drifts are kept within the 1% margin. All settings may be optimized during the study. Visual stimulus paradigm will be delivered via a digital LCD back projection system that the subject will see through a mirror system mounted on the head coil. This paradigm is delivered and controlled by a computer outside the scanner room. Synchronization of the paradigm with the data acquisition is obtained through an optical trigger pulse from the MRI scanner.

Results

- Subjects with ASD demonstrate decrease activation in anterior cingulate cortex, indicating a relative deficiency in inhibiting an already initiated action. In addition, they demonstrate increased activation in the subgenual cingulate cortex suggesting either recruitment of affective circuitry with response inhibition or failure to reactivate the midline resting network. Exploratory analysis suggests that ACC activation correlates with measures of repetitive behaviors in this population (ADI-R, C domain) and that subjects with autism demonstrate decreased functional connectivity between ACC and striatal structures.

Baseline Characteristics:

<table>
<thead>
<tr>
<th>Subjects with ASD</th>
<th>Healthy Volunteers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 28.83</td>
<td>26</td>
</tr>
<tr>
<td>IQ 108.6</td>
<td>118.4</td>
</tr>
<tr>
<td>Sex 4F, 6M</td>
<td>4F, 6M</td>
</tr>
</tbody>
</table>

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