

**Supporting Information for**

**Original article**

**Small molecule conjugates with selective estrogen receptor  $\beta$  agonism promote anti-aging benefits in metabolism and skin recovery**

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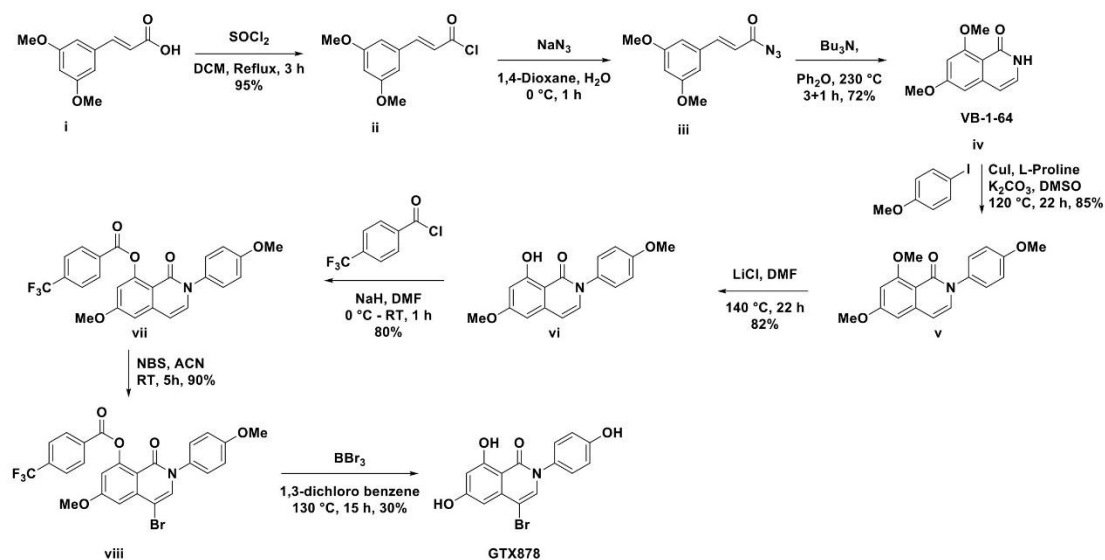
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Running title: Anti-aging benefits of selective ER $\beta$  conjugate agonists in mice



## Scheme S1.

Scheme S1. Synthesis of GTX-878 using an 8-step linear method.

