atmosphere

Supplementary Materials: The Impact of Air or Nitrogen Non-Thermal Plasma on Variations of Natural Bioactive Compounds in Djulis (*Chenopodium formosanum* Koidz.) Seed and the Potential Effects for Human Health

Bing-Jyh Lu [1], Tzu-Che Lin [2,†], How-Ran Chao [3,4,5,6,*,‡], Cheng-Hsian Tsai [1,‡], Jian-He Lu [6], Ming-Hsien Tsai [7], Ching-Tzu Chang [4], Hao Hsieh [3], I-Cheng Lu [3], Rachelle D. Arcega [8], Wei-Hsiang Chang [8], Hsiu-Ling Chen [8], Wan Nurdiyana Wan Mansor [9,10] and Ying-Chieh Lee [11]

1. Materials and methods

1.1 The Phenolic Acids and Flavonoids in Djulis were Analyzed by HPLC/DAD

The profiles of the standards (phenolic acids: gallic acid, chorogenic acid, and 4-hydroxy-3-methoxycinnamic acid; flavonoids: epicatechin, quercetin, and rutin) (Figure S1).

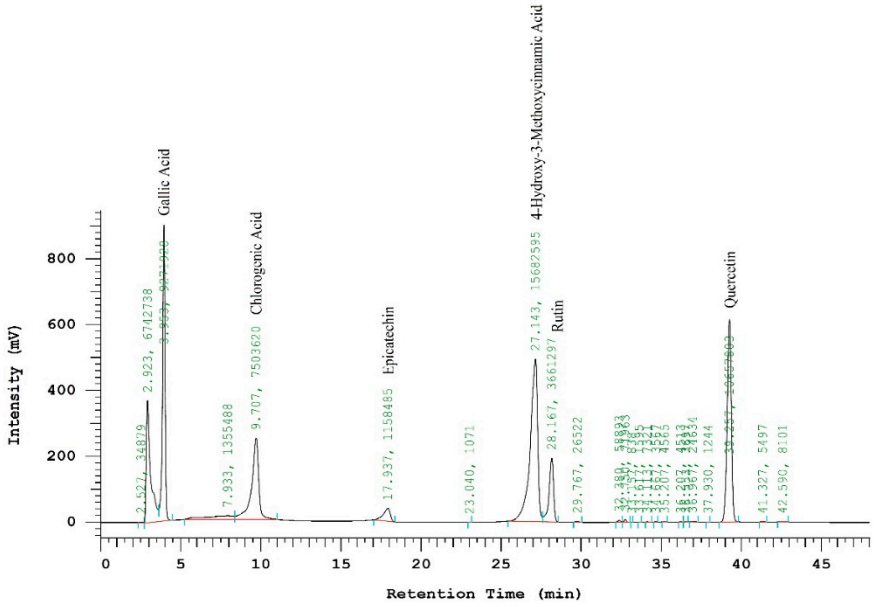

Figure S1. The standard of polyphenolic acids and flavonoids.

2. Results

2.1 FTIR spectra

The similar functional groups on the surface of the djulis seed after air-NTP treatment were found compared with those in the untreated control (Figure S2).

