Dariusz Wrzosek
Institute of Applied Mathematics and Mechanics,
University of Warsaw
e-mail: darekw@mimuw.edu.pl

Do the aggregating cells attain a tight packing state?

We consider models of chemotaxis which take into account volume-filling effects such that an *a priori* threshold for the cell density corresponding to a tight packing state is taken into account (for more information we refer to a survey [2]). Our study concerns quasilinear parabolic systems with singular or degenerate diffusion of cells which include recent models by Wang and Hillen(2007) and Lushnikov (2008). It is proved in [3] that for some range of parameters describing the relation between the diffusive and the taxis part of a cell flux there are global-in-time classical solutions which in some cases are separated from the threshold uniformly in time. Existence and uniqueness of global in time weak solutions as well as the set of stationary states are studied as well. In the recent preprint [1] it is proved for parabolic-elliptic version of the model that if the taxis force is strong enough with respect to self-diffusion and the initial data are chosen properly then there exists a classical solution which reaches the threshold in finite time provided the diffusion of cells is non-degenerate.

References

[1] Z.-A. Wang, M. Winkler and D.Wrzosek *Singularity formation in chemotaxis systems with volume-filling effect* submitted.
[2] D. Wrzosek. *Volume filling effect in modelling chemotaxis.* Math. Model. Nat. Phenom., **5**, 123-147 (2010).
[3] D. Wrzosek. *Model of chemotaxis with threshold density and singular diffusion.* Nonlinear Anal. TMA.,**73**, 338-349 (2010).