

## Abstract

Asparagine synthetase (ASNS) is a metabolic enzyme, re-discovered from screening the yeast GFP collection (Invitrogen) that, in addition to its enzymatic function in asparagine biosynthesis, it is able to assemble into visible cytoplasmic structures (foci/filaments). While investigating if ASNS assembly is evolutionarily conserved in mammalian cells using immuno-staining techniques, I ran into dividing cells with ASNS, seemingly, lining up with the mitotic spindles. Pilot experiments have been performed to confirm that the observation was not resulted from cross-reaction between anti-ASNS antibody and microtubules. According to the data from indirect immunofluorescence and human cell lines expressing ASNS-EGFP, ASNS is, indeed, localized to the mitotic spindles during mitosis. This finding might have a great impact on the field of cell and cancer biology as ASNS is one of the key markers for cancer diagnosis. My hypothesis is that ASNS might moonlight in cell division process as a mitotic spindle associated protein. Misregulation of ASNS expression or mutation of ASNS might cause abnormality in spindle formation and chromosome segregation, therefore leading to production of aneuploid cells. These cells could eventually become cancerous. This project has 2 main goals which are (1) establish ASNS as a novel mitotic spindle associated protein, and (2) study the effect of asparaginase, an enzyme used to lower asparagine levels in acute lymphoblastic leukemia patients, and the effect of nocodazole, a microtubule formation inhibitor, on the relative expression between ASNS to tubulin.

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**Project Title:**

Asparagine Synthetase, A Novel Mitotic Spindle Associated Protein

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