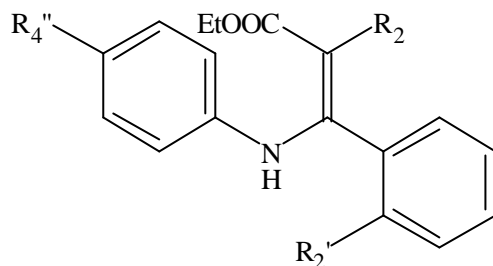


**Table 17. The inhibitory effect of compounds (26-30) on mast cell degranulation (*in vitro*)**



Animal: Rat (Sprague Dawley)

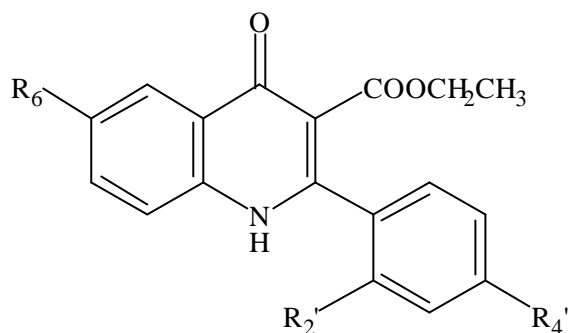
Inducer: Compound 48/80 (10 µg/ml)

| No.                    | Conc.<br>(µM) | R <sub>2</sub> | R <sub>2</sub> ' | R <sub>4</sub> '' | Percent Release     |              |                     |              |
|------------------------|---------------|----------------|------------------|-------------------|---------------------|--------------|---------------------|--------------|
|                        |               |                |                  |                   | -Glucuronidase      | % inhibition | Histamine           | % inhibition |
| 26                     | Control       |                |                  |                   | 50.2 ±0.8           |              | 53.8 ±1.4           |              |
|                        | 10            | COOEt          | F                | Cl                | 40.6 ±1.0           | 19.1 ±1.8    | 46.7 ±1.0           | 13.0 ±1.1    |
|                        | 30            |                |                  |                   | 40.0 ±1.2           | 20.3 ±2.0    | 48.0 ±1.6           | 10.6 ±2.5    |
| 27                     | Control       |                |                  |                   | 50.2 ±0.8           |              | 53.8 ±1.4           |              |
|                        | 10            | COOEt          | F                | F                 | 47.3 ±0.3           | 5.7 ±0.9     | 46.0 ±2.0           | 14.4 ±2.1    |
|                        | 30            |                |                  |                   | 41.2 ±0.1           | 17.8 ±1.4    | 43.1 ±1.1           | 19.7 ±2.5    |
| 28                     | Control       |                |                  |                   | 57.3 ±2.3           |              | 73.1 ±3.8           |              |
|                        | 10            | H              | Cl               | F                 | 48.3 ±2.3           | 5.9 ±6.2     | 68.5 ±3.6           | 6.2 ±0.3     |
|                        | 30            |                |                  |                   | 32.7 ±5.4**         | 37.5 ±6.1**  | 62.7 ±3.6           | 14.1 ±1.7    |
| 29                     | Control       |                |                  |                   | 50.2 ±0.8           |              | 53.8 ±1.4           |              |
|                        | 10            | H              | F                | OCH <sub>3</sub>  | 48.9 ±0.3           | 2.6 ±1.2     | 52.6 ±2.8           | 2.0 ±6.0     |
|                        | 30            |                |                  |                   | 45.0 ±0.2           | 10.2 ±1.0    | 48.5 ±0.7           | 9.6 ±1.8     |
| 30                     | Control       |                |                  |                   | 57.3 ±2.3           |              | 73.1 ±3.8           |              |
|                        | 10            | H              | Cl               | H                 | 51.8 ±5.4           | 0.3 ±2.8     | 70.9 ±4.6           | 3.2 ±1.3     |
|                        | 30            |                |                  |                   | 47.9 ±3.3           | 7.0 ±3.9     | 67.8 ±3.2           | 7.1 ±1.3     |
| mepacrine              |               |                |                  |                   | 57.3 ±2.3           |              | 73.1 ±3.8           |              |
|                        | 3             |                |                  |                   | 36.9 ±1.0*          | 29.5 ±1.9*   | 55.4 ±2.8           | 24.2 ±3.1    |
|                        | 10            |                |                  |                   | 25.6 ±2.4**         | 51.0 ±5.1**  | 47.1 ±2.6*          | 35.5 ±3.2*   |
|                        | 30            |                |                  |                   | 20.9 ±1.4**         | 59.8 ±3.3**  | 33.2 ±1.9**         | 54.6 ±2.2**  |
| <b>IC<sub>50</sub></b> |               |                |                  |                   | <b>13.7 ±3.2 µM</b> |              | <b>23.3 ±3.0 µM</b> |              |

