SUPPLEMENTARY MATERIAL

Flavonoids from the leaves of *Epimedium koreanum* Nakai and their potential cytotoxic activities

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Abstract

Phytochemical studies on the leaves of *Epimedium koreanum* Nakai have resulted in the discovery of two new flavonol glycosides, koreanoside F (1) and koreanoside G (2), along with six known flavonoids. Their structures were elucidated on the basis of HRESIMS, UV, IR, 1D NMR and 2D NMR data. Absolute configurations of 1 and 2 was further determined by $^{13}$C-NMR spectra with gate decoupling (GD). All of the compounds were evaluated for cytotoxic activities by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H-tetrazoliumbromide (MTT) assay. The results indicated that compounds 3, 5, 6, 7 and 8 inhibited the proliferation of A549 and NCI-292 cells with IC$_{50}$ values of 5.7-23.5 μM. Real-time monitoring in three kinds of lung cancer cells and a kind of human bronchial epithelial cells treated with compound 6 was also assessed.

Key words: *Epimedium koreanum* Nakai; flavonoids; cytotoxicity; flavonol glycoside
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Figure S21 Real-time monitoring of cell viability treated with compound 6
Table S1 $^1$H and $^{13}$C NMR data of compounds 1 and 2$^a$ ($\delta$ in ppm, $J$ in Hz).

| Position | 1  | 2  |
|----------|----|----|
|          | $\delta_H$ | $\delta_C$ | $\delta_H$ | $\delta_C$ |
| 2        | 158.9 |         | 156.3 | |
| 3        | 137.2 |         | 134.2 | |
| 4        | 180.5 |         | 177.7 | |
| 5        | 6.87, s | 98.3 | 159.1 | |
| 6        | 110.6 | 6.25, s | 98.6 | |
| 7        | 159.3 |         | 163.3 | |
| 8        | 6.85, s | 95.6 | 103.9 | |
| 9        | 150.3 |         | 154.3 | |
| 10       | 108.7 |         | 103.6 | |
| 11       | 160.4 | 2.88, m | 26.2 | |
| 12       | 164.9 | 3.54, m | 60.1 | |
| 13       | 69.6 |         |         | |
| 14, 15   | 1.64, s | 28.9 |         | |
| 1'       | 123.6 |         | 122.6 | |
| 2'       | 7.95, d (8.5) | 131.9 | 7.90, d (8.9) | 130.4 |
| 3'       | 7.13, d (8.5) | 115.3 | 7.13, d (8.9) | 114.1 |
| 4'       | 163.6 |         | 161.2 | |
| 5'       | 7.13, d (8.5) | 115.3 | 7.13, d (8.9) | 114.1 |
| 6'       | 7.95, d (8.5) | 131.9 | 7.90, d (8.9) | 130.4 |
| 4'-OMe   | 3.91, s | 56.0 | 3.85, s | 55.4 |
5-OH & 12.57, s \\

Rha \\
1" & 5.46 d (0.8) & 103.5 & 5.27, d (0.9) & 101.9 \\
2" & 4.26, s & 72.1 & 3.98, s & 70.1 \\
3" & 3.74, dd (9.2, 3.2) & 72.1 & 3.48, dd (9.2, 3.1) & 70.3 \\
4" & 3.36, m & 73.1 & 3.17, m & 71.1 \\
5" & 3.32, m & 71.9 & 3.08, m & 70.6 \\
6" & 0.92, d (6.0) & 17.7 & 0.78, d (6.1) & 17.4 \\

\(^a\) NMR data (\(\delta\)) were recorded for \(1\) at 600 MHz for \(^1\)H and 150 MHz for \(^{13}\)C in methanol-\(d_4\), and for \(2\) in DMSO-\(d_6\).

**Table S2** The effects of compounds on the proliferation of A549 and NCI-H292 cells

| Compound | IC\(_{50}\) (\(\mu\)M) for 48 h |
|----------|---------------------------------|
|          | A549                           | NCI-H292 |
| **1**    | >50                             | >50       |
| **2**    | >50                             | >50       |
| **3**    | 18.75                           | 17.17     |
| **4**    | >50                             | 33.96     |
| **5**    | >50                             | 6.439     |
| **6**    | 7.901                           | 5.689     |
| **7**    | 13.89                           | 14.75     |
| **8**    | 18.31                           | 23.53     |
| CDDP | 11.43 | 6.956 |