The role of RNase Y in rpoS transcript processing in Borrelia burgdorferi

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**Abstract**

*Borrelia burgdorferi* is the bacterial agent that causes Lyme disease. The pathogenic bacteria are transmitted to vertebrates through tick feeding and are maintained in nature in an enzootic cycle. The expression of outer surface protein OspC is essential for *B. burgdorferi* to move from the tick to a mammal. Alternative sigma factor RpoS is responsible for inducing gene expression for OspC production during the enzootic cycle. RpoS is encoded by two versions of RNA: a long one, which is hypothesized to be required for transmission from the tick, and a short one, which is thought to be involved in infection of the mammal. We seek to understand the mechanism of how the long rpoS RNA is generated so that RpoS protein can activate ospC gene expression during transmission.

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**Hypothesis**

The long *rpoS* transcript is processed from an even longer *rpoS* transcript by a ribonuclease called RNase Y.

**Construction of a *B. burgdorferi* that produces an RNase Y-10X-His fusion**

- Construct a recombinant *rny*, the gene encoding RNase Y, with a 10X-histidine tag.
- Transform the recombinant *rny* into *B. burgdorferi*.

**Purification of *B. burgdorferi* RNase Y from *Escherichia coli***

The expression of a recombinant RNase Y (*rny*) in *pET28b*-TEV was optimized in *E. coli*, from which we purified RNase Y. Yield of the purified protein was assayed by Western blotting. RNase Y-*rpoS* cleavage assay was performed to observe RNase Y activity.

**Future directions**

- Direct expression and purification of RNase Y from *B. burgdorferi* using the recombinant *rny* with 10X-His tag.
- Test the recombinant *rny* with 10X-His construct in *vivo*, using inducible gene system.

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