

# Sesquiterpenes from Myrrh and their ICAM-1 Inhibitory Activity *in vitro*

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## Supplementary Material

**Table S1.** <sup>1</sup>H-NMR data of compound **8** (400 MHz; CDCl<sub>3</sub>) and **10–12** (600 MHz; CDCl<sub>3</sub>) (δ in ppm, *J* in Hz; s singlet, d doublet, br broad, m multiplet).

| no. | 8                                                     | 10                                                      | 11                                       | 12                                                                |
|-----|-------------------------------------------------------|---------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------|
| 1   | 5.53 (1H, d, 8.7)                                     | 1.25 (1H, m)<br>1.58 (1H, m)                            | 6.87 (1H, d, 9.9)                        |                                                                   |
| 2   | 5.76 (1H, dd, 5.7, 8.7)                               | 1.64 (2H, m)                                            | 6.37 (1H, d, 9.9)                        | 2.45 (1H, ddd, 3.6, 4.1, 15.1)<br>2.73 (1H, ddd, 6.0, 15.1, 15.1) |
| 3   | 5.74 <sup>1</sup> (1H, m)                             | 1.97 (1H, ddd, 6.7, 12.5, 12.5)<br>2.37 (1H, ddd, 12.5) |                                          | 1.93 (1H, ddd, 5.2, 14.5, 14.9)<br>2.03 (1H, ddd, 2.8, 6.0, 13.3) |
| 5   | 2.32 (1H, m)                                          | 1.84 (1H, dd, 3.3, 13.2)                                |                                          | 2.89 (1H, s)                                                      |
| 6   | 2.45 (1H, dd, 13.0, 13.0)<br>2.87 (1H, dd, 3.4, 13.0) | 2.43 (1H, dd, 13.2, 13.2)<br>2.63 (1H, dd, 3.3, 13.2)   |                                          |                                                                   |
| 9   | 1.82 (1H, d, 13.8)<br>2.28 (1H, d, 13.8)              | 1.56 (1H, d, 13.8)<br>2.25 (1H, d, 13.8)                | 2.94 (1H, d, 16.9)<br>3.00 (1H, d, 16.9) | 3.03 (1H, d, 17.9)<br>2.95 (1H, d, 17.9)                          |
| 12  |                                                       |                                                         | 7.17 (1H, s)                             | 7.12 (1H, s)                                                      |
| 13  | 1.84 (3H, brs)                                        | 1.83 (3H, brs)                                          | 2.27 (3H, brs)                           | 2.20 (3H, s)                                                      |
| 14  | 1.13 (3H, s)                                          | 1.03 (3H, s)                                            | 1.39 (3H, s)                             | 1.27 (3H, s)                                                      |
| 15  | 1.89 (1H, s)                                          | 4.60 (1H, brs)<br>4.87 (1H, brs)                        | 2.19 (3H, s)                             | 1.73 (3H, s)                                                      |

