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Merging and Emerging Patterns in Chemotaxis Models

The study of pattern formation for chemotaxis PDEs (partial differential equations) started with the identification of blow-up solutions. If, however, the model is adapted to allow for global existence of solutions, then another interesting pattern formation process arises. Local maxima form and they show an interaction of merging (two local maxima coagulate) or emerging (a new maximum is formed). This dynamics can lead to steady states, periodic solutions or to (what we think is) chaotic behavior. I will show that this pattern interaction is very typical for a wide variety of chemotaxis models and I will discuss possible ideas on how to understand this complicated pattern interaction.

Joint work with K. Painter and Z. Wang.