

Induction of Ferroptosis Protocol

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What is Ferroptosis?

Ferroptosis is a form of programmed or regulated cell death different from apoptosis. Ferroptosis is an iron mediated mechanism that causes catastrophic damage to the mitochondrial membrane and other cellular lipid membranes. This is also known as lipid peroxidation chain reactions. Cancer cells are far more sensitive to ferroptosis than normal cells because of a multitude of factors. The primary factor is an elevated level of oxidative stress (ROS) compared to normal cells.

Ferroptosis is initiated by a Fenton reaction between hydrogen peroxide and ferrous iron which produces hydroxyl radical. The reaction proceeds further ultimately resulting a chain reaction which causes irreversible damage to phospholipid cell membranes. This is called lipid peroxidation.

Protocol

Dietary Methionine and Cysteine Restriction

The primary goal of methionine and cysteine restriction is to limit glutathione synthesis. Glutathione is a tripeptide synthesized from cysteine, glycine and glutamate. Cancer cells are highly dependent on glutathione for regulation of oxidation (ROS).

The diet offers many side benefits which help to lower inflammation, suppress angiogenesis, lower IGF-1, stabilize glucose and insulin and shift the tumor microenvironment towards an alkaline pH.

Iron Overload - Ferric Ammonium Citrate

A sufficient amount of intracellular free iron (ferrous) must be present for the initiation of ferroptosis. Cancer cells exhibit altered iron metabolism and excessive iron storage by ferritin.

Studies have demonstrated that exogenous iron alone can induce ferroptosis or augment ferroptosis inducers. Ferric iron is converted to ferrous iron.

Ferric Ammonium Citrate is a highly water soluble form of iron. The recommended dosing schedule is one 25 mg sublingual tablet 4 times a day for a total of 100 mg of elemental iron per day.

Thioredoxin Reductase Inhibition - Sodium Selenite, Piperlongumine

Sodium Selenite and Piperlongumine are both inhibitors of the thioredoxin antioxidant system. Both inhibit the thioredoxin reductase enzyme which blocks recycling of reduced thioredoxin.

Sodium Selenite dosage is 0.3 mg/kg using a combination of sublingual and slow release oral tablets.

Piperlongumine is administered as a whole herb preparation of Piper Longum fruit and root parts. Dosage is 4 tablets 4 times a day.

Exclusion of all Antioxidant Supplements

Antioxidants in food can not be controlled but concentrated vegetable juices should be avoided. Juicing may be counterproductive in this regard.

Do not take any supplements containing Vitamin C, Vitamin E tocopherol, NAC, Vitamin A, Polyphenols

Exclusion of all Iron Chelators and Iron Sequestors

Curcumin

References

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