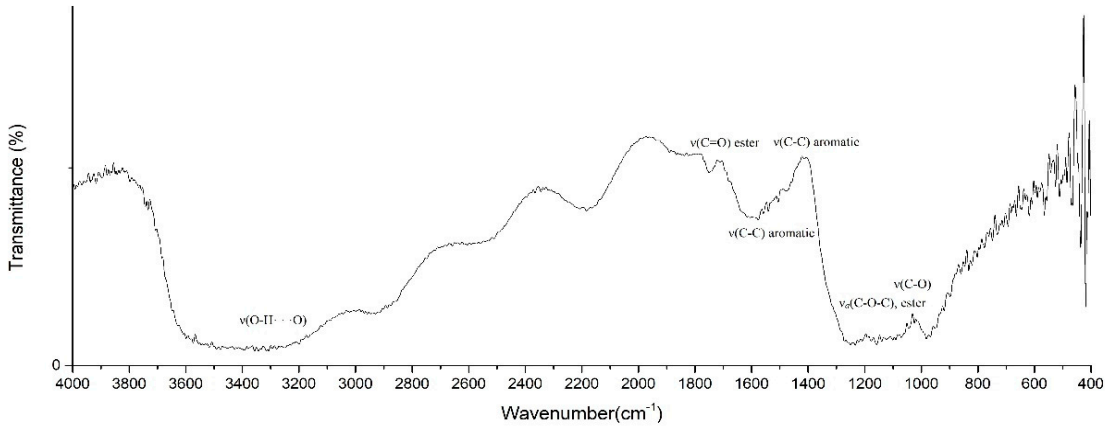

Figure S2. FTIR spectrum on the surface of the air-NTP-treated djulis seed at the condition of Method C (plasma nozzle: A50; Distance: 5 mm, Plasma gas: N_2, Power input: 0.8 kW, Sweep speed: 150 mm/s, Temperature: 46°C, Torch diameter: 42 mm, Treatment time: 0.68 sec).

2.2 SEM Micrographs

Surface morphological images of djulis seed before and after NTP treatment were examined using SEM (Figure S3). The SEM micrographs of the seed surface without the NTP treatment (control) were observed (Figure S3A.: SEM 50X and Figure S3B.: SEM 200X). The SEM micrographs showed that the surface of the untreated (Figure S3C.: control) or treated by air-NTP seed (power input: 800 W, distance: 10 mm, and sweep speed: 100 mm/s) using different plasma nozzles (A50/A30/A10), which are shown as SEM micrographs (Figure S2D: A50, Figure S2E.: A30, Figure S2F.: A10). The seed surface before NTP treatment presented as a compact, solid, rough, and naturally morphological structure. After treatment with air NTP, the seed surface changed due to surface etching generated by plasma and presented as an eroded structure with a smooth, soft surface.

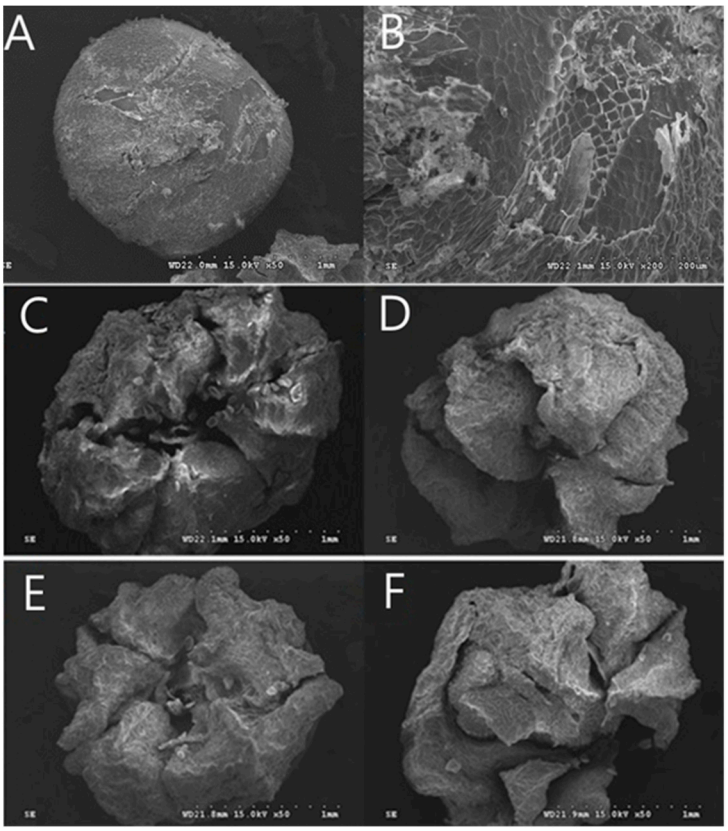

Figure S3. The surface of the djulis seed was analyzed using SEM. The surface of the djulis seed without the NTP treatment (control) was observed using SEM: (**A**) SEM 50X and (**B**) SEM 200X. The surface of the djulis seed treated by air-NTP (power input: 800 W, Distance: 10 mm, and sweep speed: 100 mm/s) with different plasma nozzles (A50/A30/A10) to be shown in SEM photographs: (**C**) control, (**D**) A50, (**E**) A30, and (**F**) A10.

