

INTRODUCTION

Fasting is consuming little to no food at certain period, usually varied from 12 hours to 3 weeks.¹ Intermittent fasting is dietary intervention in which a person spends a long time (around 16–48 hours) with little to no calorie intake, followed by normal calorie intake period, repetitively.² There are many intermittent fasting regimens, with a few popular being used in studies: alternate-day fasting (ADF), 5:2 intermittent fasting, and daily time-restricted feeding (TRF).³ Alternate-day fasting involves alternating day of feeding and fasting for 24 hours with water provided ad libitum for both days.^{1,4} 5:2 intermittent fasting involves 2 non-consecutive days of severe calorie restriction and 5 days of ad libitum calorie intake.^{3–5} Daily time-restricted feeding involves food intake restriction to a specific time window of 8 hours or less every day.^{2,4} Other than those three, there is also religious fasting where variety of fasting regimens are used for religious or spiritual purposes. Religious fasting includes Islamic fasting and other religious fasts like Latter-day Saints followers and Seventh-day Adventists.⁴

Fasting is one of the most potent non-genetic stimuli of autophagy process. Autophagy is well-conserved process in eukaryotic cells which protects the cell by eliminating damaged organelles, long-lived misfolded proteins, and invading pathogens. There are 3 main types of autophagy that has been studied: macroautophagy (the most prevalent form, otherwise known as autophagy), microautophagy, and chaperone-mediated autophagy. Macroautophagy involves the engulfment of target material by phagophore, which elongates to be an autophagosome. This autophagosome fuses with lysosome, forming the autolysosome, and degradation occurs with the help of acidic lysosomal hydrolase.^{6,7} Metabolites resulted from autophagy process become new building blocks for macromolecule synthesis.⁸ Autophagy plays protective role in stress condition, including intermittent fasting. Several organs benefit from autophagy, including liver, muscle, adipose tissue, and kidney. In liver, autophagy improves fatty acid oxidation, ketogenesis, and gluconeogenesis. In muscle, autophagy is necessary to fulfill the high metabolism requirement, regulating protein degradation and supplying amino acids to produce energy. Fasting-induced autophagy could decrease oxidative stress and increase mitochondrial activity, so it helps muscle regeneration. Autophagy plays a role in the regulation and differentiation of adipose tissue. Kidneys require high energy to maintain its function, so autophagy is necessary for metabolism process regulation and maintenance of organelle quality.^{6,9} Fasting-induced autophagy shows potential to attenuate variety of disease. Therefore, the aim of this review is to summarize the results of studies about intermittent fasting related to the autophagy in mammals in the last 5 years.