A quasilinear chemotaxis-haptotaxis system: existence and blow-up results

Poonam Rani
Ph.D Student
Supervisor: Prof. Jagmohan Tyagi
IIT Gandhinagar
IIT Gandhinagar, Palaj, 382355, India
poonamrani@iitgn.ac.in

We consider the following chemotaxis-haptotaxis system:

$$\begin{cases} u_t = \nabla \cdot (D(u)\nabla u) - \chi \nabla \cdot (S(u)\nabla v) - \xi \nabla \cdot (u \nabla w), \ x \in \Omega, \ t > 0, \\ v_t = \Delta v - v + u, \ x \in \Omega, \ t > 0, \\ w_t = -vw, \ x \in \Omega, \ t > 0, \end{cases}$$

under homogeneous Neumann boundary and initial conditions in a bounded domain $\Omega \subset \mathbb{R}^n, n \geq 3$ with smooth boundary. It is proved that for $\frac{S(s)}{D(s)} \leq A(s+1)^\alpha$ for $\alpha < \frac{2}{n}$ and under suitable growth conditions on D, there exists a uniform-in-time bounded classical solution. Also, we prove that for radial domains, when the opposite inequality holds, the corresponding solutions blow-up in finite or infinite-time.

References

[1] P. Rani, J. Tyagi, A quasilinear chemotaxis-haptotaxis system: Existence and blow-up results, J. Differential Equations 402 (2024), 180–217.