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Effect of Black Cumin (Nigella sativa) Extract on Damaged Brain Cells

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Abstract : The nervous system is made up of complex delicate structures such as the spinal cord, peripheral nerves and the brain. These are prone to various types of injury ranging from neurodegenerative diseases to trauma leading to diseases like Parkinson's, Alzheimer's, multiple sclerosis, amyotrophic lateral sclerosis (ALS), multiple system atrophy etc. Unfortunately, because of the complicated structure of nervous system, spontaneous regeneration, repair and healing is seldom seen due to which brain damage, peripheral nerve damage and paralysis from spinal cord injury are often permanent and incapacitating. Hence, innovative and standardized approach is required for advance treatment of neurological injury. Nigella sativa (N. sativa), an annual flowering plant native to regions of southern Europe and Asia; has been suggested to have neuroprotective and anti-seizures properties. Neuroregeneration is found to occur in damaged cells when treated using extract of N. sativa. Due to its proven health benefits, lots of experiments are being conducted to extract all the benefits from the plant. The flowers are delicate and are usually pale blue and white in color with small black seeds. These seeds are the source of active components such as 30–40% fixed oils, 0.5–1.5% essential oils, pharmacologically active components containing thymoquinone (TQ), ditimoquinone (DTQ) and nigellin. In traditional medicine, this herb was identified to have healing properties and was extensively used Middle East and Far East for treating diseases such as head ache, back pain, asthma, infections, dysentery, hypertension, obesity and gastrointestinal problems. Literature studies have confirmed the extract of N. sativa seeds and TQ have inhibitory effects on inducible nitric oxide synthase and production of nitric oxide as well as anti-inflammatory and anticancer activities. Experimental investigation will be conducted to understand which ingredient of N. sativa causes neuroregeneration and roots to its healing property. An aqueous/ alcoholic extract of N. sativa will be made. Seed oil is also found to have used by researchers to prepare such extracts. For the alcoholic extracts, the seeds need to be powdered and soaked in alcohol for a period of time and the alcohol must be evaporated using rotary evaporator. For aqueous extracts, the powder must be dissolved in distilled water to obtain a pure extract. The mobile phase will be the extract while the suitable stationary phase (substance that is a good adsorbent e.g. silica gels, alumina, cellulose etc.) will be selected. Different ingredients of N. sativa will be separated using High Performance Liquid Chromatography (HPLC) for treating damaged cells. Damaged brain cells will be treated individually and in different combinations of 2 or 3 compounds for different intervals of time. The most suitable compound or a combination of compounds for the regeneration of cells will be determined using DOE methodology. Later the gene will also be determined and using Polymerase Chain Reaction (PCR) it will be replicated in a plasmid vector. This plasmid vector shall be inserted in the brain of the organism used and replicated within. The gene insertion can also be done by the gene gun method. The gene in question can be coated on a micro bullet of tungsten and bombarded in the area of interest and gene replication and coding shall be studied. Investigation on whether the gene replicates in the organism or not will be examined.

Keywords : black cumin, brain cells, damage, extract, neuroregeneration, PCR, plasmids, vectors
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