

# ANTI-MITOTIC ACTIVITY AND DOWNSTREAM IMMUNE RESPONSE OF TUMOR TREATING FIELDS (TTFIELDS) THERAPY

TTFIELDS Preclinical Science



- TTFIELDS employ electrical fields at a frequency of **100–500 kHz**.<sup>1,2</sup>
- They enter cancer cells and **disrupt processes critical to cell viability**, primarily **mitosis**, with minimal stimulation or heating of the surrounding tissue.<sup>1,2</sup>
- TTFIELDS therapy targets cancer cells, while sparing healthy cells and tissue.
  - TTFIELDS spare healthy cells because these have different properties from cancer cells, including division rate, morphology, and electrical properties.<sup>1,3,4</sup>
  - TTFIELDS induce an anti-mitotic effect, to which rapidly-dividing cancer cells are particularly susceptible compared with quiescent cells.<sup>2</sup>
- Across solid tumour types, TTFIELDS have been studied with:



Chemotherapy<sup>5-9</sup>



Immune checkpoint inhibitors (ICI)<sup>10,11</sup>

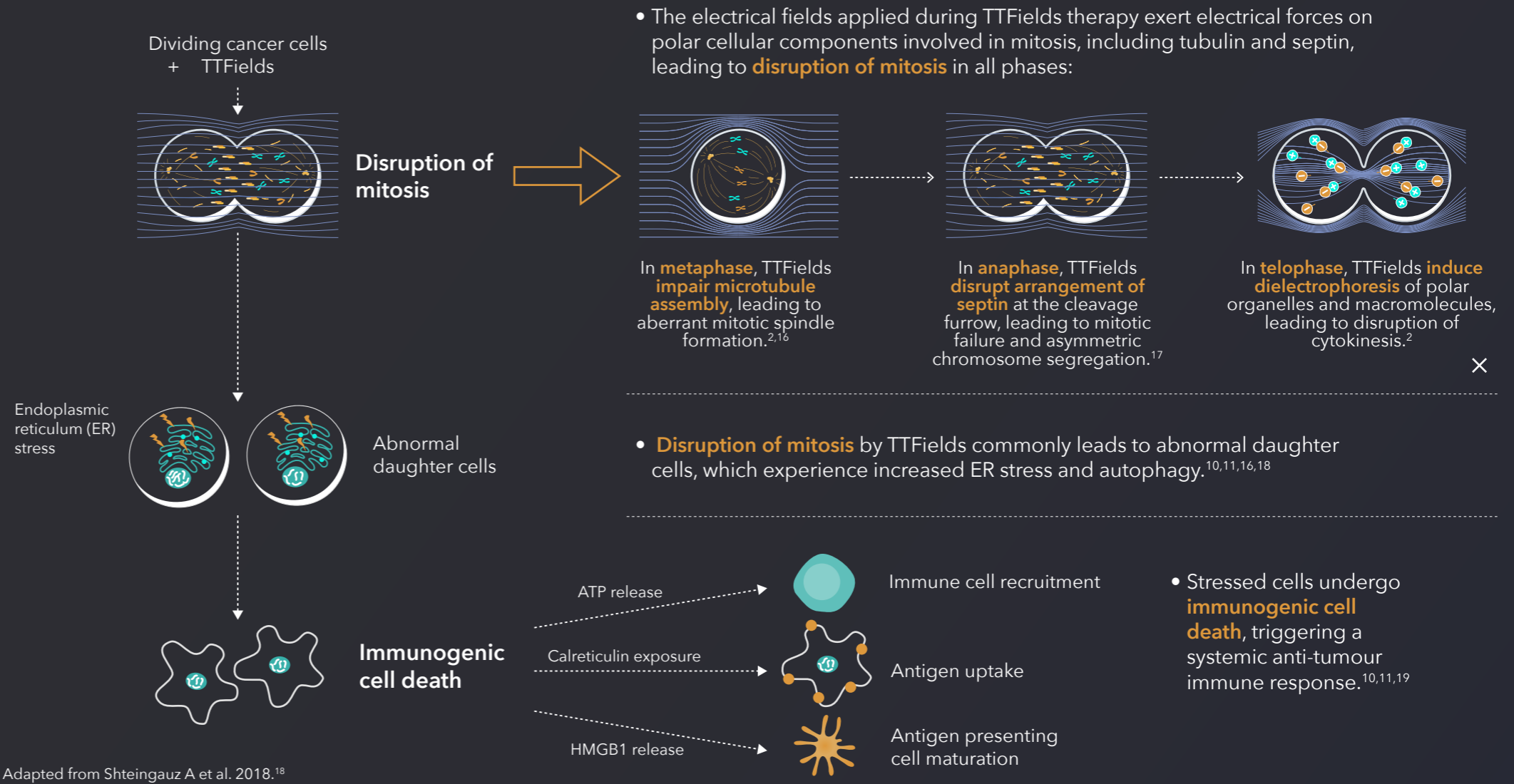


Radiation therapy<sup>12-14</sup>



Targeted therapies<sup>15</sup>

## TTFIELDS Mechanism of Action

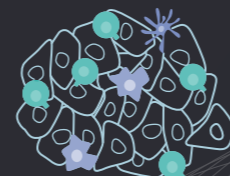


## The Downstream Immune Effects of TTFIELDS Therapy

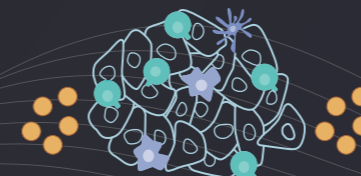
Experiments in mouse models showed that, compared with monotherapy, TTFIELDS with checkpoint inhibitors (specifically anti-PD-1, anti-PD-L1, and anti-CTLA-4 antibodies) led to:



slowed tumour growth<sup>10,11</sup>



increased immune cell infiltration<sup>10,11</sup>



increased inflammatory cytokine production

## Key Takeaways

- **Disruption of mitosis** is a core mechanism underlying the effects of TTFIELDS therapy on cancer cells.
- Downstream effects include **immunogenic cell death**, which in turn triggers an **anti-tumour immune response**.

## Abbreviations

ATP: adenosine triphosphate; CTLA4: cytotoxic T-lymphocyte associated protein 4; ER: endoplasmic reticulum; HMGB1: high mobility group box 1 protein; ICI: immune checkpoint inhibitor; PD-1: programmed cell death protein 1; PD-L1: programmed death-ligand 1; TTFIELDS: Tumour Treating Fields.

See below to view references

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