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Molecular dynamics studies of rabbit, dog, horse, human, mouse and elk prion proteins

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Mad cow disease" (Bovine Spongiform Encephalopathy (BSE)) belongs to a contagious type of Transmissible Spongiform Encephalopathies (TSEs). Scientists believe that it is caused by prions (the misfolding prion proteins) but they may have not yet solved the riddle of "mad cow disease". This is due to the fact that a prion is neither a virus, neither a bacteria nor any microorganism so the disease cannot be caused by the vigilance of the organism immune system and it can freely spread from one species to another species. The humans exists the susceptibility of TSEs; for example, the human version of "mad cow disease" named Creutzfeldt-Jakob Disease (CJD) and variant CJD (vCJD) just happened randomly through infections of transplanted tissue or blood transfusions or consumption of infected beef products. Mouse, elk and many other animals are also susceptible to TSEs. However, rabbits, horses and dogs seem to be unaffected by Prions. Scientists do not know the reason. The infectious diseased prion is thought to be an abnormally folded isoform (PrP^{Sc}) of a host protein known as the prion protein (PrP^{C}). The conversion of PrP^{C} to PrP^{Sc} occurs post-translationally and involves conformational change from a predominantly α -helical protein to one rich in β -sheet amyloid fibrils. Much remains to be understood about how the normal cellular isoform of the prion protein PrP^{C} undergoes structural changes to become the disease associated amyloid fibril form PrP^{Sc} . The "structural conformational" changes of PrP^{Sc} from PrP^{C} are just very proper to be studied by molecular dynamics (MD) techniques. This report will present the MD studies of rabbit, dog, horse, human, mouse and elk PrPs and reveal some secrets of immunity to prion diseases.

Biography

Jiapu Zhang completed his PhD in 2004 from The Federation University of Australia and postdoctoral studies from CSIRO (Commonwealth Scientific and Industrial Research Organisation) of Australia. He is an Australian scientist who has been the project leader and lead chief investigator for the above computational neurodegenerative prion project of Australia. He has published a series of papers on prion proteins and prions and serving as an editorial board member of several journals in bioinformatics.

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