1. No.
   2021Y004

2. Title
   The elucidation of function of mitochondrial alpha7-nicotinic acetylcholine receptor

3. Period
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4. Summary
   The alpha-7 nicotinic acetylcholine receptor (α7-nAChR) is a well-established homopentameric ligand-gated ion channel receptor. However, previous studies have suggested that α7-nAChR expressed in microglia may possess functions beyond its canonical ionotropic role, as its activation failed to elicit the influx of extracellular cations. Therefore, the present study aimed to identify novel intracellular functions of α7-nAChR in microglia. Our findings demonstrated the absence of TMEM35A expression in microglia, indicating the potential for atypical α7-nAChR function. Furthermore, we revealed that α7-nAChR in microglia lacks the pentameric structure and predominantly localizes to the mitochondria. Notably, choline treatment significantly increased ATP production, suggesting a novel role for α7-nAChR in regulating cellular energy metabolism. This study provides evidence for a novel function of α7-nAChR in microglia, where it resides on the mitochondria and modulates intracellular ATP levels upon activation. This finding expands our understanding of the multifaceted roles of α7-nAChR in the central nervous system and opens new avenues for exploring its therapeutic potential in microglial-related disorders.