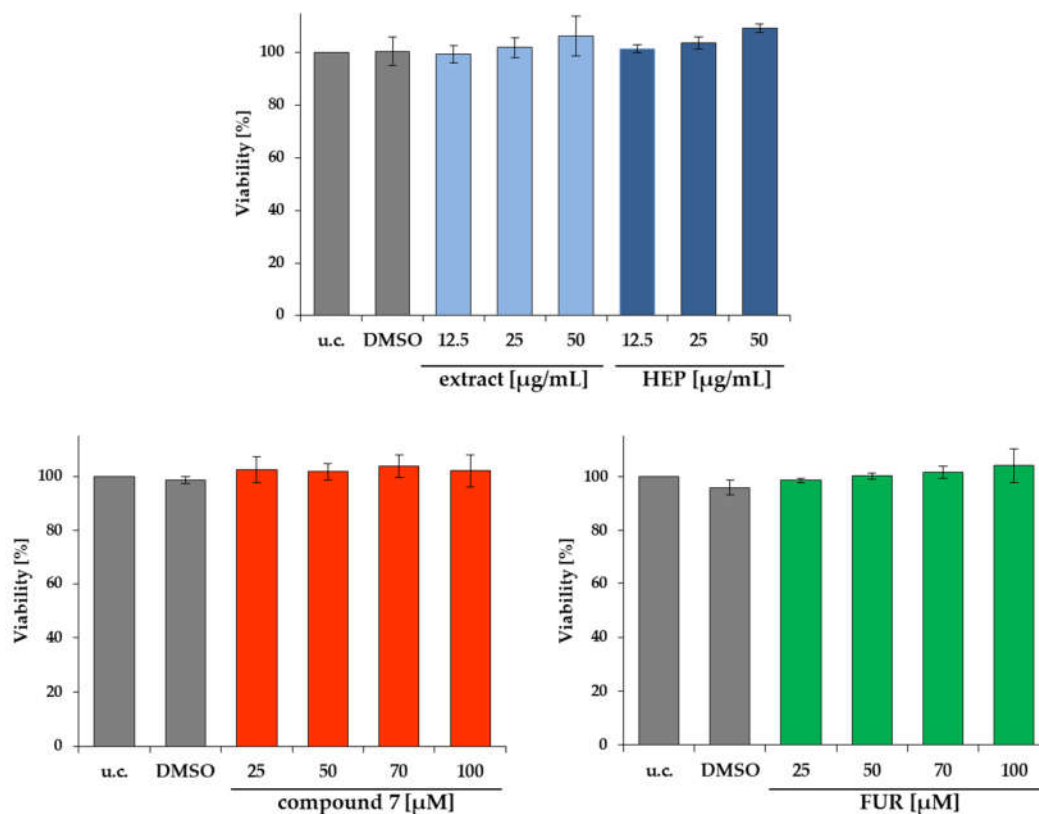
<sup>1</sup> overlapped signal

**Table S2.** <sup>1</sup>H NMR data of compound **13**, **15** and **16** (600 MHz; CDCl<sub>3</sub>) (δ in ppm, *J* in Hz; s singlet, d doublet, t triplet, br broad).

| no.   | 13                                                     | 15                                                    | 16                                                    |
|-------|--------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| 1     | 5.73 (1H, dd, 10.8, 17.6)                              | 4.68 (1H, d, 12.9)                                    | 4.90 (1H, d, 12.9)                                    |
| 2     | 4.97 (1H, brd, 17.6)<br>5.00 (1H, brd, 11.0)           | 6.17 (1H, d, 12.9)                                    | 6.45 (1H, d, 12.9)                                    |
| 3     | 4.73 (1H, brs)<br>4.99 (1H, brs)                       | 4.74 (1H, brs)<br>5.01 (1H, brs)                      | 4.68 (1H, brs)<br>4.80 (1H, brs)                      |
| 5     | 2.05 (1H, dd, 4.1, 14.0)                               | 2.00 (1H, dd, 4.1, 13.5)                              | 2.47 (1H, brd, 6.6)                                   |
| 6     | 2.55 (1H, brt, 14.0, 14.0)<br>2.68 (1H, dd, 4.1, 14.0) | 2.53 (1H, dd, 14.0, 14.0)<br>2.67 (1H, dd, 3.9, 14.0) | 2.69 (1H, brd, 14.9)<br>2.72 (1H, dd, 7.1, 14.9)      |
| 8     | 4.83 (1H, dd, 6.2, 12.0)                               | 4.82 (1H, dd, 6.2, 12.0)                              | 4.93 (1H, dd, 6.6, 11.6)                              |
| 9     | 1.34 (1H, t, 12.0)<br>2.21 (1H, dd, 6.2, 12.0)         | 1.31 (1H, dd, 12.1, 12.1)<br>2.26 (1H, dd, 6.2, 12.1) | 1.68 (1H, dd, 12.1, 12.1)<br>2.20 (1H, dd, 6.6, 12.5) |
| 13    | 1.83 (3H, t, 1.4, 1.4)                                 | 1.82 (3H, brs)                                        | 1.81 (3H, brs)                                        |
| 14    | 1.17 (3H, s)                                           | 1.15 (3H, s)                                          | 1.05 (3H, s)                                          |
| 15    | 1.77 (1H, s)                                           | 1.79 (3H, s)                                          | 1.70 (3H, s)                                          |
| 1'-Me |                                                        | 3.50 (3H, s)                                          | 3.55 (3H, s)                                          |

**Table S3.** <sup>13</sup>C-NMR data of compound **8** (100 MHz; CDCl<sub>3</sub>) and **10-16** (150 MHz; CDCl<sub>3</sub>) ( $\delta$  in ppm).

| no.   | 8     | 10    | 11    | 12    | 13    | 15    | 16    |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 1     | 137.0 | 41.3  | 153.0 | 210.9 | 146.5 | 112.8 | 111.5 |
| 2     | 122.5 | 22.3  | 126.9 | 34.7  | 111.8 | 145.9 | 147.4 |
| 3     | 120.7 | 36.1  | 186.4 | 38.8  | 113.9 | 113.9 | 113.8 |
| 4     | 136.2 | 148.5 | 137.6 | 70.2  | 144.9 | 145.1 | 147.3 |
| 5     | 48.3  | 51.7  | 150.6 | 62.1  | 52.9  | 54.0  | 51.1  |
| 6     | 23.1  | 24.5  | 186.8 | 195.4 | 28.4  | 28.3  | 28.6  |
| 7     | 160.4 | 160.7 | 121.5 | 119.3 | 161.9 | 162.0 | 161.8 |
| 8     | 103.5 | 103.3 | 163.6 | 165.8 | 77.9  | 77.8  | 78.3  |
| 9     | 48.0  | 51.3  | 36.6  | 35.6  | 45.7  | 47.0  | 40.4  |
| 10    | 35.8  | 36.7  | 42.4  | 51.1  | 40.9  | 38.0  | 37.9  |
| 11    | 122.4 | 122.3 | 119.6 | 119.0 | 120.1 | 120.0 | 120.8 |
| 12    | 172.1 | 171.9 | 140.7 | 140.1 | 174.9 | 174.8 | 174.7 |
| 13    | 8.3   | 8.2   | 9.0   | 8.9   | 8.2   | 8.2   | 8.3   |
| 14    | 15.3  | 16.6  | 24.9  | 20.3  | 17.0  | 18.1  | 28.9  |
| 15    | 20.2  | 106.9 | 12.2  | 23.8  | 24.7  | 25.0  | 25.4  |
| 1'-Me |       |       |       |       |       | 56.1  | 56.4  |



