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In the first part of the talk we will investigate a Keller-Segel model with quorum sensing and a fractional diffusion operator. This model describes the collective cell movement due to chemical sensing with flux limitation for high cell densities and with anomalous media represented by a nonlinear, degenerate fractional diffusion operator. The purpose here is to introduce and prove the existence of a properly defined entropy solution. In the second part of the talk we will analyze an equation that is gradient flow of a functional related to Hardy-Littlewood-Sobolev inequality in whole Euclidean space  $R^d$ ,  $d \geq 3$ . Under the hypothesis of integrable initial data with finite second moment and energy, we show local-in-time existence for any mass of “free-energy solutions”, namely weak solutions with some free energy estimates. We exhibit that the qualitative behavior of solutions is decided by a critical value. The motivation for this part is to generalize Keller-Segel model to higher dimensions. (Received September 19, 2018)