**Fig. S1.** Schematic overview of BLG sensitization and challenge protocol. Three-week-old, female BLAB/c mice were divided into 3 groups (n= 8/group). CON: PBS, control mice; BLG: BLG (1 mg/g BW) + cholera toxin (CT, 10 µg/mouse); L9: BLG + mice supplemented with L9 (2 ×10^9 CFU in 200 µl of PBS) for 5 weeks. 1 hour after the final oral BLG challenged, mice were killed and samples were collected. L9, *Lactobacillus paracasei* L9; BLG, β-lactoglobulin.

**Fig. S2.** Hypersensitivity symptoms were scored within 1 hour after last challenge with BLG. Each point represents an individual mouse. Symptoms were evaluated by two independent researchers who were blinded to the study treatments. The scores were as follows: 0 = no symptom; 1 = scratching and rubbing around the nose and head; 2 = puffiness around the eyes and mouth and pilar erecti; 3 = reduced activity with increased respiratory rate; 4 = wheezing, labored respiration and shivering; 5 = death. The Mann–Whitney U-test was used to determine statistical significance. The values with different superscript letters are significantly different (p < 0.05). CON: PBS, control mice; BLG: BLG + CT; L9: BLG mice supplemented with L9. L9, *Lactobacillus paracasei* L9; BLG, β-lactoglobulin; CT, cholera toxin.
**SI Materials and Methods**

Total RNA from BM-DCs was isolated using TRIzol reagent (Life Technologies, Carlsbad, CA, USA) and reverse transcription was performed with the cDNA Synthesis Kit (Takara, Kyoto, Japan) according to the manufacturer’s instructions. Real-time PCR reactions were carried out with LightCycler FastStart DNA Master PLUSS SYBR Green 1 kit (Roche Diagnostics, Indianapolis, IN, USA). Respective primers were for RALDH2, (forward) 5'- CCG CCA TTT AGG GAT TCC ATA G-3' and (reverse) 5'-AGG TGG ATA TAG ACA AGG CAG T-3', for IDO (forward) 5'-TGG CGT ATG TGT GGA ACC G-3' and (reverse) 5'-CTG CAT AAG ACA GAA TAG GAG GC-3', for GAPDH (forward) 5'-GTG TTC CTA CCC CCA ATG TGT-3' and (reverse) 5'-ATT GTC ATA CCA GGA AAT GAG CTT-3'. The cycling parameters were initiated by 5 min at 95°C, followed by 95°C for 30 sec, 60°C for 30 sec, and 72°C for 30 sec using the Roche LightCycler Instrument 1.5. The fold expression or repression of the target gene relative to the internal control gene (GAPDH) in each sample was calculated by ∆CT method [1].

**References**