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Physiological alterations of GS-CHO cells in response to adenosine monophosphate treatment

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Highlights

- AMP treatment causes reduced proliferation, accumulated S-phase cells, increased cell size and specific productivity.
- Total intracellular protein content is considered the key determinant in increasing cell size in this case.
- Different mechanisms are likely responsible for improved total intracellular protein content in G1 and S phase arrest.

Abstract

Growth-arrested strategies (e.g. hypothermia and hyperosmolarity) have been widely employed to enhance cell-specific productivity (qP) in mammalian cell culture bioprocess. In addition to enhanced qP, alterations in cell physiology, such as cell size and cell cycle phase, have also attracted extensive attention under growth-arrested conditions. However, to date, very few reports on associations between physiological changes in growth-inhibiting approaches have been published. In this study, we explored associations between the physiological changes of GS-CHO cells in response to adenosine monophosphate (AMP) treatment. In dose response studies, AMP treatment resulted in suppressed proliferation, accumulated S-phase cells, increased cell size and enhanced qP. Subsequently, six GS-CHO clones exhibited the physiological alterations in varying degrees when treated with 7 mM AMP. But more importantly, a significant positive correlation between total intracellular protein content and mean electronic volume, an