\*  $P < 0.05$ , \*\*  $P < 0.01$ ; N = 3

mepacrine: positive control

**Table 18. The inhibitory effect of compounds (31-37, 39-41) on mast cell degranulation (*in vitro*)**



Animal: Rat (Sprague Dawley)

Inducer: Compound 48/80 (10 µg/ml)

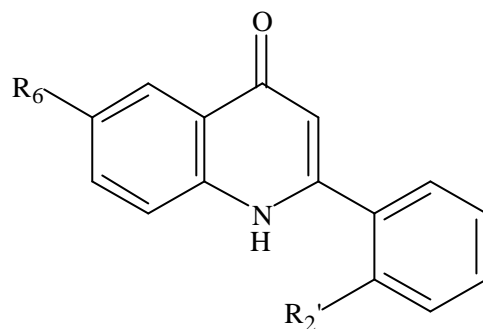
| No. | Conc.<br>(µM) | R <sub>6</sub>   | R <sub>2</sub> ' | R <sub>4</sub> ' | Percent Release |              |            |              |
|-----|---------------|------------------|------------------|------------------|-----------------|--------------|------------|--------------|
|     |               |                  |                  |                  | -Glucuronidase  | % inhibition | Histamine  | % inhibition |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 31  | 10            | Cl               | F                | H                | 50.5 ± 4.8      | 2.8 ± 1.1    | 72.4 ± 3.6 | 0.9 ± 1.2    |
|     | 30            |                  |                  |                  | 38.3 ± 1.0      | 24.1 ± 1.0   | 66.8 ± 4.7 | 8.7 ± 2.7    |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 32  | 10            | Cl               | Cl               | H                | 49.1 ± 4.9      | 5.4 ± 3.1    | 70.9 ± 5.0 | 3.1 ± 1.8    |
|     | 30            |                  |                  |                  | 40.9 ± 2.9      | 20.6 ± 3.8   | 64.0 ± 4.6 | 12.5 ± 1.7   |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 33  | 10            | Cl               | OCH <sub>3</sub> | H                | 50.4 ± 7.0      | 3.7 ± 4.5    | 69.2 ± 5.2 | 5.4 ± 2.2    |
|     | 30            |                  |                  |                  | 46.5 ± 2.2      | 9.0 ± 7.9    | 67.3 ± 4.3 | 7.9 ± 1.1    |
|     | Control       |                  |                  |                  | 50.2 ± 0.8      |              | 53.8 ± 1.4 |              |
| 34  | 10            | Cl               | H                | H                | 44.6 ± 1.1      | 11.0 ± 2.6   | 47.9 ± 1.9 | 10.9 ± 0.6   |
|     | 30            |                  |                  |                  | 40.4 ± 2.2      | 19.5 ± 3.4   | 46.7 ± 1.2 | 13.0 ± 0.6   |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 35  | 10            | F                | F                | H                | 48.8 ± 2.7      | 4.8 ± 7.3    | 70.8 ± 5.7 | 3.3 ± 3.0    |
|     | 30            |                  |                  |                  | 40.0 ± 6.9      | 24.1 ± 7.0   | 64.7 ± 4.0 | 11.6 ± 0.9   |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 36  | 10            | F                | Cl               | H                | 46.2 ± 6.4      | 11.9 ± 3.8   | 71.5 ± 5.2 | 2.4 ± 2.0    |
|     | 30            |                  |                  |                  | 43.0 ± 3.0      | 16.7 ± 3.3   | 65.4 ± 5.1 | 10.7 ± 2.4   |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 37  | 10            | F                | OCH <sub>3</sub> | H                | 49.5 ± 3.2      | 4.0 ± 4.7    | 71.7 ± 4.2 | 2.0 ± 1.4    |
|     | 30            |                  |                  |                  | 45.3 ± 1.7      | 11.5 ± 3.1   | 66.6 ± 3.0 | 8.8 ± 0.9    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 39  | 10            | OCH <sub>3</sub> | F                | H                | 49.2 ± 5.1      | 5.3 ± 1.3    | 70.4 ± 3.8 | 3.6 ± 0.6    |
|     | 30            |                  |                  |                  | 47.3 ± 5.6      | 9.4 ± 2.3    | 66.9 ± 3.5 | 8.4 ± 1.6    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |

