

# A SAFER AND EFFECTIVE ALTERNATIVE FOR CHOLESTEROL SUPPLEMENTATION OF MAMMALIAN CULTURES

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## Abstract:

Lipogro® is a stable, water-soluble concentrate of biologically active cholesterol, phospholipids and essential fatty acids purified from validated raw materials of Australia, New Zealand or US origin. Providing a balanced profile of key nutritional components in their native forms while ensuring the highest level of safety among similar products, Lipogro® supports robust cell growth and high cell density, and boosts protein production in cholesterol-dependent NS0 cells. Relative cell specific production in the presence of Lipogro® is higher in comparison with fetal bovine serum or a competitor cholesterol concentrate. On-going studies with other mammalian cell lines show Lipogro® can be used to significantly enhance performance of cholesterol non-auxotrophs.

## Introduction

Cholesterol has long been shown to promote cell health and productivity in mammalian cultures, and is an essential nutrient for the growth of certain sterol auxotrophs. Cholesterol provided to cells in its native, water-soluble form, and in combination with fatty acids and other bioactive lipids, dramatically improves cell mass and longevity, thus boosting production of desirable cell products, such as recombinant proteins and vaccines. Highly purified fractions of bovine serum can significantly ameliorate concerns associated with whole serum supplementation, but is difficult to achieve with little or no compromise to culture performance.

Rocky Mountain Biologicals, Inc. (RMBIO) has developed a lipoprotein solution derived from the safest sourced bovine raw material. This product, called Lipogro®, is manufactured in a custom built

facility utilizing a fully automated and validated proprietary process that incorporates a viral reduction step for increased safety.

Independent cell culture studies performed by GIRUS Life Sciences, Inc., ([www.girusinc.com](http://www.girusinc.com)), a cell culture research and product development company located in San Jose, California, demonstrate the benefits of Lipogro® in the production of recombinant immunoglobulins in cholesterol-dependent NS0 cells.

## Materials And Methods

NS0 myeloma cell lines expressing human immunoglobulin were generated by transfection with an expression vector encoding a humanized antibody.

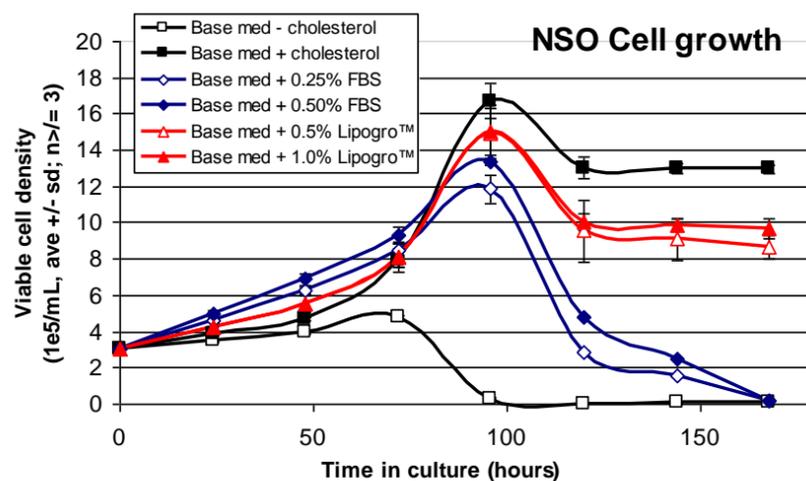
After successful adaptation into serum-free, cholesterol-containing media (proprietary to GIRUS Life Sciences), cells were inoculated directly into test conditions (either lacking cholesterol or where the source of cholesterol is provided by serum, Lipogro® or a competitor's US-sourced cholesterol product) in TC plates and evaluated for growth and protein production without further adaptation. Growth and productivity kinetics of cells were evaluated in multi-well plates and cultures were allowed to proceed in batch mode without feeding in humidified CO2 incubators at 37°C. Cell counts and viabilities were measured using a semi-automated fluorescence method.

Expression of total accumulated Ig was measured in terminal culture supernatants by standardized ELISA assay against the Fc chain of the immunoglobulin.

## Results

NS0 cells growing in serum-free media containing cholesterol were seeded at 3e5/mL in the same medium either lacking cholesterol ("Base med - cholesterol"), or containing serum ("+ FBS") or Lipogro®. The results shown in the graph on the right show that Lipogro® can substitute for US-sourced bovine cholesterol without prior adaptation and with minimal loss of cell mass. Additionally, Lipogro® sustains cells at higher densities longer than fetal bovine serum.

As shown below, Lipogro® boosts production of recombinant immunoglobulin to levels greater than the original cholesterol-containing medium. Ig levels in the Lipogro® conditions were comparable to the competitor's US-sourced cholesterol concentrate.



## Discussion

Manufactured by Rocky Mountain Biologicals, Inc. (RMBIO) from the safest sourced material currently available and produced using a unique process under strict guidelines in a dedicated facility at commercial scale, Lipogro® addresses the bioprocessing industry's drive to minimize risk while achieving maximal performance in its biologics drug manufacturing processes. Derived from bovine raw materials from domestic (US) or Australia/New Zealand origin, the Lipogro® safety profile is further enhanced through a validated viral reduction step in the manufacturing process; the quality of the Lipogro® product is built-in from start to finish. In addition, RMBIO has a rigorous system of quality control and in-process analytical testing that confirms product quality and consistency throughout the production process, as well as performance. This poster describes use of Lipogro® in Ig-expressing NS0 cells; Lipogro® has been successfully used with excellent results in a variety of other cell types, including CHO, HEK293, and MDCK cells.

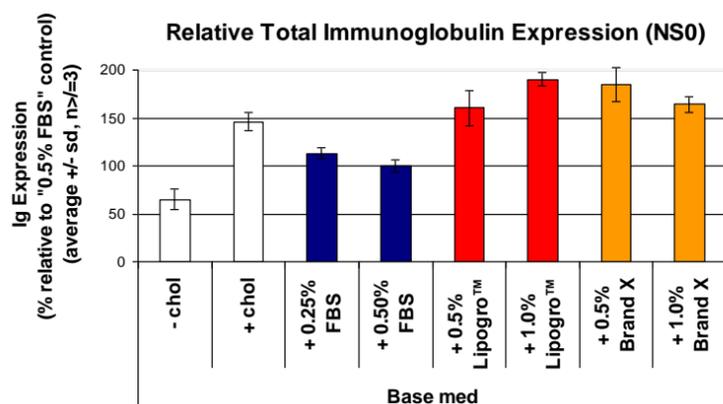
## Conclusion

Sourced from the safest bovine raw materials, Lipogro® is a safer, easy-to-use, effective substitute for existing cholesterol supplementation in NS0 cell culture.

## Contact

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Finally, cell specific productivity (Qp) is improved with Lipogro®.

