1. Extraction and purification of polysaccharide (AAP) from *A. auricular*

Grown in Liaoning Province, China, *A. auricular* was selected from a Carrefour supermarket (Shenyang, China). The fruit bodies of mushrooms were collected, cleaned, dried at 40℃, crushed into fine powder with a mixer and sieved. The resulting powder was extracted by deionized (DI) water (1:40, w/v) at 85℃ in a water bath. After constant stirring for 3h, impurities were removed by filtering through several medical gauzes, and the residues were further extracted twice via the same method. The pH value of the combined liquid extracts was adjusted to 8.0 with ammonia and concentrated in a rotary evaporator at 50℃. Polysaccharides were precipitated with 95% ethanol and incubated at 4℃ overnight. The precipitate was washed with anhydrous ethanol and dried by vacuum drying at 60℃. Afterwards, the polysaccharides were purified by the adsorption-desorption process on macroporous resins, which is an efficient and inexpensive method to eliminate non-polar impurities and pigments from polysaccharides. AB-8 macroporous resins were employed to purify the polysaccharides. The resin was immersed in ethanol thoroughly and subsequently washed by deionized water. After the treatment of resin, the decolourate sample was deproteinized by the Sevag method (chloroform: n-butanol=4:1). The Sevag reagents, salts and other unwanted impurities were removed by a dialysis membrane with molecular weight (MW) < 8000 against excessive deionized water for one week. Ultimately, the dialysates was concentrated and lyophilized and the purified AAP was obtained.

2. Preparation of AAP hydrogel

AAP hydrogel was cross-linked by epichlorohydrin (ECH) in basic environment. AAP was dissolved in 2.5mol/L sodium hydroxide solution, stirred vigorously at room temperature for 2 h to obtain transparent solution and ECH was added to the solution. After stirring, the crosslinking reaction continued at 50℃ for another 3 h. Subsequently, the hydrogel was taken out carefully, divided into an appropriate size and soaked in deionized water for 4 days to remove salt, alkali and residual crosslinking agent. The final hydrogels was washed by deionized water and lyophilized for further study.

3. Swelling studies of AAP hydrogel

AAP hydrogel was cut into smaller gels (cubic shape-edges of about 1.5 cm) for this measurement and dried at room temperature. In order to investigate the effects of temperature on AAP hydrogel, the dry gels were weighed and then soaked in solutions of phosphate buffer (pH 7.4) at different crosslinking temperatures (25℃, 37℃, 45℃). At predetermined time points, the immersed gels were taken out of the solutions, wiped off the excess water on their surfaces with filter papers, weighed and returned to the container until the swelling equilibrium reached. The SR was determined by the formula as follow:

$$SR = \frac{W_s - W_d}{W_d} \quad (1)$$

where *Ws* represents the weight of the gel in the equilibrium-swollen state and *Wd* represents the weight of corresponding dry gel.

Besides, to study the effects of pH on AAP hydrogel, gels were immersed in solutions of 0.1mol/L HCl (pH 1.2), phosphate buffer (pH 7.4) and 0.1mol/L NaOH (pH 12.5) at 37℃, respectively. And their swelling ratios (SR) were calculated by the equation (1).

4. Release profiles of BSA from AAP hydrogel

The drug was loaded into the hydrogel via a swelling method. AAP hydrogel was immersed in 10wt% BSA solution for 72 h to reach the swelling equilibrium. After reaching the equilibrium, the hydrogel was taken out, dried and reweighed. In order to determine the release profile of the drug, the BSA-loaded hydrogels were soaked in 100ml different solutions: pH 1.2 HCl (simulated gastric fluid), pH 7.4 phosphate buffer (simulated intestinal fluid), respectively. Solutions were both shaken at 37℃ in a rotary water bath shaker at 100 rpm. At regular intervals, the 0.5ml solution was removed and replaced with fresh medium which had been pre-equilibrated at 37℃ to maintain the total volume constant. The percentage of cumulative amount of released BSA (wt %) was calculated as follow:

$$wt\% = \frac{M_t}{M_\infty} \tag{2}$$

where *Mt* is the amount of BSA released from the hydrogel in the solution at time *t* and $M\infty$ is the amount preloaded into hydrogel. All of the trials were performed three times.

5. Figure S1

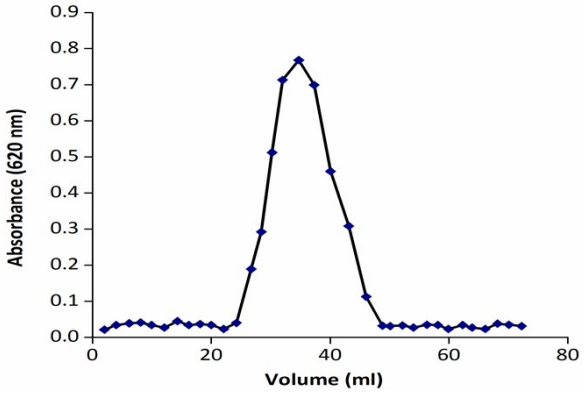

Fig. S1 Chromatogram of AAP by Sephadex-G100 gel chromatography. The AAP sample was resolved with 0.1mol/L NaCl solution, and eluted by 0.1mol/L NaCl solution at a flow rate of 0.2 mL/min.

6. Figure S2

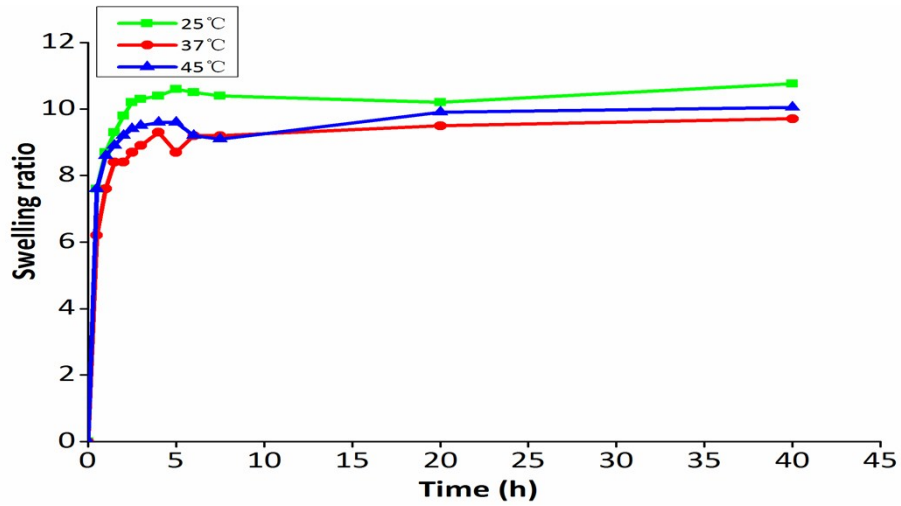

Fig. S2 Swelling profiles of AAP hydrogel at pH7.4 at different temperatures.