Molecular and Cellular Mechanism that Protect Against Cancer and Neurodegeneration

PRESENTERS:
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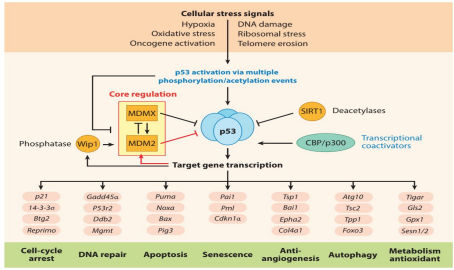
BACKGROUND:

- Proteins have a natural tendency to fold into their wild-type formations; however, other pathways lead to misfolding and aggregation .[1]
- Molecular chaperones and chaperonins maintain protein quality control by disaggregating misfolded proteins.[2]
- Degradation pathways mark proteins beyond repair (aggregates) using ubiquitin or LC3 recruiting proteins for degradation through the ubiquitin-proteasome system (UPS) or autophagy.[3]
- When enough aggregates form, irreversible structures, amyloid plaques and fibrillary tangles, manifest cranially, eventually developing into neurodegenerative diseases (including Alzheimer's, Huntington's, and Parkinson's Disease).[4]
- The Guardian of the Genome, p53, is responsible for genomic stability and preventing mutations. Mutations in the p53 gene lead to its misfolding and non-functioning cell cycle regulation, DNA repair, and cell apoptosis, which leads to the development of most human cancers.[5]

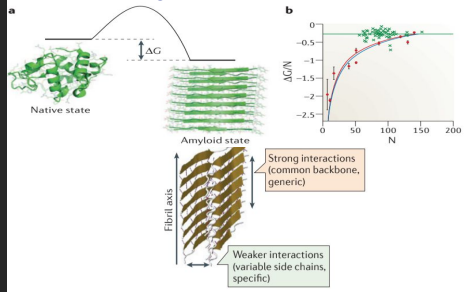
DISCUSSION

- There is much left to learn when it comes to research in protein folding. Potential therapeutic applications and medical treatments are possible by researching misfolding, molecular pathways, and the diseases as a consequence.

Misfolded proteins lead to **neurodegenerative diseases** that **ruin lives** of **friends**, **family**, and **yourself**, so **how** does the body **protect itself?**



The p53 pathway is activated upon cellular stress and depending on the type of stress, this activation results in upregulation or repression of genes involved in cell-cycle arrest, DNA repair, apoptosis, and senescence (Joerger and Fersht 2016).[6]



The native state is thermodynamically stable relative to t amyloid state in terms of free energy (G). The figure also represents the 'cross-β' interactions common to amyloid fibrils (Knowles et al. 2014).[7]

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[1] David Balchin, Manajit Hayer-Hartl, F. Ulrich Hartl
[2] Jens Tyedmers, Axel Mogk and Bernd Bukau
[3] Yong Tae Kwon, Aaron Ciechanover
[4] Lars M. Ittner and Jürgen Götz
[5] Arnold J. Levine
[6] Andreas C. Joerger, Alan R. Fersht, Tuomas P. J.
[7] Knowles, Michele Vendruscolo, Christopher M. Dobson

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