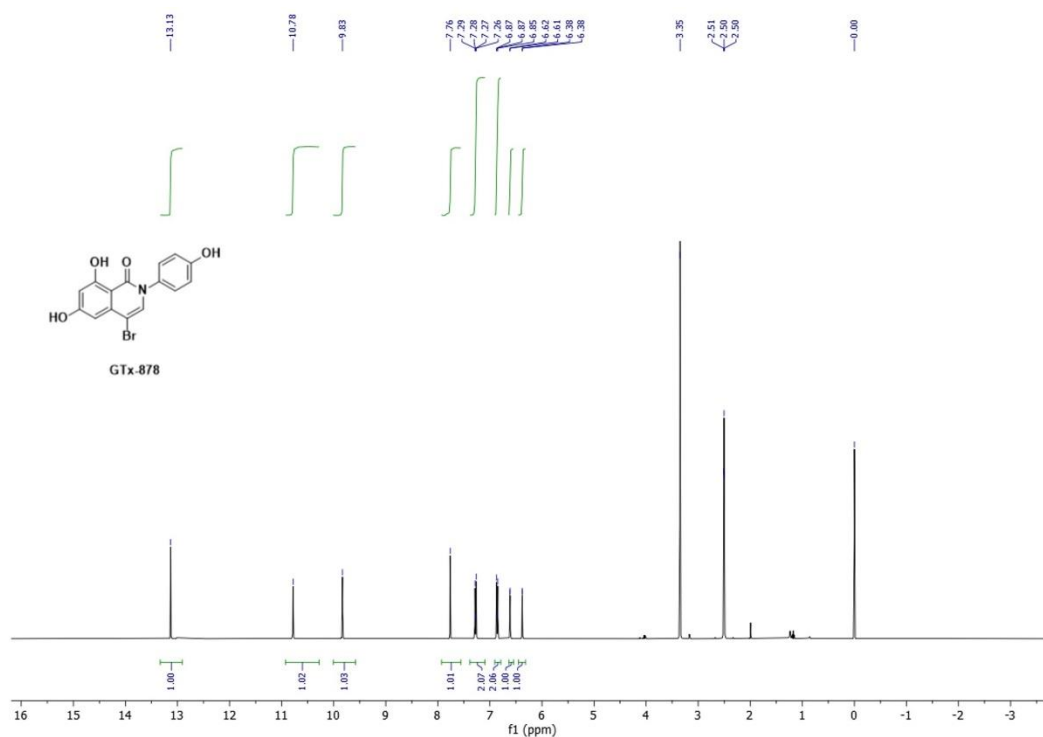
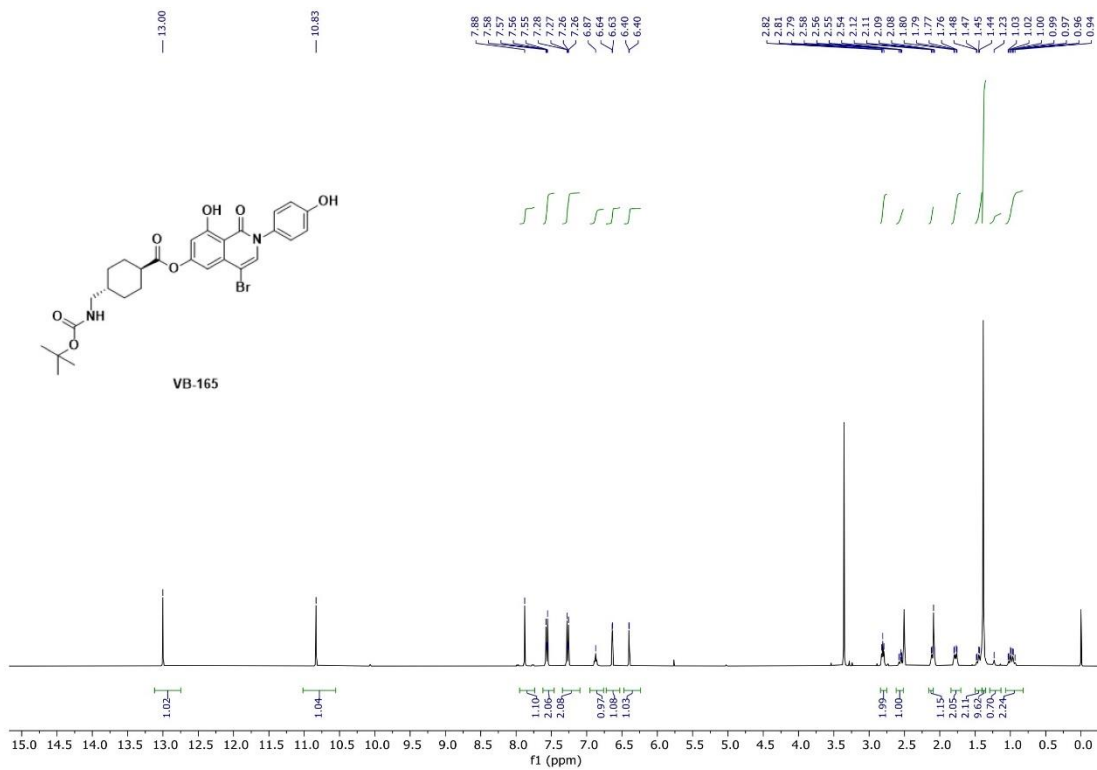
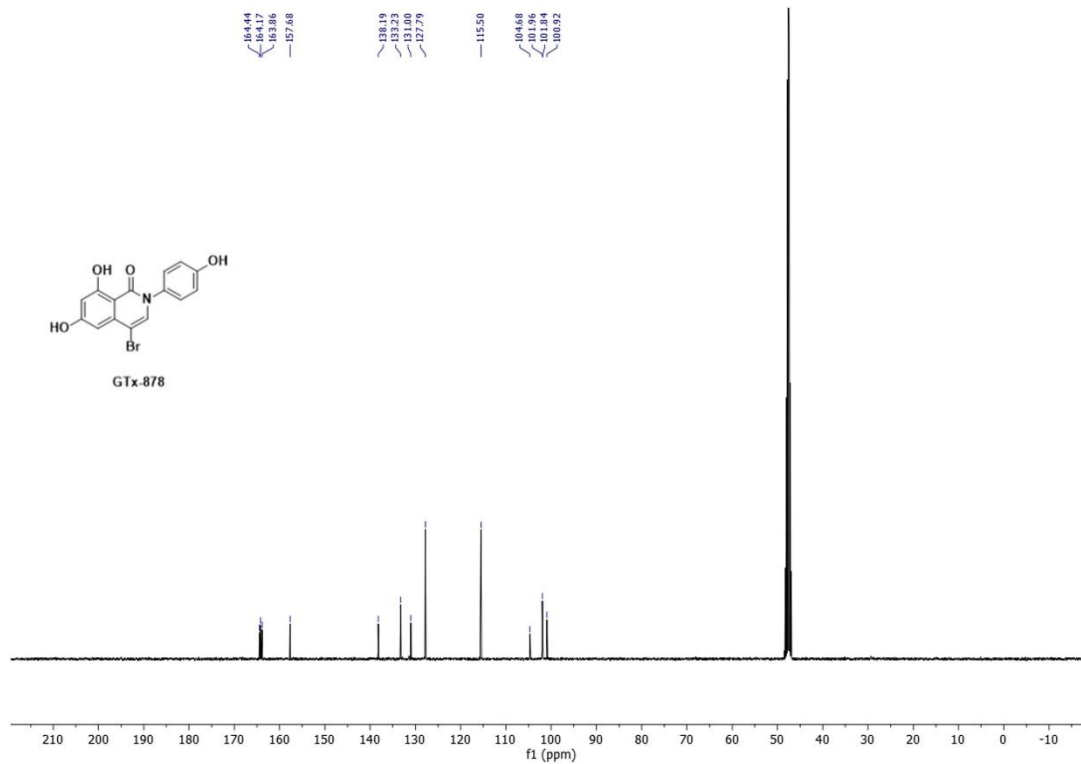


