Technical data of heterologous expression and purification of SARS-CoV-2 proteases using escherichia coli system

ABSTRACT

The SARS-CoV-2 coronavirus expresses two essential proteases: firstly, the 3Chymotrypsin-like protease (3CLpro) or main protease (Mpro), and secondly, the papain-like protease (PLpro), both of which are considered as viable drug targets for the inhibition of viral replication. In order to perform drug discovery assays for SARS-CoV-2, it is imperative that efficient methods are established for the production and purification of 3CLpro and PLpro of SARS-CoV-2, designated as 3CLpro-CoV2 and PLpro-CoV2, respectively. This article expands the data collected in the attempts to express SARS-CoV-2 proteases under different conditions and purify them under single-step chromatography. Data showed that the use of E. coli BL21(DE3) strain was sufficient to express 3CLpro-CoV2 in a fully soluble form. Nevertheless, the single affinity chromatography step was only applicable for 3CLpro-CoV2 expressed at 18 °C, with a yield and purification fold of 92% and 49, respectively. Meanwhile, PLpro-CoV2 was successfully expressed in a fully soluble form in either BL21(DE3) or BL21-CodonPlus(DE3) strains. In contrast, the single affinity chromatography step was only applicable for PLpro-CoV2 expressed using E. coli BL21-CodonPlus(DE3) at 18 or 37 °C, with a yield and purification fold of 86% (18 °C) or 83.36% (37 °C) and 112 (18 °C) or 71 (37 °C), respectively. The findings provide a guide for optimizing the production of SARS-CoV-2 proteases of E. coli host cells.