|                        |    |                  |    |   |                      |              |                      |              |
|------------------------|----|------------------|----|---|----------------------|--------------|----------------------|--------------|
| <b>40</b>              | 10 | OCH <sub>3</sub> | Cl | H | 51.4 ± 4.1           | 2.2 ± 6.4    | 71.0 ± 3.9           | 2.8 ± 1.9    |
|                        | 30 |                  |    |   | 51.1 ± 2.8           | -0.1 ± 9.5   | 72.1 ± 1.8           | 1.0 ± 3.5    |
| Control                |    |                  |    |   | 50.2 ± 0.8           |              | 53.8 ± 1.4           |              |
| <b>41</b>              | 10 | OCH <sub>3</sub> | H  | F | 46.7 ± 1.2           | 7.0 ± 2.4    | 51.3 ± 1.5           | 4.3 ± 5.2    |
|                        | 30 |                  |    |   | 42.0 ± 0.5           | 16.2 ± 1.3   | 46.8 ± 0.8           | 12.8 ± 2.5   |
| Control                |    |                  |    |   | 57.3 ± 2.3           |              | 73.1 ± 3.8           |              |
| <b>mepacrine</b>       |    |                  |    |   |                      |              |                      |              |
|                        | 3  |                  |    |   | 36.9 ± 1.0*          | 29.5 ± 1.9*  | 55.4 ± 2.8           | 24.2 ± 3.1   |
|                        | 10 |                  |    |   | 25.6 ± 2.4**         | 51.0 ± 5.1** | 47.1 ± 2.6*          | 35.5 ± 3.2*  |
|                        | 30 |                  |    |   | 20.9 ± 1.4**         | 59.8 ± 3.3** | 33.2 ± 1.9**         | 54.6 ± 2.2** |
| <b>IC<sub>50</sub></b> |    |                  |    |   | <b>13.7 ± 3.2 μM</b> |              | <b>23.3 ± 3.0 μM</b> |              |

\*  $P < 0.05$ , \*\*  $P < 0.01$ ; N = 3

mepacrine: positive control

**Table 19. The inhibitory effect of compounds (43, 44) on mast cell degranulation (*in vitro*)**



Animal: Rat (Sprague Dawley)

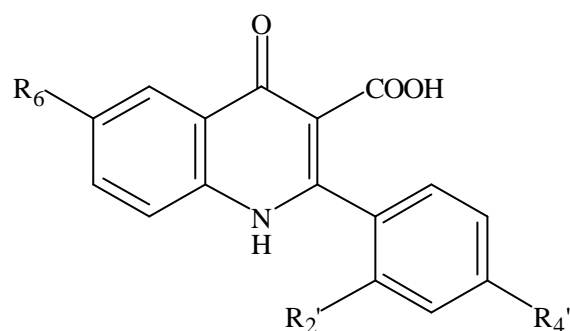
Inducer: Compound 48/80 (10 µg/ml)