The profiles of djulis extract were separated by HPLC/DAD shown in Figures S4–S6.

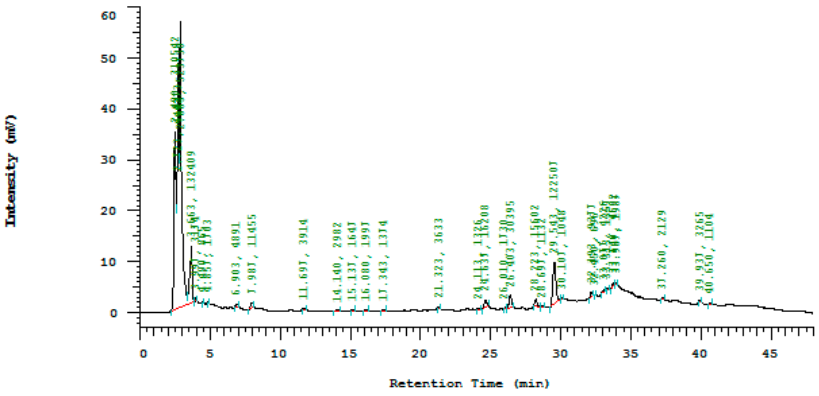

Figure S4. The distribution of djulis seed extract without NTP treatment.

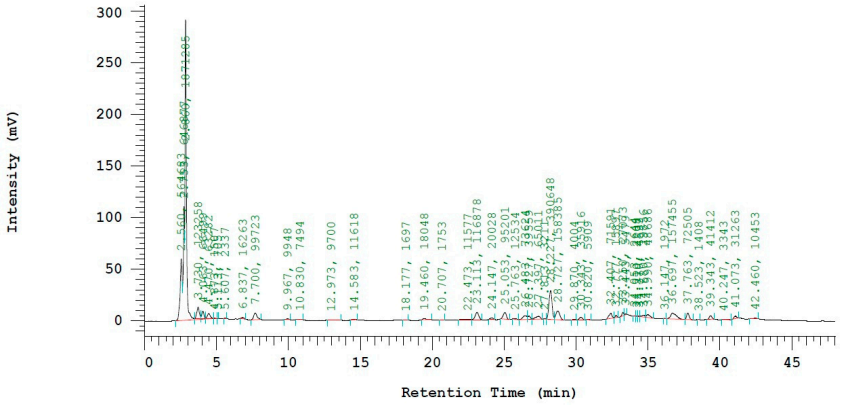

Figure S5. The distribution of djulis seed extract with air-NTP treatment (Method B).

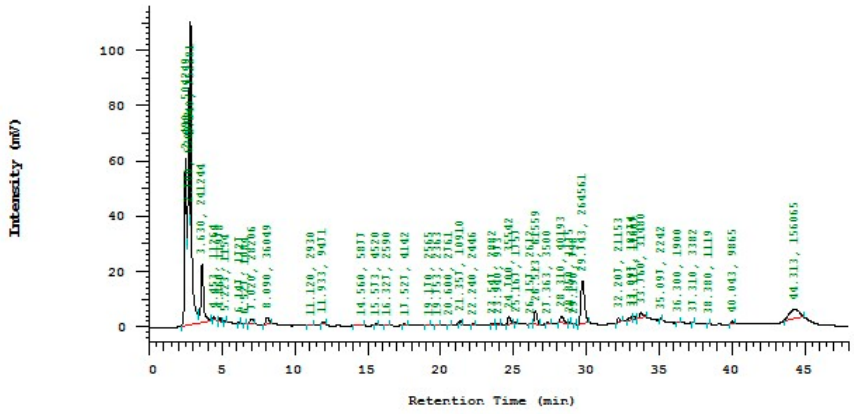

Figure S6. The distribution of djulis seed extract with N_2-NTP treatment (Method B).

