**Table S2. Summary of recent studies (2020–2024) on the effects of other extracts against aging and age-related diseases**

| Effects | Extracts of *P. multiflorum* | Aging model (inducer; object) | Treatment (dose; duration) | Component analysis | Potential mechanisms | Author (year) | References |
|---|---|---|---|---|---|---|---|
| **Lifespan extension** | **Polysaccharide** | Paraquat; *C. elegans* | 2, 2.5, and 3.0 mg/mL; 48 h | UPLC-MS/MS | Oxidative stress↓ (NO↓, ROS↓, MDA↓, SOD↑, CAT↑, GSH-PX↑, lipofuscin↓) | Fan et al. (2024) | [69] |
| | **60% ethanol extract** | Paraquat, or Aβ transgenic *C. elegans* strain CL4176 | 50 μg/mL; 36 h, or 96 h | HPLC | Oxidative stress↓, age-related phenotypes↓, improving mitochondrial function (Insulin/IGF-1 pathway; MMP↑, ATP↑, ROS↓; lipofuscin↓; SIR-2.1↑, SKN-1↑; Aβ↓) | Sun et al. (2021) | [74] |
| **Neuroprotection** | **Emodin** | High-glucose; HT-22 cells | 100 μM; 48 h | Unclear (standard) | Apoptosis↓ (HAT↓, HDAC↓, Bax↓, Caspase-3↓, Bcl-2↑) | Chen et al. (2022) | [14] |
| | **75% ethanol extract** | D-gal; C57BL/6 mice | 0.3, 0.6, and 1 g/mL/kg; 60 days | None | Regulating methylation and transcription (SOD↑, GSH-Px↑, MDA↓, *Synpo*↑, *Mapkapk5*↑, *Tcf7*↑, *Rab15*↑) | Zou et al. (2020) | [70] |
| **Alleviating AD** | **Mito-TSGs** | AD model: APP695V717I transgenic mice | 0.4 mL/20 g/d; 4 weeks | Unclear | Oxidative stress↓, apoptosis↓, mitochondrial function↑, and improving behavioral performance ($H_2O_2$↓, NO↓, MDA↓, LD↓, LDH↑, SOD↑, CAT↑, GSH-Px↑. MMP↑, caspase-3↓, Bax↓, Bcl-2↑) | Qian et al. (2023) | [67] |
| **Alleviating DE** | **Aqueous extract, and Emodin** | ① DE model: Streptozotocin; SD rats. ② High glucose; HT-22 cells | ① 1 and 2 g/kg/d; 12 weeks. ② Emodin 100 μM; 48 h | UPLC/ TQD IVD | Apoptosis↓, cell proliferation↑, cognitive function↑ (HDAC4/JNK pathway; HAT↓, p-JNK↓, HDAC↓, HDAC4↓, JNK↓, Bax↓, Caspase-3↓, Bcl-2↑) | Xu et al. (2022) | [63] |
| **Relieving VaD** | **50% ethanol extract** | VaD model: 2-VO; SD rats | 2 g/kg/d; 4 weeks | LC–MS | Oxidative stress↓, ameliorating metabolism disordered (MDA↓, GSH↑) | Wu et al. (2022) | [73] |
| **Inhibiting AS** | **Emodin** | High-fat diet + LPS; $ApoE^{-/-}$ mice | 40, 20 and 10 mg/kg; 6 weeks | Unclear (standard) | Autophagy↓ (PI3K/ AKT/mTOR pathway; PI3K↓, AKT↓, mTOR↓, TC↓, TG↓, LDL-C↓, HDL-C↑) | Zhang et al. (2021) | [64] |
| **Estrogenic activity** | **80% methanol extract** | ER (+) MCF-7 cells | 100 nM; 24 h | HPLC | Inflammation↓, cell proliferation↑, acting as phytoestrogens (ER-α↑, ER-β↑, pS2↑, ROS↓, NO↓) | Akter et al. (2023) | [51] |

| Effects | Extracts of *P. multiflorum* | Aging model (inducer; object) | Treatment (dose; duration) | Component analysis | Potential mechanisms | Author (year) | References |
|---|---|---|---|---|---|---|---|
| | **Aqueous extract** | Infancy KM mice | 1 and 4 g/kg/d; 5 days | None | Uterus growth↑ ($E_2$↑, ER-α↑, ER-β↑) | Zhu et al. (2020) | [76] |
| **Retarding liver aging** | **Aqueous extract** | D-gal; ICR mice | 2 g/kg/d, 12 weeks | None | Oxidative stress↓, learning and memory↑, body weight↑, organ index↑, improving liver and kidney function (SOD↑, GSH-Px↑, MDA↓) | Ren et al. (2024) | [75] |
| **Reducing OP** | **Polydatin** | OP model: Dex; MC3T3-E1 cells | 20, 40, and 80 μM; unclear | Unclear | Bone turnover markers↑, mineralization damage↓ (MAPK pathway; p-JNK↓, p-P38↓, p-ERK↓) | Lin et al. (2021) | [68] |
| | **75% ethanol extract** | GIOP model: Prednisone; SD rats | 400 and 200 mg/kg/d; 21 weeks | HPLC | Apoptosis↓, autophagy↑, bone formation↑ (OCN↑, OPG↑, RANKL↑, TRACP-5b↓, CTX-I↓, LC3↑, Agt5↑, Beclin 1↑) | Liu et al. (2024) | [72] |
| **Promoting hair darkening** | **Emodin** | B16F1 cells | 0.125-2 μM; 8 h | Unclear | Melanogenesis↑ (ERK pathway, MITF pathway; tyrosinase↑, TYR↑, TRP-1↑, TRP-2↑, MITF↑, SIRT1↑, ERK↓, FOXO1↓) | Kim et al. (2022) | [65] |
| **Promoting hair growth** | **Physcion** | Testosterone + depilated with wax/resin mixtures ; SD rats, C57BL/6 mice | 5, 2 mg/d; at least 8 days | Purity > 98% | Improving hair follicle morphology, and increasing hair follicle count (5α-reductase↓) | Lao et al. (2022) | [66] |
| | **Aqueous extract** | Androgenetic alopecia model: Testosterone propionate; C57BL/6J mice | 0.78, 1.56 and 3.12 g/kg/d; 60 days | None | New hair growth↑, melanin follicles↑ (Wnt/β-catenin pathway; β-catenin↑, p-GSK-3β↑, GSK-3β↓, T↓, DHT↓) | Pan et al. (2024) | [77] |
| **Delaying skin aging** | **Aqueous extract** | D-gal; mice (unclear) | 40 g/kg/d; 10 weeks | Unclear | Oxidative damage↓, apoptosis↓, mitochondrial autophagy↑, fibrous tissue↑ (PINK1↑, Parkin↑, LC3Ⅰ/Ⅱ↑, p62↓; MMP↑, ATP↑, ROS↓; Cleaved- cas3↓, Bax↓, Cyt-c↓, AIF↓, Smac↓, Bcl-2↑; type I/type III collagen↑) | Liu et al. (2021) | [78] |