| No.              | Conc.<br>(µM)          | R <sub>6</sub>   | R <sub>2</sub> ' | Percent Release      |              |                      |              |
|------------------|------------------------|------------------|------------------|----------------------|--------------|----------------------|--------------|
|                  |                        |                  |                  | -Glucuronidase       | % inhibition | Histamine            | % inhibition |
|                  | Control                |                  |                  | 52.0 ± 5.4           |              | 73.1 ± 3.8           |              |
| <b>43</b>        | 10                     | F                | F                | 40.1 ± 3.9           | 22.7 ± 1.0   | 62.7 ± 3.0           | 14.2 ± 0.8   |
|                  | 30                     |                  |                  | 35.8 ± 0.9*          | 29.8 ± 6.3*  | 58.4 ± 2.5           | 20.0 ± 1.2   |
| <b>44</b>        | 10                     | OCH <sub>3</sub> | Cl               | 38.8 ± 3.7           | 34.9 ± 4.6   | 70.5 ± 1.4           | 3.2 ± 3.3    |
|                  | 30                     |                  |                  | 38.4 ± 1.8           | 25.5 ± 5.1   | 74.2 ± 0.4           | -2.0 ± 5.2   |
| <b>mepacrine</b> |                        |                  |                  |                      |              |                      |              |
|                  | 3                      |                  |                  | 36.9 ± 1.0*          | 29.5 ± 1.9*  | 55.4 ± 2.8           | 24.2 ± 3.1   |
|                  | 10                     |                  |                  | 25.6 ± 2.4**         | 51.0 ± 5.1** | 47.1 ± 2.6*          | 35.5 ± 3.2*  |
|                  | 30                     |                  |                  | 20.9 ± 1.4**         | 59.8 ± 3.3** | 33.2 ± 1.9**         | 54.6 ± 2.2** |
|                  | <b>IC<sub>50</sub></b> |                  |                  | <b>13.7 ± 3.2 µM</b> |              | <b>23.3 ± 3.0 µM</b> |              |

\*  $P < 0.05$ , \*\*  $P < 0.01$ ; N = 3

mepacrine: positive control

**Table 20. The inhibitory effect of compounds (45-51, 53-55) on mast cell degranulation (*in vitro*)**



Animal: Rat (Sprague Dawley)

Inducer: Compound 48/80 (10 µg/ml)

