Modulated Electro-Hyperthermia: Improving cancer treatments in low resource settings

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Hyperthermia in oncology refers to the process of heating tumours. The aim of heating tumours is to sensitise tumours to radiotherapy and to increase the efficacy of chemotherapy and radiotherapy.

Studies have demonstrated that the use of hyperthermia in combination with conventional therapies can [1,2]

• Increase local disease control
• Increase overall survival
• Lower healthcare costs

Technology Description:
Modulated electro-hyperthermia utilises the principles of extracellular hyperthermia in order to sensitise tumours to the effects of chemo- and radiotherapy. The low frequency modulated direct electric field (13.56 MHz) is applied using capacitive coupling.

The technique has been developed to enhance the efficiency of conventional hyperthermia by effectively overcoming the previous obstacles associated with hyperthermia and by the addition of the non-thermal effects associated with modulated electro-hyperthermia.

The illustration shows how the electric field passes through the patient’s body. The tumour acts as a capacitor in the electrical circuit as it retains some of the energy.

Hyperthermia:

• Damages cell membranes
• Increases blood flow to the tumours
  • Increases pO2 in tumours
  • Increases delivery of cytotoxic agents to tumours
• Increases metabolism and reaction rate of chemotherapy of tumours
• Sensitises hypoxic and acidic tumours to radiation therapy
• Acts on the S-phase of mitosis and activates cells in resting phases of mitosis
• Slows DNA and RNA repair and synthesis
• Induces an immune response [10,11]

Safe: Can be used safely even in sensitive areas such as the brain
Selective: Preserves integrity of the surrounding healthy tissue
Effective: Heats tumours regardless of the depth or location of the tumor
Affordable: Low running costs, low consumable costs, and low maintenance costs.
Practical: Quick, easy and non-invasive. No specialized facilities, equipment or personal required.