MicroQuin
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MicroQuin: hunting down breast cancer

Working with two complementary technologies, biotech company MicroQuin is developing next-generation targeted therapies that kill all breast cancers with no toxicity.

MicroQuin is engineering first-in-class therapies that hunt out cancerous cells to induce rapid cell death with minimal to no toxicity and immunogenicity. The biotech is breaking the current trends of immunotherapy and precision medicine through innovative, yet 'back-to-basics', cellular research on overlooked candidates integral in tumorigenesis.

The highly efficacious treatments developed by MicroQuin are enabled by two technologies: cell penetrating peptides/peptidomimetics (CPPs) and protein-based drugs. MicroQuin's CPPs are delivery vehicles that selectively guide payloads to cancer cells, that when paired with existing drugs enhance therapeutic safety and efficacy. MicroQuin's in-house focus is on combining its CPPs with the company's own protein-based drugs to kill tumor cells by modulating organelle function and signal-transduction pathways.

When applied to breast cancer cell lines *in vitro*, MicroQuin's drugs induced apoptosis in 100% of cells in 96 hours, regardless of the genotype or phenotype.

Subsequent tests in 'humanized' mice confirmed the drugs' cancer-killing potential. Mice transplanted with triple-negative human breast carcinoma cells were treated with lead compound MQ001. Tumor volumes shrank 91% in 4–10 days, and immunohistochemical staining showed apoptotic characteristics throughout the excised tumors. MQ001 also inhibited metastasis.

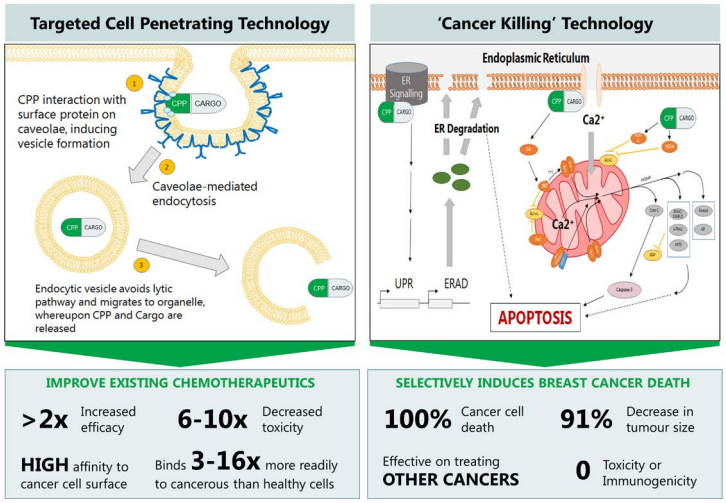
The results are part of a body of evidence generated by MicroQuin and its collaborators that suggests that MQ001 is a monotherapy that selectively hunts out and kills breast cancer cells, in a matter of days, with no signs of toxicity or immunogenicity.

CPPs: unique drug delivery technology

MicroQuin's CPP has preferentially high affinity for caveolae on cancerous cells, evidenced by flooding *in vitro* plates containing cancerous or healthy breast cells with the CPP. Tumor cells rapidly bound and internalized the CPP, as well as any conjugated cargo, whereas healthy breast cells ignored the CPP, even over a seven-hour exposure period. This result was replicated *in vivo*.

The dramatic difference in CPP uptake suggests that MicroQuin's technology can precisely target breast cancer cells. Furthermore, this effect was observed across other cancerous cell lines (i.e., lung, melanoma, prostate, and ovarian), with varying degrees of efficacy.

MicroQuin can therefore expand on its own pipeline of drugs and move beyond its breast cancer focus to enhance the efficacy of existing cancer treatments. Conjugation of MicroQuin's CPP to existing drugs could significantly increase their efficacy whilst dramatically reducing toxicity. MicroQuin evidenced its CPP has the ability to overcome dose-limiting toxicity issues of therapeutics, such as the alkylating agent Doxorubicin, by reducing the likelihood of toxic events from occurring, i.e. doxorubicin-induced cardiac dysfunction.



MicroQuin's technologies in action. An overview of both the targeted cell-penetrating technology and the cancer-killing technology.

MQ001: novel cancer therapeutic

Tumorigenesis is promoted via the formation of a pathophysiological microenvironment characterized by hypoxic conditions, nutrient deprivation, and acidification—all outputs of cellular processes.

MQ001, or its sister compound MQ002, act on such processes to induce cancerous cell death. First, the compounds target the endoplasmic reticulum (ER) and the ATF-6 and IRE1 pathways that regulate ER stress. The ER, an organelle that is heavily burdened during tumorigenesis, is further stressed by MQ001/MQ002 to promote an elevated and prolonged unfolded protein response and activate ER-associated degradation (ERAD) machinery. This results in ER degradation and calcium release.

Calcium is well researched with regard to its ability to hyperpermeabilize mitochondria, which contain an abundance of pro-apoptotic proteins. As such, MicroQuin's compounds promote a 'perfect storm' for apoptosis, in which ERAD machinery combine with the release of mitochondrial pro-apoptotic proteins to kill cancerous cells.

MQ001 and MQ002 stop cancer cells from fighting back by inhibiting anti-apoptotic members of the Bcl-2 protein family, such as Bcl-2 and Bcl-xL, while promoting the activation of pro-apoptotic ones such as Bax and Bak. In addition, MicroQuin compounds act on the actin cytoskeleton to block the formation of F-actin in cancerous cells and inhibit their invasiveness. None of these effects were observed in non-cancerous cells treated with the same compounds.

Almost everything is in place for MicroQuin to press on and learn whether its compounds can live up to their demonstrated potential.

The next steps are an investigational new drug (IND) application for the CPP technology, and lead optimization of MQ001 and MQ002. MicroQuin is aiming to secure approval to test these compounds in humans by the end of 2021.

Partnering opportunities

MicroQuin's co-founders have self-funded their research while actively seeking grants and investments. They are seeking to partner the CPP technology with major players in the chemotherapy space to create targeted therapeutics with increased efficacy and reduced toxicity.

On the MQ001 side, MicroQuin is looking for investment or codevelopment opportunities to advance its simplistic, yet highly efficacious and toxicity-free treatment, for all types of breast cancer.

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