

Lecture: good cell culture practice

New developments in commercial supply of serum-free media

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The culture medium is an essential component of the *in vitro*-environment of cultured cells and should be best designed for the special purposes of the respective cell type.

Serum addition, especially fetal bovine serum, to a chemically defined medium was routine until in the late sixties Sato and others propagated serum-free media. It was thought, that the thorough and complete analysis of the sera's protein components would lead to a unique approach, where all cell types would grow in a defined manner with the addition of a limited number of defined proteins from the serum. But just ten years after, this approach was given up, due to the complexity of the sera's components, which are responsible for all aspects of growth and proliferation of cells *in vitro*.

Since then, the approaches for culturing cell without sera are expanding in some aspects slowly but steadily, especially for some transformed cell lines, for stem cell research, for the production of cell components for therapy and for selected primary cell cultures.

But on the other hand for many individual cell types, the use of serum-free media is difficult and not always straightforward (maintenance of selected cell type, risk of transformation, growth characteristics).

There are some common aspects to consider, when one uses serum-free media:

- 1) Choosing the appropriate chemically defined media, which have to be more enriched than serum-containing media.
- 2) Some defined additional components are widespread used and are available as a combination package: Insulin, transferrin and selenium (ITS-System) and/or insulin, albumin and soya lipids. But these constituents are only useful for a limited number of transformed cell lines.
- 3) For all other cell types, there is a growing number of more or less individual recipes of serum-free media available, which are marketed commonly as a complete media approach. The number of these formulations are increasing steadily and it is not wise to develop own formulations from all yet known components (about 100 known components and an unknown number of additional constituents). Even the known components are not completely well defined and well known to keep in every respect the cells healthy and in a proliferative state.
- 4) In the meantime, however, there are some fifty different complete media already on the market, which can be used directly without adding additional components. Information given by the companies should be comprehensive and concise, and cautions may be appropriate when companies' media are not completely biochemically defined for whatever reasons.

Taking together all reasons and benefits for the use of serum-free media, there are certainly great advantages of this approach for those cell lines, which are designed for the production of cell proteins or especially in the stem cell research, but when cells are just used for basic research, one has to judge very carefully, if serum-free media should be used.

Keywords: commercially available serum-free media, serum substitutes, adaption to serum free media, recommendations for cell lines