

Lecture: good cell culture practice

Alternatives to the use of fetal bovine serum (FBS): A survey of recent strategies to reduce or replace FBS in cell and tissue culture

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Fetal bovine serum (FBS) is commonly used as an essential supplement to cell culture media. FBS is a cocktail of most of the factors required for cell attachment, growth, and proliferation *in vitro* (Gstraunthaler, 2003). However, the use of animal serum also bears a number of disadvantages. These can either be seen from (a) a theoretical, cell biological point of view, since serum in general is ill-defined, (b) from ethical perspectives in terms of animal protection arguments about harvest and collection of FBS from bovine fetuses (van der Valk et al., 2004), and (c) in terms of recent concerns about the global supply vs. demand of FBS. It is estimated that about 500,000 litres FBS are produced per year for the world market. This means, that more than 1,000,000 bovine fetuses have to be harvested, and it is expected, that these numbers will continue to increase annually. As a consequence, a number of strategies have been developed to reduce or replace the requirement for FBS in cell culture media. As a major goal of these initiatives, any efforts shall be undertaken in order to decrease the global demands for FBS and thus to decrease the number of bovine fetuses needed (ESAC, 2008). At the 11th Congress on Alternatives to Animal Testing in 2003, a session on alternatives to the use of FBS in cell and tissue culture was held. Several strategies were presented, that in the past five years have all been published elsewhere (Falkner et al., 2006; Gonzalez Hernandez and Fischer, 2007; Gstraunthaler, 2003; Pazos et al., 2004; van der Valk et al., 2004). The collection of fetal sera may impose harm to the bovine fetuses. To explore this topic in detail by experts in the field, a workshop was held in Utrecht, NL, in 2003. A comprehensive report of this workshop was given (van der Valk et al., 2004). Further presentations dealt with the use of plant extracts as FBS alternatives (Pazos et al., 2004), testing synthetic surfactants in serum-free bioreactors (Gonzalez Hernandez and Fischer, 2007), and a free access online database, searchable for commercially available serum-free culture media (Falkner et al., 2006). Most of this work was recently included in a statement by ESAC, the ECVAM Scientific Advisory Committee, on the use of FBS and other animal-derived supplements, that has been endorsed at the 28th ESAC Meeting in May 2008 (ESAC, 2008).

References

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