Avian embryonic stem cells: a new tool for embryologists and industrials

Fact Sheet

Project Information

Grant agreement ID: BIO4972106

Project closed

Start date
1 September 1997

End date
31 August 2000

Funded under
Specific research, technological development and demonstration programme in the field of biotechnology, 1994-1998

Total cost
No data

EU contribution
No data

Coordinated by
KAROLINSKA INSTITUTE
Sweden

Objective

Viruses and bacteria give rise to a large number of gastrointestinal infections and enteropathogenic E coli alone, account for 650 million cases per year worldwide. In spite of the rather mild clinical course, these bacteria cause a million deaths annually. Rotavirus is another major human pathogen, also resulting in a similar death toll every year and major efforts are therefore being made to produce vaccines for active

or passive immunization against intestinal pathogens.
Humoral immunity in the gut plays a major role in the local intestinal defense and purified human IgA antibodies, given orally, provides prophylactic and a therapeutic effects against a variety of intestinal pathogens. This preparation is however not readily available as there is a shortage of plasma used for processing and the resulting product is therefore quite expensive. Thus, only a limited number of patients eligible for treatment can actually be treated, necessitating development of alternative sources of antibodies for oral therapy.
Orally administered antibodies from other species have been applied in veterinary medicine for decades and have also been shown to protect against challenge with E. coli and Shigella flexneri bacteria and Rotavirus in man, thus showing proof of concept. Recent data also suggest that they are valuable therapeutically in patients with Clostridium difficile, Helicobacter pylori and crypto-sporidial infections. Selected pathogens are completely resistent to antibiotic therapy and reduced sensitivity to antimicrobial drugs in a majority of human pathogens is a growing medical problem. The use of specific antibodies for passive immunization would therefore constitute a valuable, alternative form of therapy.
Antibodies from chickens are normally transferred from the serum to the egg. The ease by which the antibodies can thus be collected, makes it an ethically attractive production system. Although the animals can be readily immunized, the presence of high titers of antibodies requires repeated immunization which is not practical on a large scale. Even if possible, only a minor fraction of the antibodies would be directed against the immunogen. We therefore propose to develop embryonic stem (ES) cells which will allow the creation of transgenic chickens expressing antibodies against human pathogens. Achievement of this goal requires basic knowledge both of ES cell technology and the differentiation of the avian hematopoetic system, the making of antibody gene containing gene constructs, testing of the product in experimental systems and finally, clinical trials in man.
There is an emerging interest in this field from companies producing antibodies for diagnostic (as chicken antibodies may be superior to antibodies from other species as they recognise different epitopes on the antigen) and therapeutic (i.e. against enteric infections both in man and economically important farm animals) purposes. This work should be viewed as a pilot experiment which will form the basis not only for the project described above but which also has bearing on future use of the chicken ES cell technology for related scientific and industrial projects.

Fields of science (EuroSciVoc)

agricultural sciences > **veterinary sciences**

medical and health sciences > basic medicine > immunology > **immunisation**

medical and health sciences > medical biotechnology > cells technologies > **stem cells**

medical and health sciences > basic medicine > pharmacology and pharmacy > pharmaceutical drugs > **vaccines**

medical and health sciences > clinical medicine > **gastroenterology**

Programme(s)

FP4-BIOTECH 2 - Specific research, technological development and demonstration programme in the field of biotechnology, 1994-1998

Topic(s)

0501 - Immunology and immunotechnology

Call for proposal

Data not available

Funding Scheme

CSC - Cost-sharing contracts

Coordinator

KAROLINSKA INSTITUTE

EU contribution

No data

Total cost

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Total cost

No data

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EU contribution

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