Figures S7-S9 are:

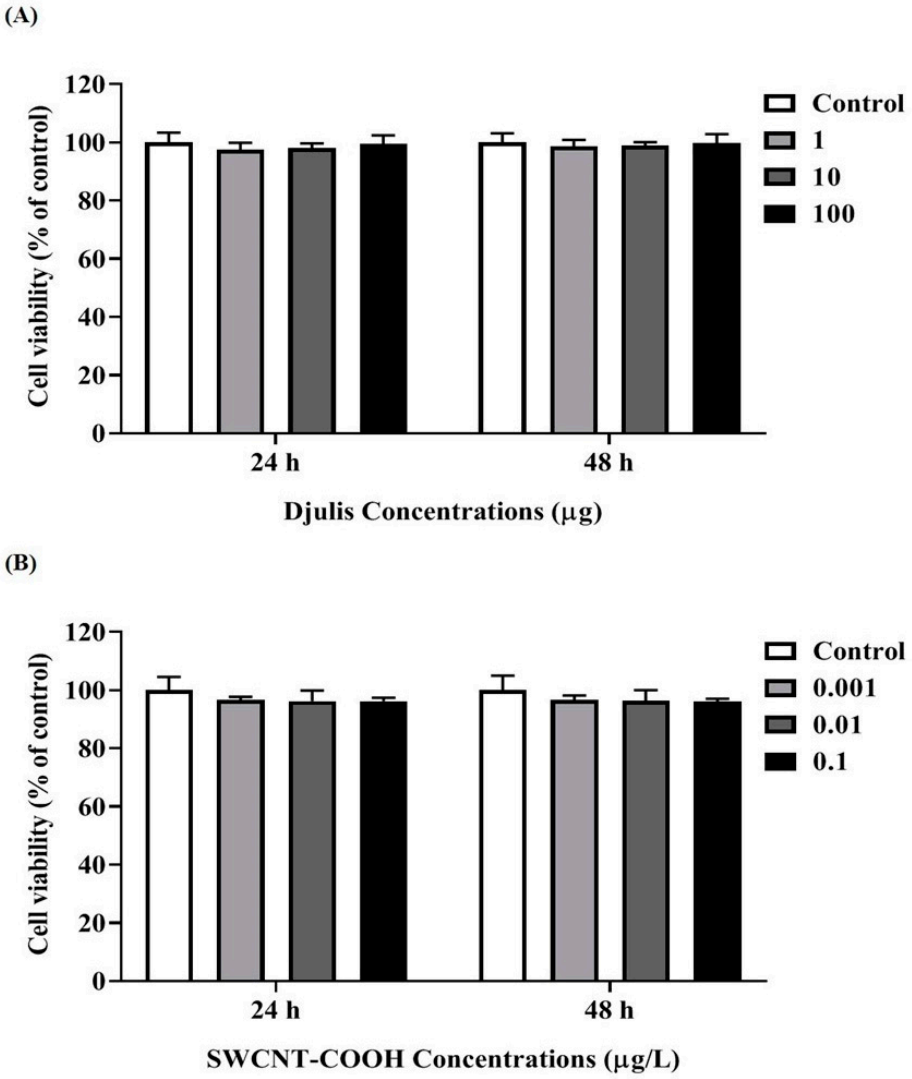

Figure S7. Effects of (**A**) Djulis seed extract and (**B**) SWCNT-COOH on THP-1 cells viability after 24 and 48-hour exposure.

