

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medicine in Space and Extreme Environments (4)

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MIRA – THE MAGNETIC-FIELD BASED IMMUNOTHERAPY FOR REMISSION USING
ENDOWED ANTOBODIES: CURRENT STATUS AND FUTURE ACTIVITIES**Abstract**

An essential problem when treating cancer is the selective access and controlled destruction of tumour cells in the patient's body. After tumours have been surgically removed, individual tumour cells often remain in the body, out of which new tumours could develop. The traditional follow-up treatments of chemotherapy and radiation are often unable to destroy these cancer cells in a controlled manner. And the destruction of healthy cells might cause more harm to the patient.

Based on current diagnostic methods, the possibility now exists of combining biotechnology and physics to come up with a more effective and gentle way to treat cancer. To this end, antibodies endowed with special iron nanospheres are used, as well as alternating magnetic fields which generate a force through a physical coupling that destroys the abnormal cell without harming the surrounding healthy tissue. MIRA, the Magnetic-field-based Immunotherapy for Remission using endowed Antibodies is a unique cancer therapy, highly selective, efficient, side-effect free and derived from a pulsed plasma thruster.

The procedure's physical foundation is based on alternating magnetic fields whose effects were described as early as 1942 by Hannes Alfvén, a Swede who would later win the Nobel Prize. During this process, the disruption of a magnetic field generates a force effect on magnetic conductive material that lies in close proximity to it. In nature, such effects can be seen in solar eruptions and in northern lights. In the case of MIRA, the coupling is enabled by iron nanospheres with which the antibody is endowed. The force effect on the antibodies is great enough to destroy the cell membrane, thereby irreversibly damaging the cancer cell.

This facilitates gentler treatment, since its effect can be switched on and off in a targeted manner. MIRA therefore functions like a light switch, except instead of light, a therapeutic treatment is switched on and off, precisely targeting the right spot at the right time. Depending on the treatment method, this allows the tumour to be destroyed in one or more carefully planned sessions. MIRA method's high efficiency is also manifested in its short treatment duration. Experiments performed so far have shown that 30 seconds is enough time for the selected cells to be destroyed.

Recently, MIRA had won a Business Incubation Centre (BIC) grant of the European Space Agency (ESA), a success that has enabled us to engage into further discussions with several investors. Right now, the MIRA team is in the process of closing its first investment. With this investment being successfully finalised, MIRA will focus on the production of the MIRA Prototype No. 1, which is to be used in the first wave of the in-vitro tests, currently foreseen to start in the 3rd quarter of 2020 – if MIRA functions well, the first complete healing of surface-near cancer types (like breast, skin and prostate) is close at hand.