AMPK is a highly evolutionarily conserved energy sensor. By evolutionarily conserved is meant that essentially all living organisms, including of course humans, have it. Increased AMPK activation is associated with longer lifespan and better health; AMPK causes a signaling cascade that promotes fat oxidation, increases cellular stress defenses and autophagy, and decreases inflammation.

Some scientists go so far as to say that it controls aging: AMP-activated protein kinase (AMPK) controls the aging process via an integrated signaling network.

Efficient control of energy metabolic homeostasis, enhanced stress resistance, and qualified cellular housekeeping are the hallmarks of improved healthspan and extended lifespan. AMPK signaling is involved in the regulation of all these characteristics via an integrated signaling network. Many studies with lower organisms have revealed that increased AMPK activity can extend the lifespan. Experiments in mammals have demonstrated that AMPK controls autophagy through mTOR and ULK1 signaling which augment the quality of cellular housekeeping. Moreover, AMPK-induced stimulation of FoxO/DAF-16, Nrf2/SKN-1, and SIRT1 signaling pathways improves cellular stress resistance. Furthermore, inhibition of NF-κB signaling by AMPK suppresses inflammatory responses. Emerging studies indicate that the responsiveness of AMPK signaling clearly declines with aging. The loss of sensitivity of AMPK activation to cellular stress impairs metabolic regulation, increases oxidative stress and reduces autophagic clearance. These age-related changes activate innate immunity defence, triggering a low-grade inflammation and metabolic disorders. We will review in detail the signaling pathways of this integrated network through which AMPK controls energy metabolism, autophagic degradation and stress resistance and ultimately the aging process.

The image below shows what can activate AMPK and in turn the effects of activation and inactivation of AMPK.
So, it looks like activation of AMPK is crucial for health and long life. The question is, how do you activate it? Following are a number of ways.

**Curcumin:** In a head-to-head comparison with metformin, the most widely prescribed anti-diabetes drug and an AMPK activator, “curcuminoids increased the phosphorylation of AMP-activated protein kinase (AMPK) and its downstream target acetyl-CoA carboxylase (ACC) in H4IIE and Hep3B cells with 400 times (curcumin) to 100,000 times (THC) the potency of metformin.”

**Aspirin:** Aspirin is a known life-extender, and it is no coincidence that it activates AMPK. “At concentrations corresponding to plasma concentrations in humans treated with high doses of aspirin or salsalate, salicylate activated wild-type AMPK… There have been numerous observational studies suggesting that metabolic parameters improved in diabetic patients who were taking salicylate-based drugs.”

**Fasting and exercise:** “…AMPK acts as the primordial trigger for fasting- and exercise-induced adaptations in skeletal muscle and that activation of SIRT1 and its downstream signaling pathways are improperly triggered in AMPK-deficient states.”

**Resveratrol:** “Resveratrol induces mitochondrial biogenesis and protects against metabolic decline… Mice treated with a moderate dose of resveratrol showed increased mitochondrial biogenesis and function, AMPK activation, and increased NAD+ levels in skeletal muscle, whereas SIRT1 knockouts displayed none of these benefits.”

**Tea and chocolate polyphenols:** “… we found that mice administered Mitochondria Activation Factor (MAF) combined with exercise training could run longer distances and for a longer time compared with the exercise only group; MAF is a high-molecular-weight polyphenol purified from black tea. Furthermore, MAF intake combined with exercise training increased phosphorylation of AMPK and mRNA level of glucose transporter 4 (GLUT4).”

So, there you have it: a common mechanism that ties together a number of processes (fasting and exercise) and chemical compounds (the rest) is the activation of the energy sensor AMPK.