

Kumihashi and Mr Masakazu Takashima, Research Foundation for Microbial Diseases, Osaka University for their excellent technical help and to Dr Kohnoſuke Fukai, Director, Research Foundation for Microbial Diseases, Osaka University for his understanding concerning this work. This work was partly supported by a Grant-in-Aid for Scientific Research, Ministry of Education, Science and Culture, Japan, (B) 03454270, (B) 04454281, a Grant-in-Aid for Encouragement of Young Scientists 04770640 and by a Grant for Scientific Research Expenses for Health and Welfare Programs, Ministry of Health and Welfare, Japan, entitled 'Research Work on Vaccine Development'.

REFERENCES

- 1 Clements, M.L. and Murphy, B.R. Developments and persistence of local and systemic antibody responses in adults given live attenuated or inactivated influenza A virus vaccine. *J. Clin. Microbiol.* 1986, **23**, 66-72
- 2 Kilbourne, E.D. Inactivated influenza vaccines. In: *Vaccines* (Eds Plotkin, S.A. and Mortimer, E.A. Jr) W.B. Saunders, Philadelphia, PA, 1988, pp. 420-434
- 3 Clements, M.L. Influenza vaccine. *Biotechnology* 1992, **20**, 129-150
- 4 Glezen, P. and Couch, R.B. Influenza vaccines. In: *Viral Infections of Humans* (Ed. Evans, A.S.) Plenum Medical Book Co., New York and London, 1989, pp. 419-449
- 5 Ghendon, Y. The immune response of humans to live and inactivated influenza vaccines. *Adv. Exp. Med. Biol.* 1989, **257**, 37-45
- 6 McGhee, J.R., Mestecky, J., Derzbauch, M.T., Eldridge, J.H., Hirasawa, M. and Kiyono, H. The mucosal immune system: from fundamental concepts to vaccine development. *Vaccine* 1992, **10**(2), 75-88
- 7 Maassab, H.F., Lamontagne, J.R. and DeBorde, D.C. Live influenza virus vaccine. In: *Vaccines* (Eds Plotkin, S.A. and Mortimer, E.A. Jr) W.B. Saunders, Philadelphia, PA, 1988, pp. 435-457
- 8 Kimura, M., Kuno-Sakai, H., Takesue, R. and Ozaki, K. Nasal application of inactivated influenza vaccine. *Acta. Paediatr. Jpn.* 1988, **30**, 601-603
- 9 Oh, Y., Ohta, K., Kuno-Sakai, H., Kim, R. and Kimura, M. Local and systemic influenza haemagglutinin-specific antibody responses following aerosol and subcutaneous administration of inactivated split influenza vaccine. *Vaccine* 1992, **10**(8), 506-511
- 10 Ohta, K., Kuno-Sakai, H., Kimura, M., Oh, Y., Kim, R., Kumihashi, H. and Fukai, K. Enzyme-linked immunosorbent assay of influenza specific IgA antibody in nasal mucus. *Acta. Paediatr. Jpn.* 1991, **33**, 617-622
- 11 Tamura, S., Kurata, H., Futano, H., Nagamine, T., Aizawa, C. and Kurata, T. Protection against influenza virus infection by a two-dose regimen of nasal vaccination using vaccines combined with cholera toxin B subunit. *Vaccine* 1989, **7**, 314-320