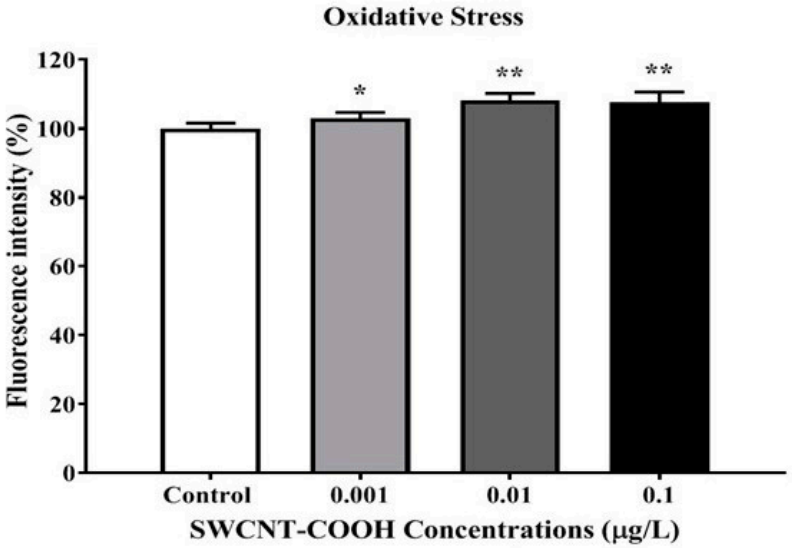

Figure S8. Effects of SWCNT-COOH on THP-1 cells ROS generation after 6-hours exposure.

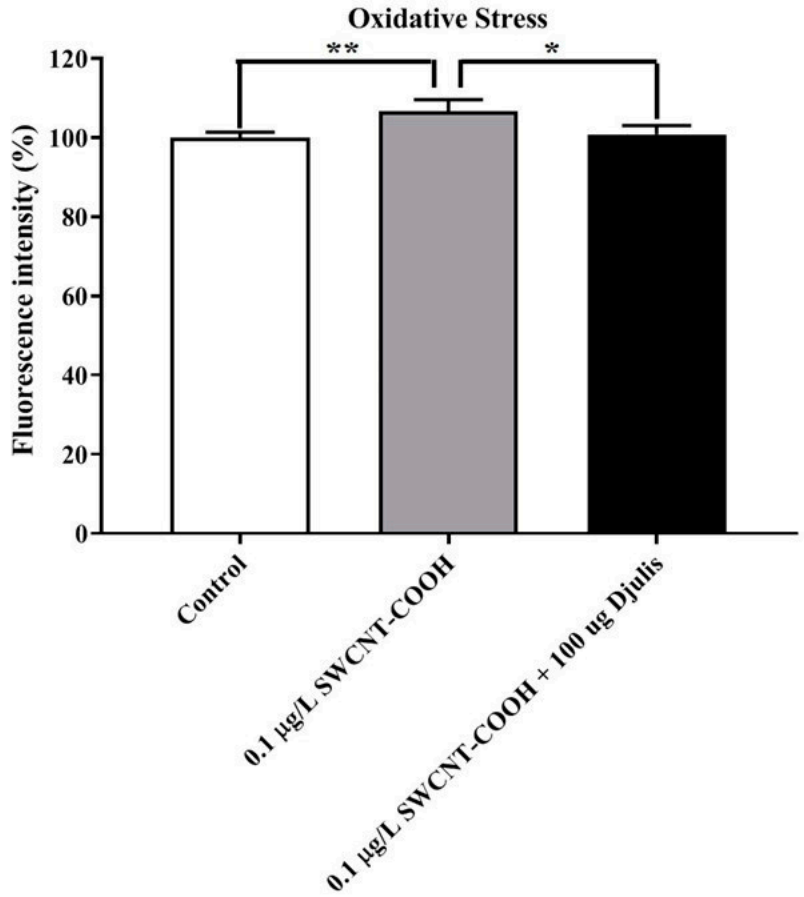

Figure S9. Effects of djulis seed extract pretreatment overnight on SWCNT-COOH-induced THP-1 cells ROS generation after 6-hours exposure.