Figure S1.  $^1\text{H}$  NMR spectrum for GTX-878.



**Figure S2. <sup>1</sup>H NMR spectrum for VB-165.**



**Figure S3. <sup>13</sup>C NMR spectrum for GTX-878.**

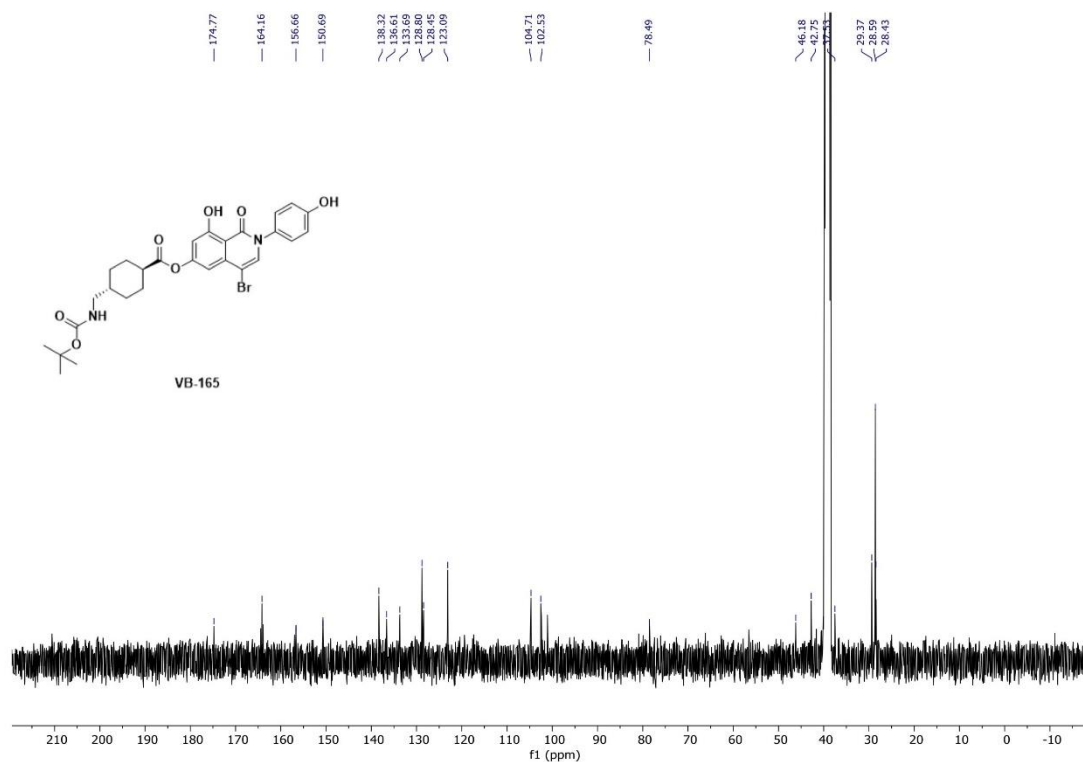


Figure S4. <sup>13</sup>C NMR spectrum for VB-165.

