Supplementary Information

Ganoderic acid A promotes amyloid-β clearance (*in vitro*) and ameliorates cognitive deficiency in Alzheimer's disease (mouse model) through autophagy induced by activating Axl

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Running title: Ganoderic acid A activates autophagy to ameliorate cognitive deficiency

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Table S1. The gradient elution used for liquid chromatography.

Time (min)	Flow (mL/min)	%A	%B
Initial	0.2	90	10
10	0.2	70	30
15	0.2	60	40
20	0.2	20	80
25	0.2	5	95
28	0.2	5	95
30	0.2	90	10
35	0.2	90	10

Table S2. The primer sequences used for qRT-PCR.

Gene		Sequence (5’ to 3’)
Atg5	F	AAGTCTGTCCTTCCGCAGTC
	R	TGAAGAAAGTTATCTGGGTAGCTCA
Becn1	F	AGGATGGTGTCTCTCGAAGATT
	R	GATCAGAGTGAAGCTATTAGCACTTTC
Mapllc3b	F	CCCCACCAAGATCCCAGT
	R	CGCTCATGTTCACGTGGT
Gapdh	F	ATGGTGAAGGTCGGTGTGAA
	R	GGTCGTTGATGGCAACAATCTC

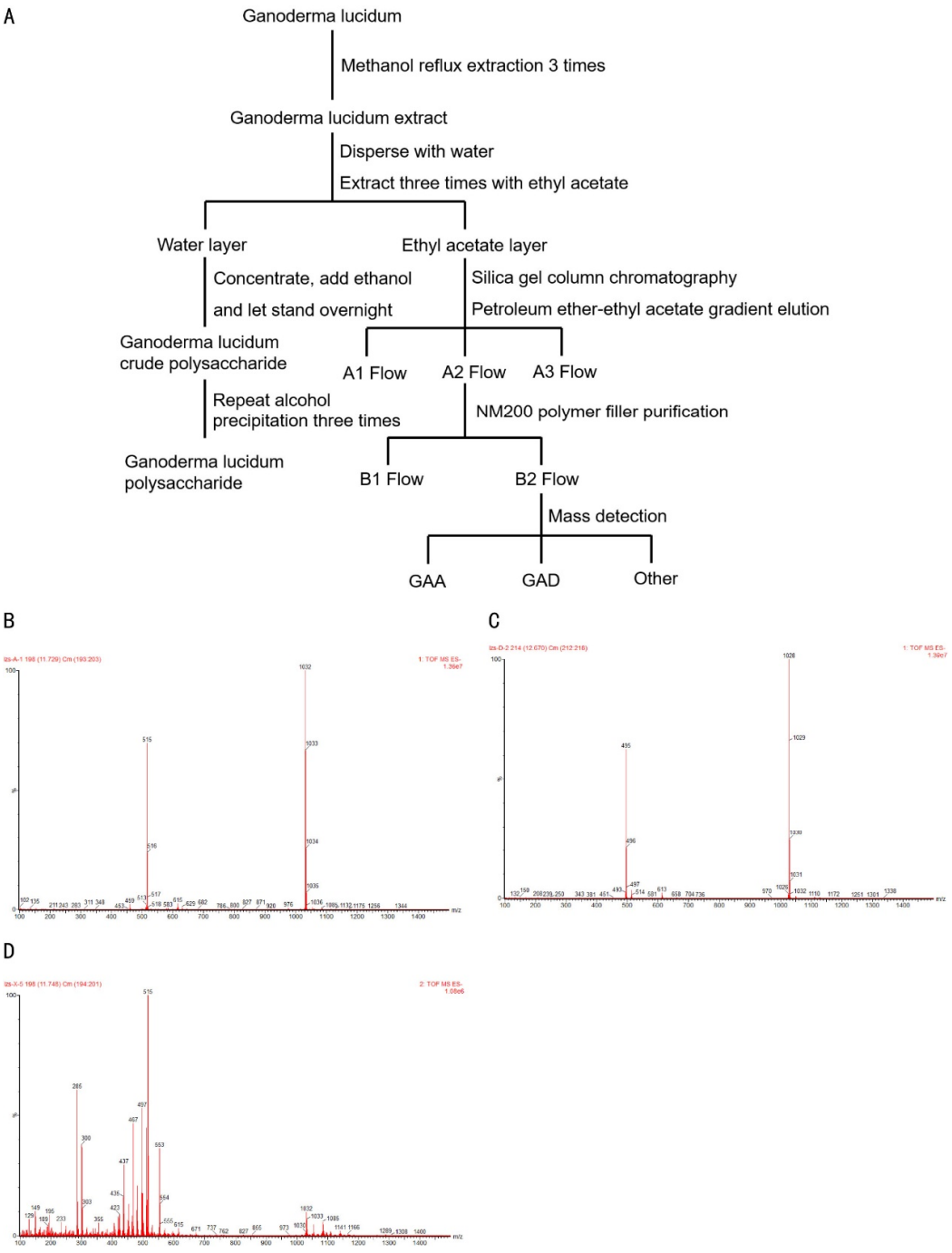

Figure S1. Extraction of triterpene acids and polysaccharides from *Ganoderma lucidum* and MS analysis of the triterpene acids. **(A)** Flow chart of Ganoderma extraction. **(B-D)** GAA, GAD and other ingredients detected by MS.

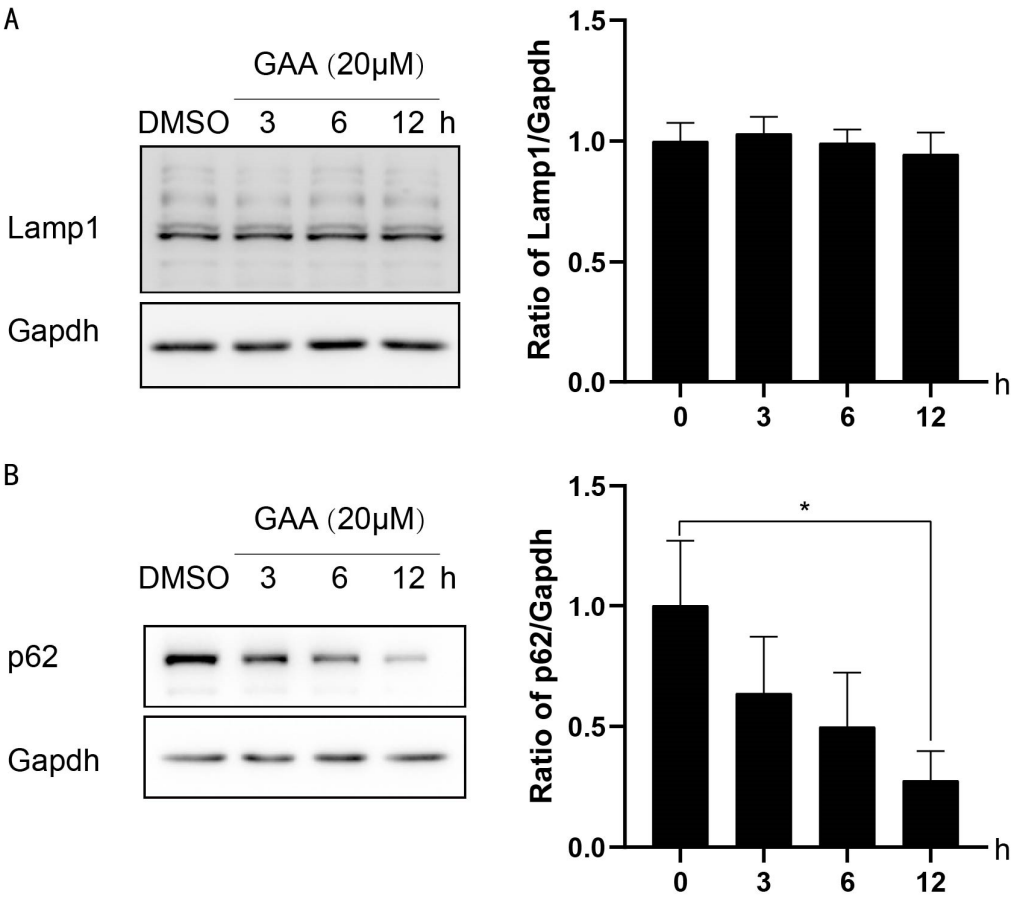

Figure S2. LAMP1 and p62 level in GAA-treated microglial cells. **(A)** LAMP1 level (N =3) and **(B)** p62 level (12 h vs 0 h: p = 0.0138; N = 3) in GAA-treated microglial cells detected by western blot. N is the number of replicates (biological and technical) used for each of the described results. *p < 0.05 vs. indicated control.

