

**Experiment title:**

The three dimensional structure of adenovirus receptor binding protein

Experiment number:

Ls 54

Beamline:

BL4

Date of experiment:

from: 1/10 94 to: 1/10 94

Date of report:

24/07 96

Shifts:

1

Local contact(s):

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Report

Adenoviruses are non-enveloped DNA viruses with icosahedral symmetry, associated with a significant number of human respiratory and gastrointestinal diseases, accounting for at least 7% of childhood acute respiratory infections (Brandt *et al.* 1987) and 17% of all infant diarrheas (Wadell *et al.* 1987). In 1962 it was demonstrated that Ad type 12 could cause tumors in rodents (Trentin *et al.* 1962). However, the adenoviruses have not been convincingly associated with any malignancies in humans (Bernard *et al.* 1991). There exist at least 41 serotypes of human adenovirus, of variable pathogenicity. All of them interact with host cells through the protein called fiber, which protrudes from each of the 12 virion vertices. This viral protein recognizes the cell receptor. Infection by adenoviruses is a good model for the study of the interaction of viruses with cell receptors. For this, a detailed knowledge of the fiber structure and the receptor is required.

The C-terminal receptor-binding domain has been expressed and overproduced in both *E. coli* and baculovirus systems. *E. coli* expressed protein is insoluble and poorly folded whereas the baculo expressed material is apparently folded correctly (Louis, N., et. al. 1994)

Crystals suitable for structural studies were obtained from protein purified from baculovirus overexpressed material. These crystals diffract to about 4\AA using a rotating anode and to beyond 3\AA resolution on a synchrotron source. In spring 1994 we could collect 10 degrees of data from a small ($0.05 \times 0.05 \times 0.05 \text{ mm}^3$) crystal on BL1, ESRF. The cell dimensions and spacegroup could be determined to P3(n)21 $a=63\text{\AA}$ $b=63\text{\AA}$ $c=90\text{\AA}$, $\alpha=90$ $\beta=90$ and $\gamma=120$ degrees.

The time on BL4 (LS54) was used to try out freezing conditions for the crystals since they were radiation sensitive. However the crystals we had were very small and did not diffract to a reasonable resolution preventing us from collecting useful data.

Bernard, N.F. and Knipe, D.M. Fundamental virology. 1991, Raven press, New York.

Brandt, C. D., Kim, H. W., Vargosko, A. J., Jeffries, B. C., Arrobio, J.O. Rindge, B., Parrott, R.H. and Chanock, R.M. 1969, *Am. J. Epidemiol.*, **90**, 484-500.

Louis, N., Fender, P., Barge, A., P. Kitts, P & Chroboczek, J. 1994, Cell-binding domain of adenovirus serotype 2 fiber. *J Virol* **68**: 4104-6

Trentin, J. J., Yabe, Y. and Taylor, G. 1962, *J. Mol. Biol.* **137**, 835-849.

Wadell, G. and Norrby, E. 1969, *J. Virol.* **4**, 671-680.