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Physics of Lipofuscin Formation and Growth in Age Related Macular Degeneration FEREYDOON FAMILY, Emory University, K.I. MAZZITELLO, C.M. ARIZMENDI, University of Mar del Plata, HANS E. GROSSNIKLAUS, Emory University — Age-related macular degeneration (AMD) is the leading cause of blindness beyond the age of 50 years. The most common pathogenic mechanism that leads to AMD is choroidal neovascularization (CNV). CNV is produced by accumulation of residual material caused by aging of retinal pigment epithelium cells (RPE). With time, incompletely degraded membrane material builds up in the RPE in the form of lipofuscin. Lipofuscin is made of free-radical-damaged protein and fat, which forms not only in AMD, but also Alzheimer disease, and Parkinson disease. We will present the results of a study of the kinetics of lipofuscin growth in RPE cells using Kinetic Monte Carlo simulations and scaling theory on a cluster aggregation model. The model captures the essential physics of lipofuscin growth in the cells. A remarkable feature is that small particles may be removed from the cells while the larger ones become fixed and grow by aggregation. We compare our results to the number of lipofuscin granules in eyes with early age-related degeneration.

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