



## NanoMed Round Table Communication Working Group

### Annex 1 – MagForce Nanotechnologies AG

#### Overview

Based in Berlin, Germany, MagForce Nanotechnologies AG is a global leader in the field of nanotechnology cancer treatment. This revolutionary technology aims to establish an entirely new form of cancer treatment within the near future, using magnetic particles to treat tumours with very minimal side effects, thus enhancing patient quality of life. The technology and its related equipment are currently in the final phases of clinical trials.

MagForce Nanotechnologies AG was chosen as a case study by the Communication Working Group for two main reasons. First of all the method is one of the most advanced applications in the field of nanomedicine. At the time of selection it was currently in the final stages of clinical trials and, assuming a successful completion, could therefore be expected on the market in the immediate future.<sup>1</sup> The second factor that contributed to the selection as a case study is that MagForce Nanotechnologies AG has always had a strong focus on the communication of its work, and has therefore developed a comprehensive communication strategy over the years.

#### Treatment Method

The Nano-Cancer<sup>®</sup> therapy of MagForce Nanotechnologies AG is a novel way of treating tumours locally. The principle behind the method is the direct, minimally invasive introduction of magnetic nanoparticles into the tumour and their subsequent heating in an alternating magnetic field. The nanoparticles are very small particles of iron oxide with a diameter of approximately 20 nanometres (including the covering) which are suspended in a liquid. The particles are made to vibrate by a magnetic field which alters its polarity up to 100,000 times per minute. In response, they generate heat.

This technique makes it possible to fight the tumour from the inside out. Through their application, the particles are placed directly in the tumour. Their special coating allows them to penetrate into the tumour cells. Due to this covered design, they remain in the tumour and are not ejected, so that the treatment is limited solely to the tumorous tissues. Surrounding healthy tissues are spared.

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<sup>1</sup> MagForce Nanotechnologies AG successfully completed its single-arm clinical trial on the efficacy of thermotherapy using superparamagnetic nanoparticles in patients with recurrent glioblastoma in November 2009.

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## **Communication Strategy: Introduction**

The highly impressive communication efforts of MagForce Nanotechnologies AG are focused on various different target groups. From the initial idea up to and beyond market introduction, it is an absolute necessity for a start-up company to

secure investments. In order to ensure success in this field, potential investors have to be convinced of the idea and then require constant updating on the status of the project. The continued existence of the company is proof that the communication strategy in this area has been successful.

The presentation of the therapy in print media and on television has ensured a certain familiarity among cancer patient groups. According to the founder, Dr Andreas Jordan, after each television broadcast the company headquarters receive numerous phone calls from patients inquiring about treatment (all these inquiries sadly have to be declined, however, as long as clinical trials have not been completed). Due to this widespread dissemination it is to be expected that the therapy will be in high demand when formal approval has been given.

Numerous publications in scientific journals and many presentations at nanoscientific conferences have ensured that the work of MagForce Nanotechnologies AG is known in the nanotechnological community and is well regarded by peers and colleagues. This, however, contrasts with the impact in the medical (oncology) community. According to Dr Andreas Jordan, a similar approach with conference presentations and medical publications has not been sufficient to gain widespread acceptance of the therapy. This appears to be the only main field where the communication strategy of MagForce Nanotechnologies has not achieved the desired impact.

## **Communication Strategy: Website Example**

MagForce Nanotechnologies has an extensive website where a wide variety of information is communicated both in German and in English. On the homepage (*see Figure 1 below*) are three short introductory statements on nanomedicine by experts in the field. Below the statements is a brief description of MagForce Nanotechnologies AG, as well as segments for 'Press & News' and 'Calendar & Events'. There are also direct links to an information brochure which can be viewed and downloaded (*see Figure 2 below*) and a high-quality 3D-animation film describing the therapy. Finally, direct links to sections 'For Patients' and 'For Physicians' enable these target groups to directly access the information relevant to them.

The subsequent pages of the website contain elaborate information on the company, its products, clinical trials and research. There is a page for potential investors as well as a database of selected press releases, press reports and videos from 2006 to the present. This collection itself gives an impressive insight into the communication activities of MagForce Nanotechnologies AG. Finally, it is possible to sign up for a regular newsletter that informs in detail about the newest developments in the company and includes contributions from internal as well as external specialists. In addition, it also addresses the general state of developments in nanomedicine.

