Propofol may increase caspase and MAPK pathways, and suppress the Akt pathway to induce apoptosis in MA-10 mouse Leydig tumor cells

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Europe has the highest incidence of testicular cancer in the world as reviewed by medical journal in 2018. Treatment for malignant testicular cancer is primarily surgery combined with chemotherapy. Propofol, an anesthetic and sedative agent used by anesthesiologist in the operating room had been shown to activate endoplasmic reticulum stress to induce apoptosis in lung cancer. However, it remains elusive whether propofol regulates caspase and/or mitogen-activated protein kinase (MAPK) pathways to induce apoptosis in Leydig tumor cells. In Taiwan, Professor Edmund Cheung So and his colleagues found that when MA-10 mouse Leydig tumor cells were treated with propofol(300-600 μM) for 24 h, there was significant decrease in cell viability in the treated cells ($P<0.05$). In flow cytometry analysis, the amount of sub-G1 phase cell numbers in MA-10 cells was significantly increased by propofol ($P<0.05$). Additionally, Annexin V/propidium iodide double staining further confirmed that propofol could induce MA-10 cell apoptosis. Furthermore, cleaved caspase-8, -9 and -3, and/or poly(ADP-ribose) polymerase were significantly activated following treatment of propofol in MA-10 cells. In addition, c-Jun N-terminal kinase, extracellular signal-regulated kinase 1/2, and p38 were significantly activated by propofol in MA-10 cells ($P<0.05$), indicating that propofol may induce apoptosis through the MAPK pathway. Additionally, propofol diminished the phosphorylation of Akt to activate apoptosis in MA-10 cells. In conclusion, propofol may induce MA-10 cell apoptosis by activating caspase and MAPK pathways, and inhibiting the Akt pathway in MA-10 cells, demonstrating that propofol may be a potential anticancer agent against Leydig cell cancer.