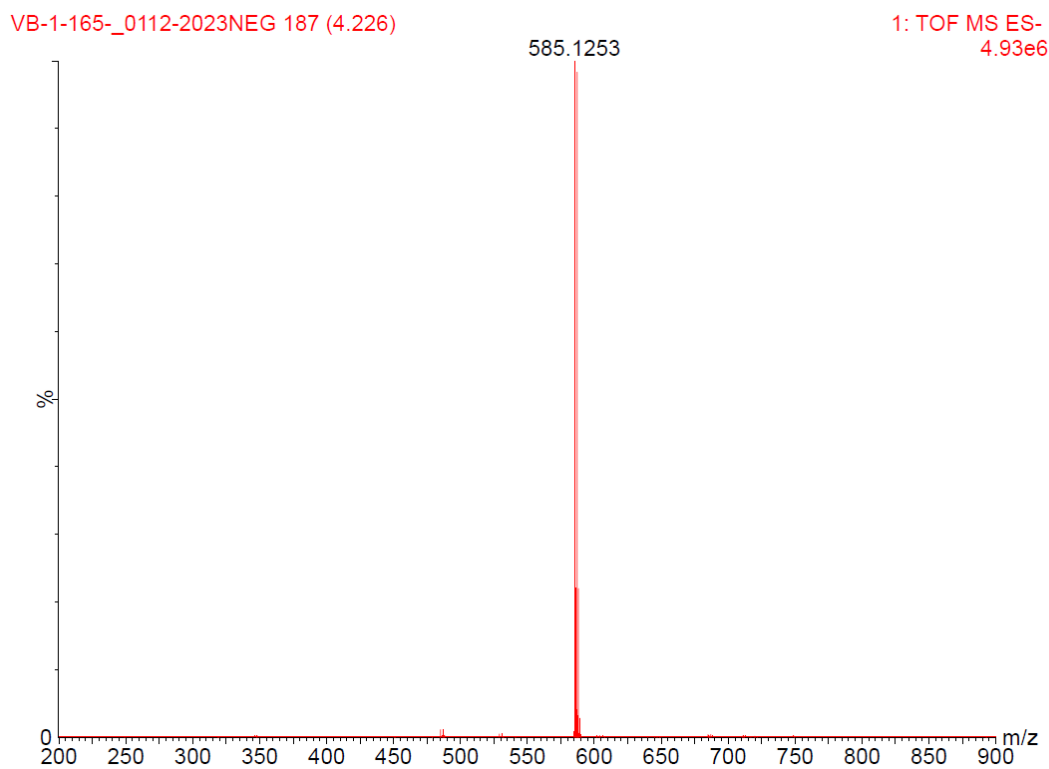


Figure S5. HRMS spectrum for VB-165.