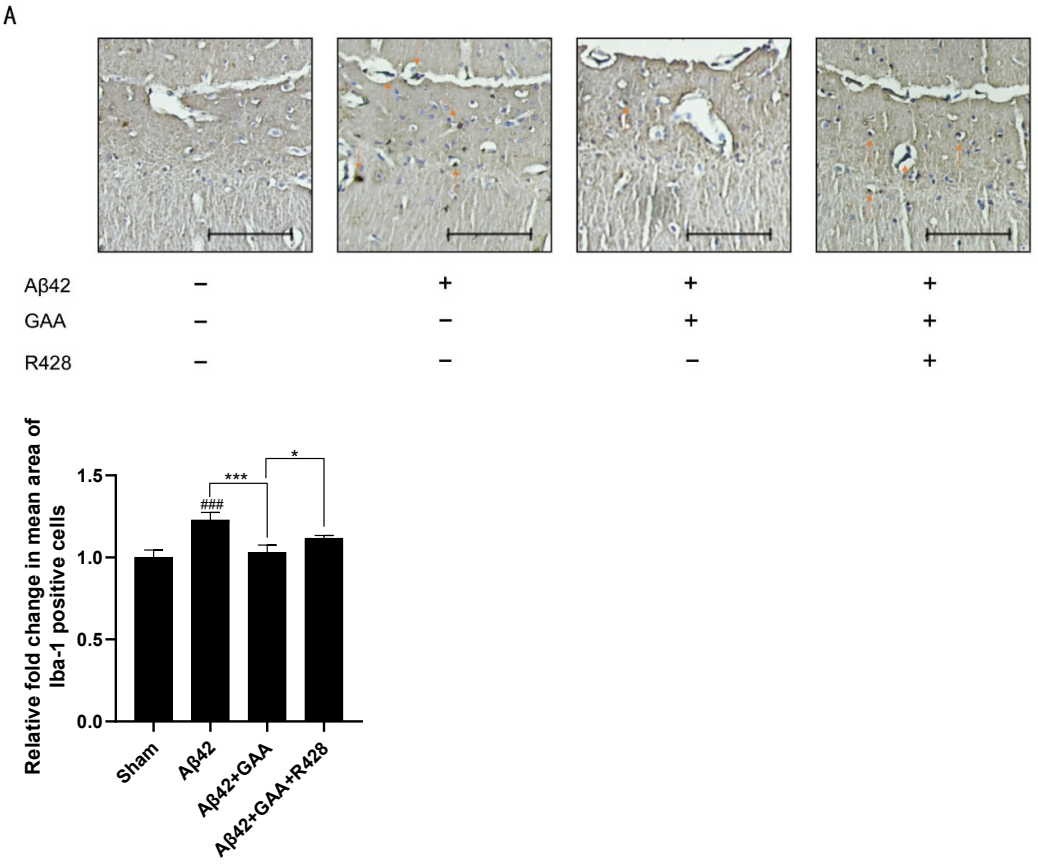

Figure S3. GAA relieves over-activation of microglia in the hippocampus. **(A)** Iba-1 level in the hippocampus detected by IHC assessment. Images were obtained under a microscope (Scale bar: 100 μm). Aβ42 vs Sham: p = 0.0004; Aβ42 + GAA vs Aβ42: p = 0.0009; Aβ42 + GAA + R428 vs Aβ42 + GAA: p = 0.0118; N = 4. N is the number of replicates (biological and technical) used for each of the described results. ###p < 0.001 vs. Sham group. * p < 0.05, **p < 0.01, ***p < 0.001, ****p < 0.0001 vs. Aβ42 group.