Docket #: S14-009

CK2 inhibitors for treating medulloblastoma

Researchers in Prof. Matthew Scott's laboratory have discovered that small-molecule inhibitors of casein kinase II (CK2) could be used as a targeted therapy for pediatric medulloblastoma or other Shh/hedgehog-related tumors. The Shh pathway is known to drive medulloblastoma, an orphan disease whose current treatment options have harsh side effects. In addition, some patients have tumors that are resistant to therapies targeting smoothened (Smo), another molecule in the hedgehog signaling pathway. By employing phosphorylation studies, the Stanford researchers verified that CK2 is a druggable target downstream of Smo and that CK2 inhibitors offer a novel approach to treat the disease.

Data and Stage of Research

- **Clinical** – a Phase I clinical trial is underway with one CK2 inhibitor being tested on 28 patients
- **Preclinical in vivo** – CK2 inhibitors had strong cytotoxic effects on medulloblastoma cells in mice with almost complete tumor regression
- **In vitro demonstration of mechanism of action** – a known, cell-permeable small molecule CK2 inhibitor prevents binding of ATP/GTP, inducing caspase-dependent apoptosis

Applications

- **Therapeutic for pediatric medulloblastoma** and potentially other hedgehog-related tumors

Advantages

- **Targeted therapy** for hedgehog-related tumors

    - inhibiting CK2 specifically reduces effects of hedgehog signaling pathway downstream of Smo
    - potential treatment option for tumors that are resistant to other Shh/Smo inhibitors
- **Pediatric orphan disease** – medulloblastoma is a rare pediatric cancer and drugs to treat this condition could be eligible for drug development incentives from the U.S. FDA

Publications

- Compositions and methods for treating medulloblastoma (U.S. Patent Application Publication No. 20170360813)

Patents

- Issued: 10,213,449 (USA)

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