**Figure S1.** Influence of the ethanolic extract, HEP fraction, compound **7** and FUR on viability of HMEC-1 cells (MTT assay). The test was performed with pure medium (u.c.), the highest DMSO concentration used in test solutions (0.15%, *v/v*) and substance concentrations between 25–100  $\mu\text{M}$ . Data are presented as mean  $\pm$  SD ( $n = 3$ ). All viability values are situated between 95–100%.

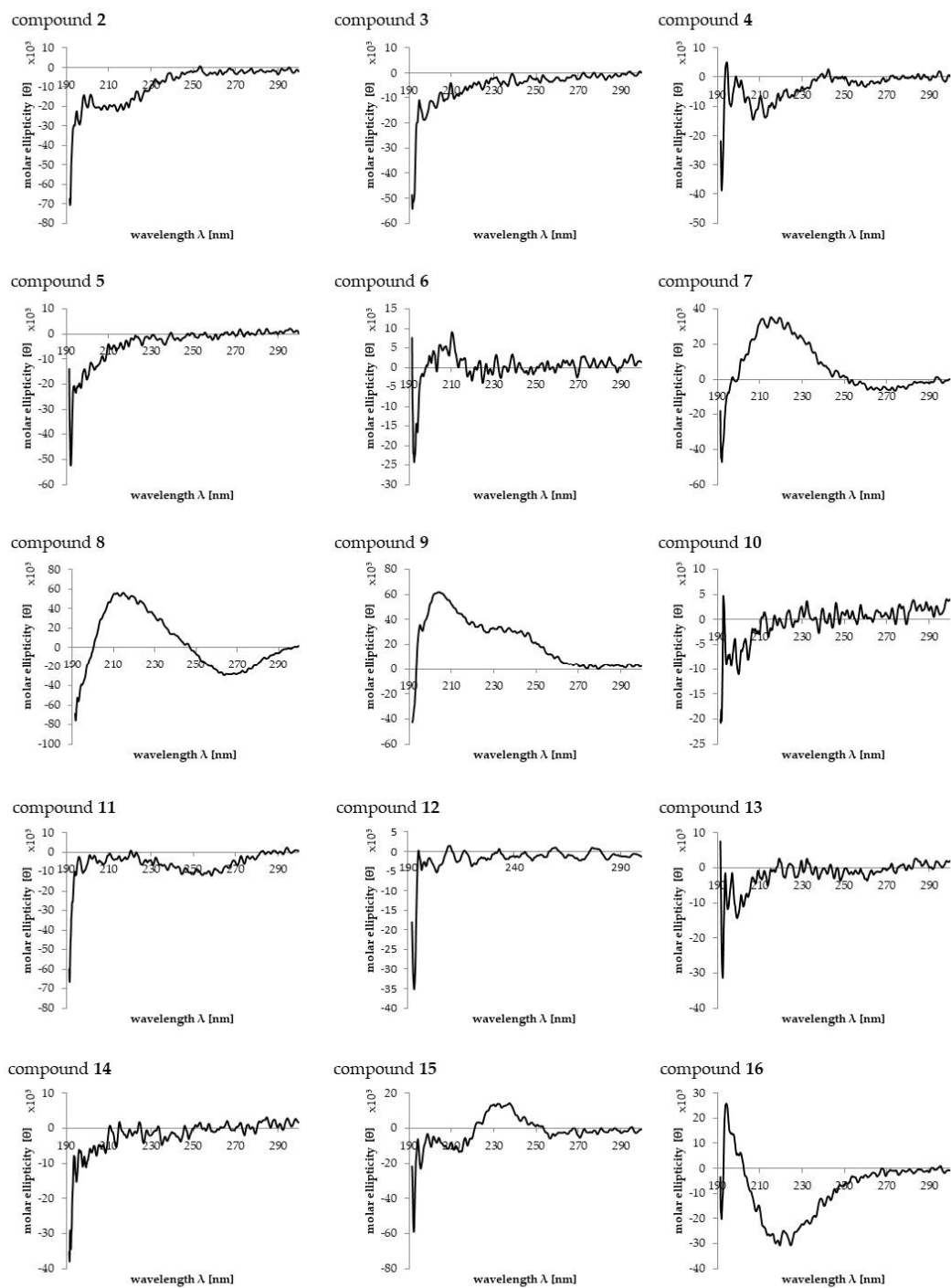


Figure S2. CD-spectra of compounds 2–16 in a range of 190–300 nm.