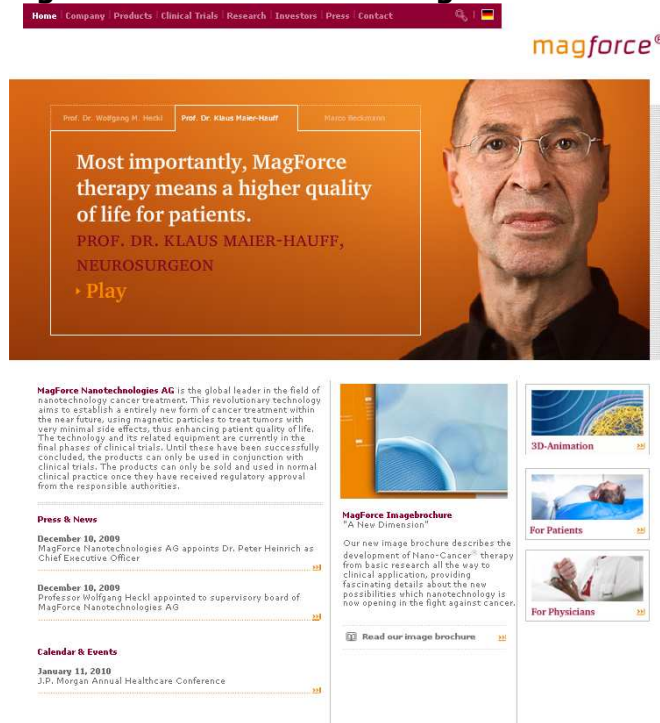
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## Overview of Communication Activities (2009)

Listed below is an overview of the communication activities of MagForce Nanotechnologies AG in the year 2009. For a company with 50 employees that is still in the developmental phase of its product and does not yet have a market presence, these significant numbers are indicative of the importance that MagForce Nanotechnologies AG places on communication.

- Scientific articles: 3
- Press Releases (published): 8
- Company Reports (for investors): 2
- Reports in newspapers / magazines: 24
- Television reports: 5
- Presentations: 10

**Figure 1 - Screenshot of MagForce Website**



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Figure 2 – Example page of MagForce information brochure

**Fighting cancer with magnetic nanoparticles**

Nano cancer therapy is a new procedure for the localized treatment of tumors. With this technique, heat can be generated within the tumor to produce temperatures of between 41 °C and 45 °C (hyperthermia), or even higher temperatures of between 46 °C and 70 °C (thermoablation). The basic principle behind the therapy is to inject magnetic nanoparticles directly into the tumor as a minimally invasive procedure, then use them to generate agents in an alternating magnetic field. As temperatures of up to 45 °C, the efficacy of simultaneously applied radiation therapy or chemotherapy is substantially increased. In the case of radiotherapy, the degree to which efficacy is increased depends on the extent to which certain enzymes which would normally repair radiation damage cease to function because of the higher temperature, thus allowing the tumor cells to be destroyed. Once these important enzymes have been degraded by the warmth, the tumor cells die even with relatively small doses of radiation. The warmth also affects other proteins, such as those which **chemoresistant tumor cells** which act to **protect themselves** from those cells, preventing them from being destroyed by conventional chemotherapy. Once these "pumps" are shut down by the higher temperatures, then the chemoresistant tumor cells can also be destroyed because the chemotherapy agents remain in the cells. At temperatures above 46 °C, virtually all biomolecules within the cells are affected, and the cells are directly destroyed as a result of overheating. The remains of the cells are then naturally broken down through normal body processes. The nanoparticles which are released from the destroyed cells are then either reabsorbed by surrounding tumor cells which are still intact or else eliminated by macrophages, part of the body's immune system. Nanoparticles are infinitesimally small particles of iron oxide in a fluid dispersion, with a diameter of approx. 20 nanometers (including coating). The particles are brought into circulation by a magnetic field which changes its polarity 100,000 times per second, transforming this magnetic energy into heat. This new technology enables doctors to fight tumors from the inside out. The nanoparticles are directly injected into the tumor and, because of the special coating, are not transported out but rather remain there. The chemotherapy can thus be limited to tumor tissue, sparing the surrounding healthy tissue.

**How nano cancer therapy works**

1. **Injecting the nanoparticles:** During fluid from MagForce, composed of iron oxide nanoparticles in an aqueous dispersion.
2. **The patient procedure:** begins with the injection of a small amount of the magnetic fluid into the tumor with the patient without disrupting the size and shape of the tumor.
3. **Enhancing the treatment:** before or immediately afterwards the chemotherapy (radiation therapy) is applied. The alternating magnetic field is then applied to bind the nanoparticles to the radiation, without the need for any physical contact.
4. **As a result of the generation of heat within the tumor:** which can be precisely controlled.
5. **and the target temperature (41 °C - 70 °C) has been achieved,** the tumor cells become more permeable for accompanying radiotherapy or chemotherapy. In the case of radiotherapy, the temperature is supported by the heat. This leads to a 4- to 10-fold increase in the effectiveness of the radiotherapy.

MagForce MagForce - The Innovation

1. Heating of tumors to temperatures of up to 70 °C, as that cancer cells are irreversibly damaged.  
 2. Heat is produced in which the chemotherapy (radiation therapy) is applied to the tumor and this leads to heat the patient does not feel any uncomfortable side effects.  
 3. Tumor cells which cannot be removed by chemotherapy.  
 4. Substances which can inhibit the growth of a neoplasm.