

Physics of age-related macular degeneration

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Age related macular degeneration (AMD) is the leading cause of blindness in the adult population. Choroidal neovascularization, which is the abnormal growth of blood vessels in the choroidal region, is the most common cause of AMD. CNV is produced with age by accumulation of residual material in the retinal pigment epithelium cells (RPE). With time, incompletely degraded membrane material build up in the RPE in the form of lipofuscin, cause abnormal growth of blood vessels that break through the Bruchs membrane, and raise the macula and eventually lead to blindness. The fact that a number of far from equilibrium dynamical processes are involved in the formation and growth of AMD makes this a rich field for application of many techniques of statistical and nonlinear physics. I will give some examples of the open problems and discuss the results of a kinetic Monte Carlo simulation of a deposition and aggregation model of lipofuscin formation in the RPE cells, as well as both two and three-dimensional simulations of the formation of CNV, that we have recently carried out.