OBJECTIVE

Many studies have suggested that memory is enhanced for emotionally arousing compared to neutral material. Emotional memory has not been evaluated in mild cognitive impairment (MCI), a disorder involving decreased hippocampal volume and may be a preclinical state of Alzheimer’s disease. However, accurate classification of "MCI" versus "normal" for research purposes can be problematic.

We used a rate of forgetting paradigm, sensitive to mesial temporal lobe dysfunction in humans, to evaluate the rate of information loss for emotional versus neutral pictures.

Specific Aims.
(1) To examine the rate of forgetting (ROF) for emotional and neutral pictures for MCI patients versus controls.
- Self-reported arousal ratings were gathered to determine whether there were group differences in arousal at encoding.
(2) To examine the ROF data using a continuous indicator of memory status rather than group classifications.
(3) To examine the relationship between hippocampal volume (regardless of group classification) and picture recognition memory.

METHODS

Neuropsychological Testing
Classification of MCI was based on a consensus conference that took into account function in daily activities, intellectual estimates, and performance on neuropsychological measures, including the Hopkins Verbal Learning Test Revised (HVLT-R).

Emotional Memory Task
Presentation of 120 target pictures (International Affective Picture Set; Lang et al., 2001)

Example Pictures
- LOW AROUSAL
- MEDIUM AROUSAL
- HIGH AROUSAL

Recognition Memory tasks:
- Each included a unique set of 30 of the original target pictures interspersed with 30 distracter pictures matched for content, valence, and arousal.

- DV: percentage of correctly discriminated words for the low, medium, and high arousal categories.

Hippocampal volume acquisition:
- A subset of 11 participants underwent MRI scanning (7 MCI and 4 controls)
- Images were obtained on a Siemens 3T Allegra scanner
- Volume of the hippocampus was traced in the program "Measure" by a trained and blinded rater.

RESULTS

SA 1: ROF for emotional and neutral pictures for MCI patients compared to controls.

Results 1:
- Arousal ratings:
  - The MCI and control groups did not differ in their ratings of low, medium, and high arousal pictures.
- ROF:
  - The groups did not differ in their recognition scores
    - 10 min: 0.362* 0.324** 0.261**
    - 1 hour: -0.036 0.07 0.033
    - 2 weeks: -0.019 -0.034 0.043*
    - 3 months: -0.041 0.027 0.03

*Indicates significance at the p<0.05 level.
**Indicates significance at the p<0.01 level.

SA 2: To examine the ROF data using a continuous indicator of memory status (HVLT % Retention z-score).

Regression coefficients (R2) for individual regression equations with memory status as the predictor of recognition memory performance for the low, medium, and high arousal conditions.

<table>
<thead>
<tr>
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<th>Low</th>
<th>Medium</th>
<th>High</th>
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<tbody>
<tr>
<td>10 min.</td>
<td>0.362*</td>
<td>0.324**</td>
<td>0.261**</td>
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<td>1 hour</td>
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SA 3: To examine the relationship between hippocampal volume & recognition memory.

Correlations between hippocampal volume and recognition memory performance for each arousal condition at each testing session.

<table>
<thead>
<tr>
<th></th>
<th>Low Arousal</th>
<th>Medium Arousal</th>
<th>High Arousal</th>
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<tr>
<td>10 min.</td>
<td>0.55</td>
<td>0.695*</td>
<td>0.714*</td>
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<tr>
<td>1 hour</td>
<td>0.14</td>
<td>0.755*</td>
<td>0.744*</td>
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<tr>
<td>2 weeks</td>
<td>0.478</td>
<td>0.263</td>
<td>0.587</td>
</tr>
<tr>
<td>3 months</td>
<td>0.054</td>
<td>0.694*</td>
<td>0.582</td>
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*Indicates significance at the p<0.05 level.
**Indicates significance at the p<0.01 level.

CONCLUSIONS

- Neither group showed enhanced recognition performance for emotionally arousing pictures.
- Upon removal of the between-groups classification, memory status was significantly associated with 2-week recognition memory performance for high arousing pictures.
- Hippocampal volume was positively correlated with recognition memory performance for high but not low arousal stimuli.
- Individuals with better memory status benefit more from emotional arousal than those with poorer memory status.

Future Directions:
- A recall rather than recognition paradigm may have better elicited differences between the groups.
- Emotional memory in MCI should also be studied using personally relevant emotional information.