Enzyme AMP-activated protein kinase (AMPK) is a serin/threonin protein kinase, its main role is in energy regulation at both on the cellular and whole body levels. As a stress sensor controls the oxidation of fatty acid, transport and uptake of glucose uptake into cell, gluconeogenesis and other metabolic pathway in tissue such as liver, skeletal muscle and adipose tissue including hypothalamic central regulation of food intake and energy expenditure. Regulation of AMPK on whole-body level is coordinated by a variety of hormones (adipokines) secreted by adipose tissue. Leptin is one of key adipokines associated with the efect of AMPK . Effects of leptin are linked to both programming the metabolism in the perinatal period and with important regulations in adult metabolism. Data about development of AMPK in the hypothalamus and peripheral tissues in the perinatal period are still rare. Considering to the key role of AMPK in mediation of central regulation of leptin in the hypothalamus and metabolic effects of leptin in muscle, further research to expand knowledge in this area is required.