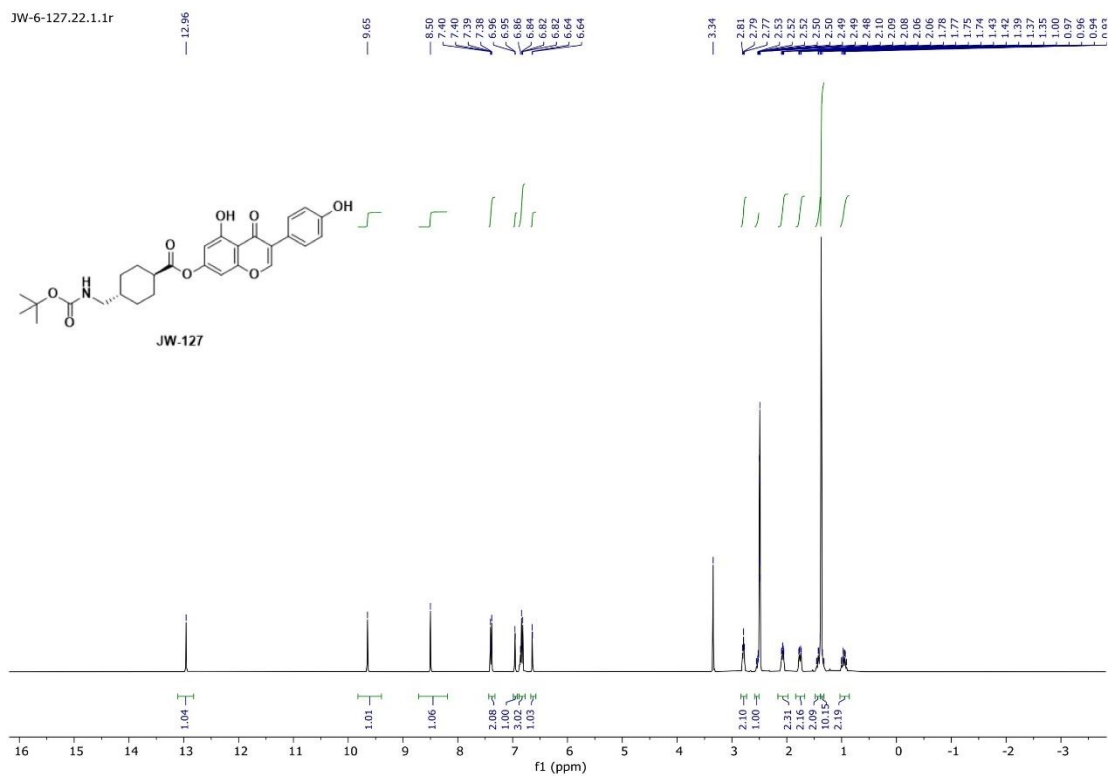


Figure S6.  $^1\text{H}$  NMR spectrum for JW-127.

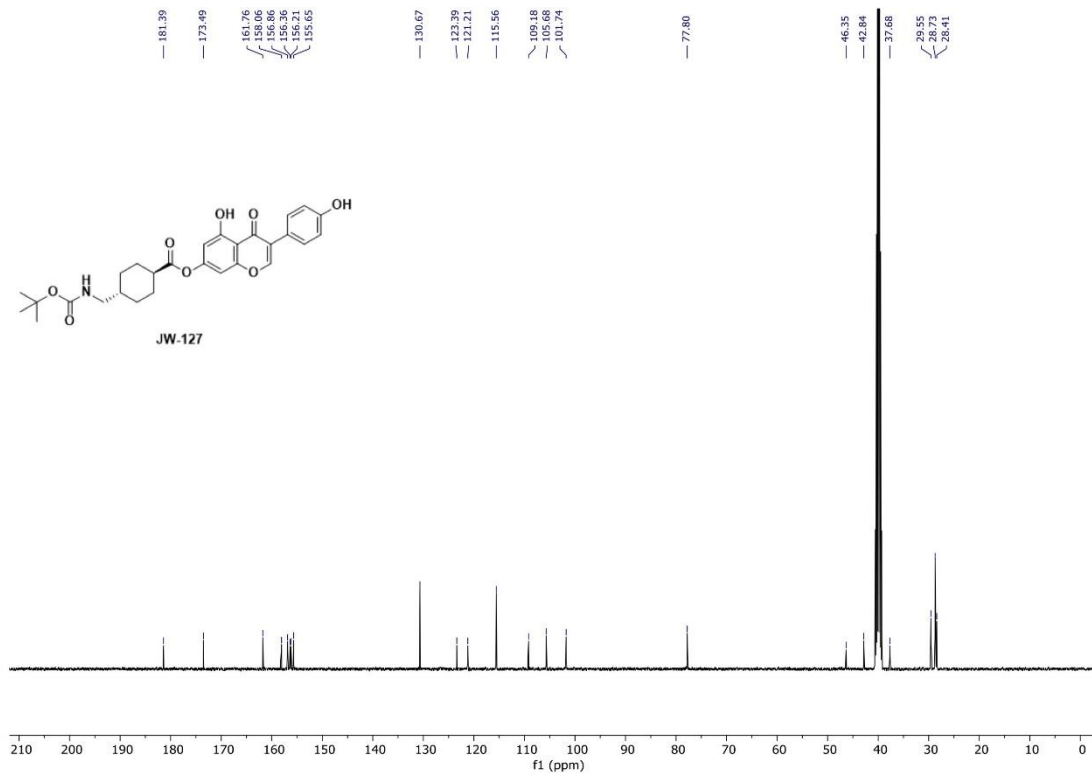


Figure S7.  $^{13}\text{C}$  NMR spectrum for JW-127.

