Molecular chaperones in pathogenic bacteria: structure and function

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We seek a highly motivated person to joint our research team as a master degree student. The successful candidate will perform his own project (see below) and may, if he/she so wishes, participate in any of our ongoing research programs.

Proteins are biological machines, sensing devices, and building blocks of living cells. They are extremely efficient, precise and complicated. They work in a changing and crowded environment. Naturally, proteins need proper assembly and repair. To perform these crucial functions organisms have evolved a specialized group of protein machines, molecular chaperones. Molecular chaperones have to find their targets, evaluate the damage, and perform repair or remove proteins from circulation. Unsurprisingly, cell survival depends heavily on efficiency of molecular chaperones. At the same time, pathogenic bacteria efficiently recruit molecular chaperones for creation and maintenance of their bio-weapons. Therefore, chemicals inhibiting these specialized chaperones can be used as very efficient antimicrobials. Pathogenic bacteria from the genus *Yersinia* (including *Yersinia pestis*, the most aggressive human bacterial pathogen) assemble on their surface PH6 capsule, consisting of PsaA protein subunits. The capsule is believed to help these bacteria to survive inside of macrophages. To assemble the capsule on the cell surface, PsaA subunits have to be transported through two cellular membranes (inner and outer) and the periplasmic space between them. The periplasmic chaperone PsaB plays a key role in assisting folding, transport, and assembly of the PsaA subunits. We would like to investigate the mechanism of function of the PsaB chaperone at all these steps.
Project includes design of PsaA and PsaB co-expression vector, characterization and crystallization of the PsaA-PsaB complex.

Our recent papers:

Zavialov, A. V., Kersley, J., Korpela, T., Zav'yalov, V. P., MacIntyre, S., and Knight, S. D. (2002). *Molec. Microb.*, 45, 983-995.
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Bouckaert, J., Berglund, J., Schembri, M., De Genst, E., Cools, L., Wuhrer, M., Hung, C., Pinkner J., Slättegård, R., Zavialov, A.V., Choudhury, D., Lagermann, S., Hultgren, S., Wyns, L., Klemm, P., Oscarson, S., Knight, S.D., and De Greve, H. (2005) *Molec. Microb.*, 55, 441-55.
Zavialov A. V., Tischenko V. M., Fooks, L. J., Brandsdal B.O., Åqvist J., Zav'yalov V. P., MacIntyre S. and Knight S. D. (2005) *Biochem. J.*, 389, 685-694.