On chemotactic systems with competitive terms

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Chemotaxis is a biological process through which living organisms orient their movement along a chemical concentration gradient; the process is present in different types of biological phenomena such as bacteria aggregation, immune system response or angiogenesis in the embryo formation and in tumor development. Mathematical models to describe chemotaxis have been proposed in the last years following the pioneering work of Keller and Segel during the 1970s.

In this talk we extend the Parabolic-Elliptic Keller-Segel system by introducing non-local terms in the logistic growth factor. We present a system of partial differential equations describing the evolution of two populations under chemotactic effects with nonlocal reaction terms. We also consider an external application of chemoattractant in the system and we introduce global competitive/cooperative factors in terms of the total mass of the populations. We will present results concerning the global existence of solutions produced by the logistic growth factor, which counteracts the blow up tendency produced by chemotaxis. For a range of parameters, we see that any solution with positive and bounded initial data converges to a spatially homogeneous state. Two situations are described: when both components are positive (coexistence) and when one of the components goes to zero (extinction).

References

[1] *M. Negreanu, J. I. Tello*: On a competitive system under chemotaxis effects with non-local terms. Nonlinearity *26* (2013), 1–21.

[2] *C. Stinner, J. I. Tello, M. Winkler*: Competitive exclusion in a two-species chemotaxis model. To appear in J. Math. Biol.

[3] *J. I. Tello, M. Winkler*: Stabilization in a two-species chemotaxis system with a logistic source. Nonlinearity *25* (2012), 1413–1425.