Abstract: Object: Matrix metalloproteinase (MMP) 2 and 9 are important for tissue breakdown in the process of tumor invasion. The aim of this study is to evaluate the relationship between the expression of MMP-2, MMP-9, MIB-1 LI and cavernous sinus invasion in pituitary adenomas.

Methods: Tissue samples from 54 patients with pituitary adenomas were studied. Expression of MMP-2, MMP-9, and MIB-1 labeling index (LI) were evaluated by immunohistochemical method. In sixteen cases, the expression of MMP-2 and MMP-9 mRNA was also examined by RT-PCR assay.

Results: Thirty-four patients were women and 20 were men, with a mean age of 49.9 years old (range 18-76 years). There were 12 cases with cavernous sinus invasion, and 42 were noninvasive cases. MMP-2 and MMP-9 score of invasive case (3.9 ± 0.5, 4.1 ± 0.4) were significantly higher than those (2.3 ± 0.2 ; p < 0.01 ; 2.6 ± 0.2 ; p < 0.01) without invasion. The MIB-1 LI of this study presented no significantly difference between the invasive and noninvasive pituitary adenomas. The percentage of MMP-2 mRNA/β-actin mRNA and MMP-9 mRNA/β-actin mRNA were also observed significantly higher in invasive pituitary adenomas (68.2 ± 15.3 % ; 59.7 ± 12.5 %) than noninvasive pituitary adenomas (21.8 ± 8.2 % , p < 0.05 ; 33.3 ± 5.4 % , p < 0.05).

Conclusions: Our study suggests that the expression of MMP-2 and MMP-9 may have a value to assess the invasive pituitary adenomas, and proliferation and invasion of pituitary adenomas may present a different mechanism. J. Med. Invest. 52 : 151-158, August, 2005

Keywords: MMP-2 ; MMP-9 ; Ki-67 ; pituitary adenomas ; tumor invasion
Reverse Transcription-Polymerase Chain Reaction (RT-PCR) Analysis

Statistical analysis

Immunohistochemistry findings
MMP-2 and MMP-9 expression in pituitary adenomas

**mRNA Expression of MMPs**

<table>
<thead>
<tr>
<th>Group</th>
<th>MMP-2</th>
<th>MMP-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tumor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- *P < 0.05*
- **P < 0.01**
Case 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16

<table>
<thead>
<tr>
<th>Protein</th>
<th>Gene</th>
<th>Size (bp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMP-2</td>
<td>β-actin</td>
<td>447bp</td>
</tr>
<tr>
<td>MMP-9</td>
<td>β-actin</td>
<td>520bp</td>
</tr>
</tbody>
</table>

![Gel Electrophoresis Image A](image1)

![Gel Electrophoresis Image B](image2)

![Bar Graph A](image3)

![Bar Graph B](image4)

![Scatter Plot A](image5)

![Scatter Plot B](image6)
in vitro

et al

et al

et al
MMP-2 and MMP-9 expression in pituitary adenomas

W. Liu, et al.