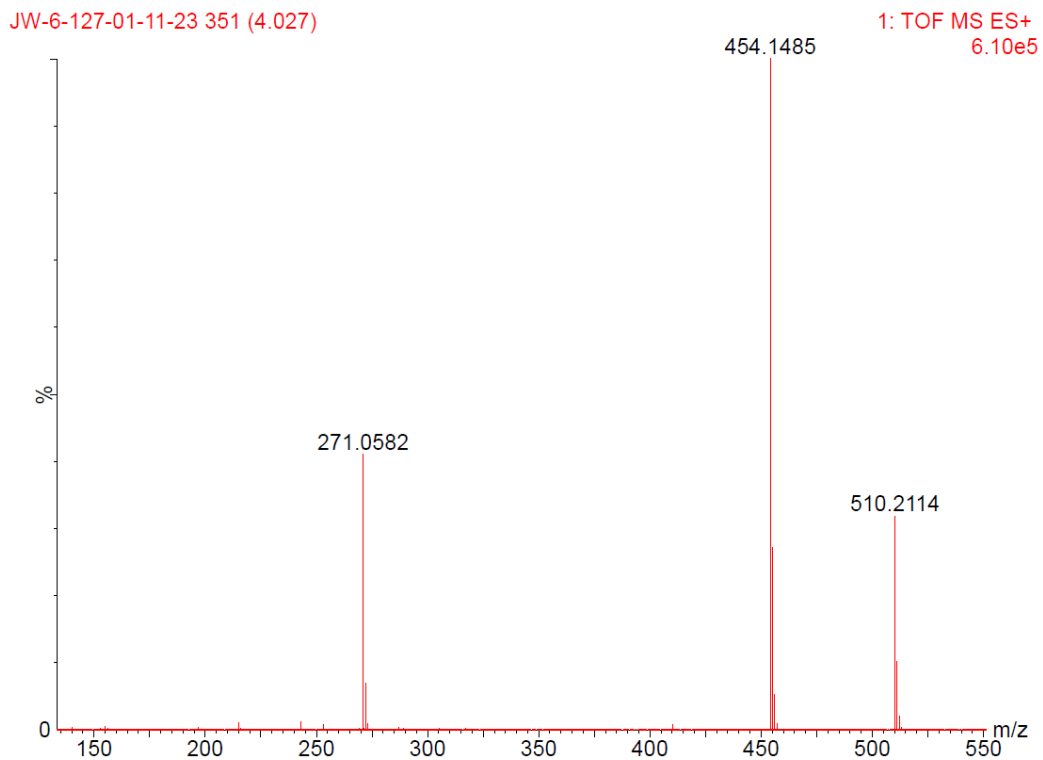


Figure S8. HRMS spectrum for JW-127.

