**Supplementary File 1: strains and plasmids used in this study**

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| **Strain** | **Description** | **Source or reference** |
| *E. coli* XL1 blue | *recA1 endA1 gyrA96 thi-1 hsdR1 supE44 relA1 lac* [F’ *proAB* *lacIq ΔM15* Tn10 (Tcr)]  | Stratagene |
| *E. coli* BL21 | *F- ompT lon hsdSB gal dcm λ* (DE3) | Novagen |
| *E. coli* *ΔclpB* | MC1000 Δ*clpB*::Km | (1) |
| *E. coli dnak103* | MC4100 *dnak103* | (1) |
| **Plasmid** | **Description** | **Source or reference** |
| pET24a-*clpL* | Vector for IPTG-inducible expression of *clpL* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-∆N* | Vector for IPTG-inducible expression of *clpL-∆N* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-Lm\_clpB* | Vector for IPTG-inducible expression of *Lm clpB* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-Lm\_DnaK* | Vector for IPTG-inducible expression of *Lm\_DnaK* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-Lm\_DnaJ* | Vector for IPTG-inducible expression of *Lm\_DnaJ* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-Lm\_GrpE* | Vector for IPTG-inducible expression of *Lm\_GrpE* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_A* | Vector for IPTG-inducible expression of *clpL-Patch\_A* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_B* | Vector for IPTG-inducible expression of *clpL-Patch\_B* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_C* | Vector for IPTG-inducible expression of *clpL-Patch\_C* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_D* | Vector for IPTG-inducible expression of *clpL-Patch\_D* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_E* | Vector for IPTG-inducible expression of *clpL-Patch\_E* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_AB* | Vector for IPTG-inducible expression of *clpL-Patch\_AB* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_AC* | Vector for IPTG-inducible expression of *clpL-Patch\_AC* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_BC* | Vector for IPTG-inducible expression of *clpL-Patch\_BC* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL\_all\_NQ🡪Ala* | Vector for IPTG-inducible expression of *clpL-Patch\_all\_NQ🡪Ala*  in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Patch\_all\_Aro🡪Ala* | Vector for IPTG-inducible expression of *clpL-Patch\_all\_Aro🡪Ala* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Y36A* | Vector for IPTG-inducible expression of *clpL-Y36A* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-F48A* | Vector for IPTG-inducible expression of *clpL-F48A* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-Y51A* | Vector for IPTG-inducible expression of *clpL-Y51A* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-NTD61* | Vector for IPTG-inducible expression of *clpL\_NTD61* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pET24a*-clpL-NTD78* | Vector for IPTG-inducible expression of *clpL\_NTD78* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag | This study |
| pCA528-*clpL-E352A* | Vector for IPTG-inducible expression of *clpL-E352A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pCA528-*clpL-F354A* | Vector for IPTG-inducible expression of *clpL-F354A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pCA528-*clpL-T355C* | Vector for IPTG-inducible expression of *clpL-T355C* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\** | Vector for IPTG-inducible expression of *LN-ClpB\** in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-E199A-E598A* | Vector for IPTG-inducible expression of *LN-ClpB\*- E199A-E598A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-Patch\_A* | Vector for IPTG-inducible expression of *LN-ClpB\*-Patch\_A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-Patch\_AB* | Vector for IPTG-inducible expression of *LN-ClpB\*-Patch\_AB* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-Patch\_C* | Vector for IPTG-inducible expression of *LN-ClpB\*-Patch\_C* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-Y36A* | Vector for IPTG-inducible expression of *LN-ClpB\*-Y36A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-F48A* | Vector for IPTG-inducible expression of *LN-ClpB\*-F48A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pC6Amp∆BsaI-*LN-ClpB\*-Y51A* | Vector for IPTG-inducible expression of *LN-ClpB\*-Y51A* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | This study |
| pUHE21-2fd12 | Empty Vector control for *in vivo* assays | This study |
| pUHE21-*clpGGI* | Vector for IPTG-inducible expression of *clpGGI* in *E.coli* *∆clpB* cells | adjust |
| pUHE21-*Ec* *clpB* | Vector for IPTG-inducible expression of *Ec* *clpB* in *E.coli* *∆clpB* cells | adjust |
| pDS56-*clpL* | Vector for IPTG-inducible expression of *clpL* in *E.coli* *clpB* cells and *E. coli dnak103* cells | This study |
| pUHE21-*clpL-∆N* | Vector for IPTG-inducible expression of *clpL* in *E.coli* *clpB* cells and *E. coli dnak103* cells | This study |
| pDS56-*clpL-E352A* | Vector for IPTG-inducible expression of *clpL* in *E.coli* *clpB* cells  | This study |
| pDS56-*clpL-F354A* | Vector for IPTG-inducible expression of *clpL* in *E.coli* *clpB* cells  | This study |
| pUHE21-*Ec* dnaK | Vector for IPTG-inducible expression of *Ec dnaK* in *E.coli* *dnak103* cells | (1) |
| pET24a-*clpGGI* | Vector for IPTG-inducible expression of *clpGGI* in *E.coli* BL21 cells, fused C-terminal 6xHis-tag  | adjust |
| pDS56-*Ec* *clpB* | Vector for IPTG-inducible expression of *Ec* *clpB* in *E.coli* *∆clpB* cells, fused C-terminal 6xHis-tag | (1) |
| pUHE21-*Ec dnaK*-His | Vector for IPTG-inducible expression of *Ec dnaK* in *E.coli* *∆clpB* cells, fused C-terminal 6xHis-tag | (1) |
| pCA528-*Ec dnaJ* | Vector for IPTG-inducible expression of *Ec dnaJ* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | (1) |
| pCA528-*Ec grpE* | Vector for IPTG-inducible expression of *Ec grpE* in *E.coli* BL21 cells, fused cleavable N-terminal 6xHis-SUMO-tag | (1) |
| pDS56-*Ec* ∆N-ClpB-K476C | Vector for IPTG-inducible expression of *Ec* *∆N-clpB-K476C*  in *E.coli* *∆clpB* cells, fused C-terminal 6xHis-tag | (2) |
| pDS56-*luciferase* | Vector for IPTG-inducible expression of *luciferase* in *E.coli* *∆clpB* cells, fused N-terminal 6xHis-tag | (3) |
| pDS56-*luciferase-yfp* | Vector for IPTG-inducible expression of *luciferase-YFP* in *E.coli* *∆clpB* cells, fused N-terminal 6xHis-tag | (3) |

**References**

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