| No. | Conc.<br>(µM) | R <sub>6</sub>   | R <sub>2</sub> ' | R <sub>4</sub> ' | Percent Release |              |            |              |
|-----|---------------|------------------|------------------|------------------|-----------------|--------------|------------|--------------|
|     |               |                  |                  |                  | -Glucuronidase  | % inhibition | Histamine  | % inhibition |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 45  | 10            | Cl               | F                | H                | 48.2 ± 6.0      | 7.8 ± 2.6    | 71.5 ± 3.4 | 2.1 ± 0.5    |
|     | 30            |                  |                  |                  | 48.9 ± 4.2      | 5.5 ± 2.1    | 67.1 ± 3.9 | 8.1 ± 1.7    |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 46  | 10            | Cl               | Cl               | H                | 50.1 ± 3.9      | 2.9 ± 4.5    | 70.5 ± 6.8 | 3.9 ± 4.5    |
|     | 30            |                  |                  |                  | 50.3 ± 3.5      | 2.5 ± 3.7    | 67.8 ± 4.1 | 7.3 ± 1.0    |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 47  | 10            | Cl               | OCH <sub>3</sub> | H                | 55.0 ± 4.4      | -6.8 ± 7.6   | 70.6 ± 5.5 | 3.5 ± 2.9    |
|     | 30            |                  |                  |                  | 47.7 ± 6.8      | 8.6 ± 6.9    | 71.4 ± 5.1 | 2.5 ± 2.3    |
|     | Control       |                  |                  |                  | 50.2 ± 0.8      |              | 53.8 ± 1.4 |              |
| 48  | 10            | Cl               | H                | H                | 47.8 ± 1.7      | 4.8 ± 1.9    | 48.7 ± 0.8 | 9.2 ± 1.9    |
|     | 30            |                  |                  |                  | 48.9 ± 0.9      | 2.4 ± 3.3    | 48.4 ± 0.5 | 9.8 ± 1.5    |
|     | Control       |                  |                  |                  | 52.0 ± 5.4      |              | 73.1 ± 3.8 |              |
| 49  | 10            | F                | F                | H                | 52.3 ± 2.8      | -1.7 ± 5.9   | 71.7 ± 4.0 | 1.9 ± 1.3    |
|     | 30            |                  |                  |                  | 49.4 ± 4.0      | 4.5 ± 3.6    | 68.7 ± 4.7 | 6.1 ± 1.9    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 50  | 10            | F                | Cl               | H                | 52.3 ± 4.6      | -0.8 ± 2.6   | 68.9 ± 5.3 | 4.2 ± 1.3    |
|     | 30            |                  |                  |                  | 51.5 ± 3.0      | -0.1 ± 5.3   | 70.1 ± 4.5 | 5.9 ± 2.4    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 51  | 10            | F                | OCH <sub>3</sub> | H                | 53.1 ± 2.7      | -3.3 ± 6.2   | 70.1 ± 2.8 | 3.9 ± 2.2    |
|     | 30            |                  |                  |                  | 49.0 ± 3.0      | 4.8 ± 5.0    | 68.3 ± 4.0 | 6.5 ± 0.6    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |
| 53  | 10            | OCH <sub>3</sub> | F                | H                | 51.8 ± 3.2      | -0.8 ± 6.6   | 73.4 ± 2.5 | -0.5 ± 1.9   |
|     | 30            |                  |                  |                  | 47.7 ± 2.4      | 7.1 ± 5.7    | 70.4 ± 2.0 | 3.4 ± 3.0    |
|     | Control       |                  |                  |                  | 57.3 ± 2.3      |              | 73.1 ± 3.8 |              |

|                  |                        |                  |    |   |                     |             |                     |             |
|------------------|------------------------|------------------|----|---|---------------------|-------------|---------------------|-------------|
| <b>54</b>        | 10                     | OCH <sub>3</sub> | Cl | H | 53.8 ±6.5           | -3.0 ±1.9   | 74.3 ±3.2           | -1.7 ±0.9   |
|                  | 30                     |                  |    |   | 48.5 ±3.3           | 5.7 ±6.4    | 67.1 ±1.3           | 7.8 ±3.2    |
| Control          |                        |                  |    |   | 50.2 ±0.8           |             | 53.8 ±1.4           |             |
| <b>55</b>        | 10                     | OCH <sub>3</sub> | H  | F | 44.9 ±1.7           | 10.6 ±3.3   | 50.6 ±0.6           | 5.7 ±3.4    |
|                  | 30                     |                  |    |   | 44.0 ±1.4           | 12.4 ±3.0   | 50.6 ±1.2           | 5.6 ±4.7    |
| Control          |                        |                  |    |   | 57.3 ±2.3           |             | 73.1 ±3.8           |             |
| <b>mepacrine</b> |                        |                  |    |   |                     |             |                     |             |
|                  | 3                      |                  |    |   | 36.9 ±1.0*          | 29.5 ±1.9*  | 55.4 ±2.8           | 24.2 ±3.1   |
|                  | 10                     |                  |    |   | 25.6 ±2.4**         | 51.0 ±5.1** | 47.1 ±2.6*          | 35.5 ±3.2*  |
|                  | 30                     |                  |    |   | 20.9 ±1.4**         | 59.8 ±3.3** | 33.2 ±1.9**         | 54.6 ±2.2** |
|                  | <b>IC<sub>50</sub></b> |                  |    |   | <b>13.7 ±3.2 μM</b> |             | <b>23.3 ±3.0 μM</b> |             |

\*  $P < 0.05$ , \*\*  $P < 0.01$ ; N = 3

mepacrine: positive control