Mode of Bioenergetic Metabolism during B Cell Differentiation in the Intestine Determines the Distinct Requirement for Vitamin B₁

Jun Kunisawa, Yuki Sugiura, Taichi Wake, Takahiro Nagatake, Hidehiko Suzuki, Risa Nagasawa, Shiori Shikata, Kurara Honda, Eri Hashimoto, Yuji Suzuki, Mitsutoshi Setou, Makoto Suematsu, and Hiroshi Kiyono
Figure S1, related to Figure 1. Metabolites generated in naïve B cells, and short- or long-lived PCs in the spleen.

B220⁺ IgM⁺ naïve B cells, CD93⁺ CD138⁺ short-lived PCs, and CD93⁻ CD138⁺ long-lived PCs were purified from the spleen for the CE–MS quantification of citrate and malate. Data are given as means ± 1 SD (n = 3).
Figure S2, related to Figure 2. Lactate production in the intestine. (A) Non-labeled lactate distribution was visualized by MALDI-IMS of intestinal tissue. (B) Flux analysis using $^{13}$C$_6$-glucose in in vitro differentiated IgA$^+$ cells was performed to measure the amounts of lactate, glutamate, and malate. The data are representative of 3 independent experiments and bar indicates 300 μm (A) and are given as means ± 1 SD (n = 3) (B).
Figure S3, related to Figure 4. Effects of vitamin B1 depletion on the cell populations in the Peyer’s patches and bone marrow. Mice were maintained on vitamin B$_1$ (+) or vitamin B$_1$ (−) diet for 21 days. Mononuclear cells were isolated from the Peyer’s patches (A) or bone marrow (B) for the flow cytometric analyses. The results shown are representative of 3 separate experiments.
Figure S4, related to Figure 4. Reversible reduction of lymphoid tissue size in vitamin B$_1$(-) mice.
Mice were maintained on vitamin (Vit) B$_1$(+) or Vit B$_1$(-) diet for 21 days. In one group, Vit B$_1$(+) diet was replaced on day 21 and maintained for an additional 14 days. Macroscopic analysis of spleen, Peyer’s patches, mesenteric lymph nodes (LN) was performed. Scale bars indicate 1 cm (spleen and mesenteric LN) and 300 μm (Peyer’s patch), and the data are representative of 3 independent experiments.
Figure S5 related to Figure 4. Effect of vitamin B₁ deficiency on the kinetics of IgA⁺ PCs in the intestine.
Mice were maintained on vitamin B₁(+)(open) or vitamin B₁(−)(closed) diet for 22 days. On day 22, mice were intraperitoneally administered with BrdU. One and three days after the injection, small intestines were collected for the enumeration of frequency of BrdU⁺ cells in IgA⁺ B220⁻ PCs. The data are given as means ± 1 SD (n = 4 or 5 from 2 separate experiments).
Figure S6, related to Figure 6. Impaired systemic IgG responses in the vitamin B(-) mice.

Mice were maintained on vitamin B$_1$(+) (open) or Vitamin B$_1$(-) (closed) diet for 21 days and then intraperitoneally immunized with OVA plus alum. Eight days after the immunization, serum was collected for the enumeration of OVA-specific IgG responses by ELISA. The data are given as means ± 1 SD ($n = 6$ from 2 separate experiments). * P<0.01.