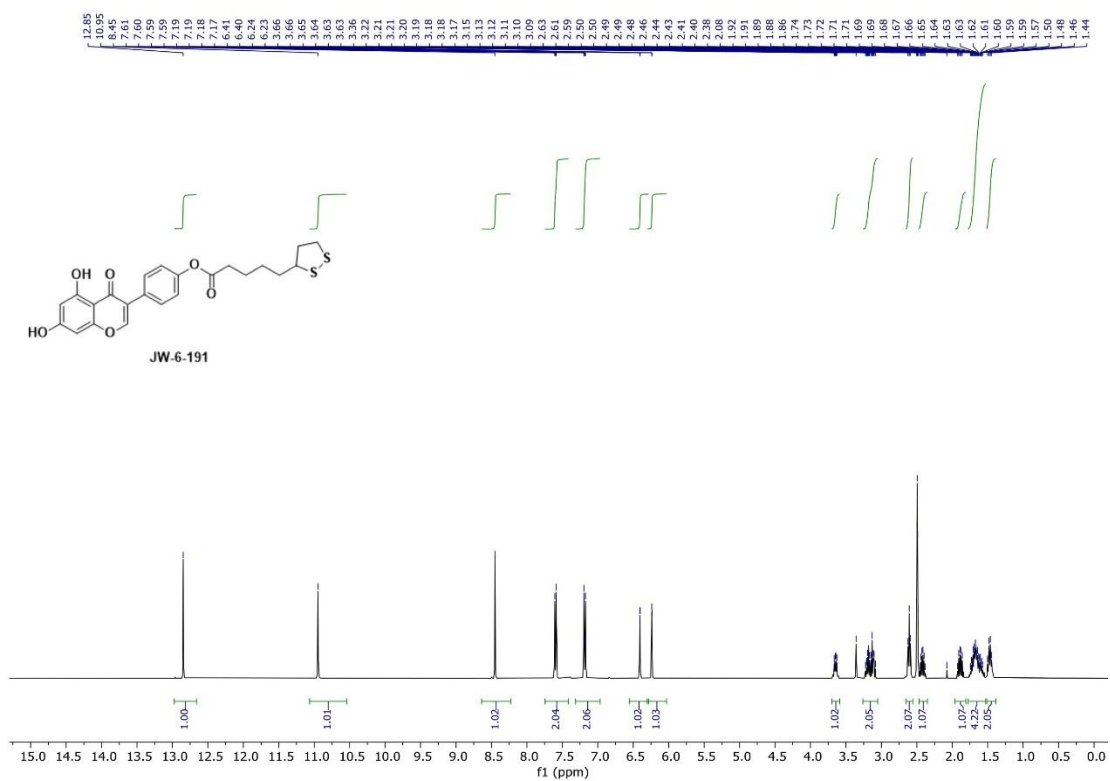


Figure S9.  $^1\text{H}$  NMR spectrum for JW-191.

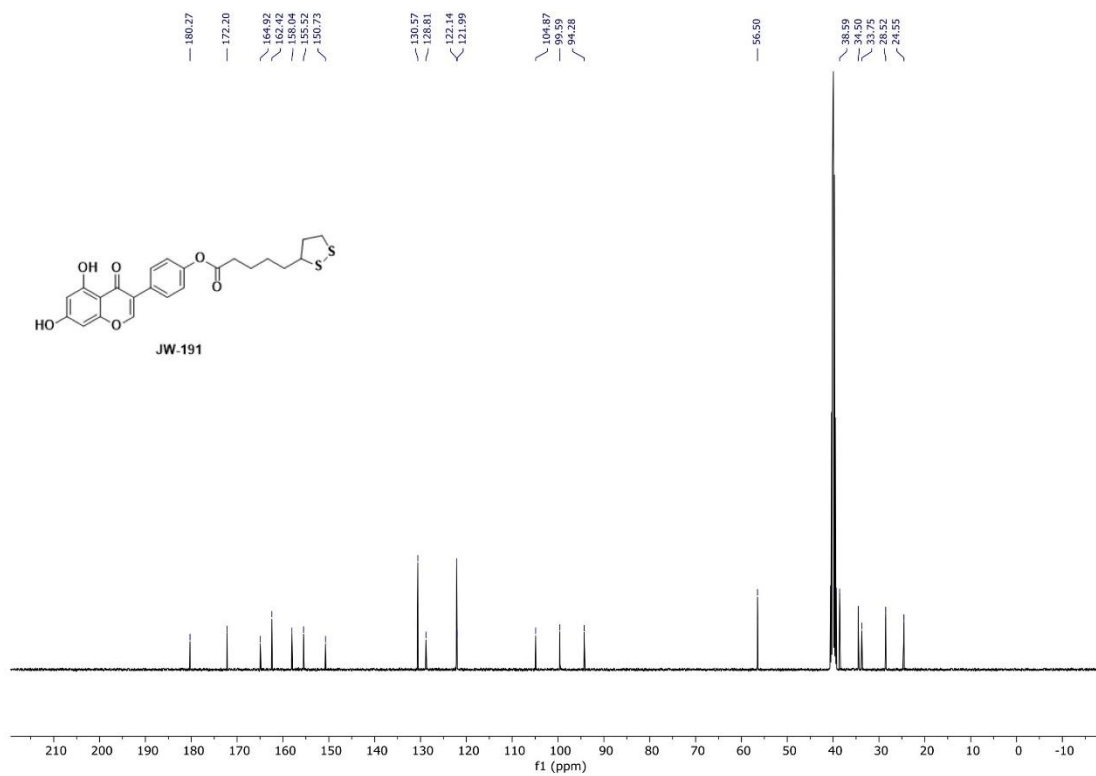


Figure S10. <sup>13</sup>C NMR spectrum for JW-191.



Figure S11. HRMS spectrum for JW-191.