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Research Interests and the facilities in Prof. Jian-Zhi Wang’ Lab
Research Interests in prof. JZ Wang’ Lab

• To explore the mechanisms underlying Alzheimer’s neurodegeneration, especially the role of tau and the nature of Neurodegeneratation.

• To develop methods, cell and animal models for measuring the abnormal tau proteins and the cellular or systemic effects of tau proteins.

• To search for new strategies arresting the disease progression.
Tau hyperphosphorylation renders the cells more resistant to the chemically induced apoptosis, simultaneously the hyperphosphorylated tau impairs the cell functions.

Based on these findings, we have proposed that the nature of “AD neurodegeneration” may represent a new type of tau-regulated chronic neuron death, namely “neurodegenerasis”.

Research Interests in prof. JZ Wang’ Lab (major findings)
We speculate that transient tau phosphorylation helps cells abort from an acute apoptosis, while persistent tau hyperphosphorylation & accumulation may trigger cell senescence with a destiny of neurodegeneration.
Research Interests in prof. JZ Wang’ Lab (major findings)

• We reveal that molecular mechanisms underlie tau-induced cell anti-apoptosis involves substrate competition of tau and β-catenin for GSK-3β; activation of Akt; preservation of Bcl-2 and suppression of Bax, cytosolic cytochrome-c, and caspase-3 activity; and upregulation of unfolded protein response (UPR) during ER stress.
Glycogen synthase kinase-3β and protein phosphatase-2A may be the most crucial kinase and phosphatase in Alzheimer-like tau pathologies.

Tau proteins isolated from the Alzheimer’s brain is abnormally glycosylated, and O-glycosylation is negatively correlated with the phosphorylation of tau.
Recent reprehensive papers (from >130)


Resources and Techniques in prof. JZ Wang’ Lab

Plasmids

• tau46, tau39, tau24
• wt and swe mutated APP
• wt and site mutated GSK-3, PKC, AKT, p38, CDK5, PP-2A, SET, PTPA
• Mitochondria related proteins: Mito, OPA1, Mfn1, Mfn2
• ER related proteins: Bip, SiL1
• Synaptic proteins: VAMP2, Sypl, GluT1, GluT4
Cell Lines & Transgenic Mice

- N2a, N2a/APP, N2a/tau40; HEK293, HEK293/tau; SH-SY5Y, SK-N-SH; PC12; CHO......
- Tg2576; APP/PS1; htau(ki)/mtau(ko); mtau(ko); 3Xtg AD; TRPC1 ko; GSK-3beta Flox-ko.....
- Sporadic AD model (hHcy rats) .......
Electrophysiology & Imaging

- Patch Clamp (EPSP, AP)
- In-vitro multi-channel electrophysiological recording (LTP in rat and mouse brains......)
- In-vivo multi-channel electrophysiological recording (Spiking recording in rats with photostimulations.......)
- Ca2+ Oscillations
- FRAP
- FRET
Animal Experiments

- Morris water maze
- Barnes circular maze
- Elevated plus maze
- Radial arm maze
- T-maze
- Stereotaxic brain injection
- Contextual fear conditioning
- Active/Passive avoidance
- Forcing swimming
- Step-down test
- Open Field
Biochemistry & Molecular Biology

- Western blot
- Immunohistochemistry
- Immunofluorescence
- Immunoprecipitation
- Flow cytometry
- ELISA
- Site-specific mutagenesis
- q-PCR
- RT-PCR
- RNA/DNA extraction
- ........
Cell Morphology and Biology

- Nissl staining
- Golgi staining (synapse morphologies)
- Silver staining (neurofibrillary tangles)
- H&E staining
- Cell lines subculture
- Primary neuron culture
- Transfection
- Cell migration
- Single cell injection
Neurological Disorders Related Journals

- Journal of Neurology & Neurophysiology
- Journal of Neuroinfectious Diseases
- International Journal of Neurorehabilitation
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