cells and of haemopoietic stem cells in the bone marrow indicate that Ftorafur is 2–3 times less effective than 5-FU. However, it is about 7 times less effective in killing rapidly proliferating haemopoietic stem cells. This finding is hard to explain since Ftorafur is reported to be active only through release of 5-FU, a report which is in agreement with our observation of ineffectiveness of Ftorafur upon incubation *in vitro* in concentrations 10 times higher than effective 5-FU concentrations. On the other hand, the lower toxicity of Ftorafur for proliferating stem cells might explain the reported better tolerance upon prolonged administration to patients in comparison with equally effective doses of 5-FU. A study, made to verify this, has indicated that upon fractionated administration Ftorafur is not only much less toxic than 5-FU but also less effective in killing L 1210 cells.

If conditions in man are comparable with those in mice, part of the good haematological tolerance to prolonged administration of Ftorafur may be due to a decrease in the fraction of the drug being hydrolyzed to liberate 5-FU.

RECENT RESULTS WITH CARCINOGEN BINDING PROTEINS. B. KETTERER and E. TIPPING. Middlesex Hospital Medical School. D. BEALE. ARC Institute of Animal Physiology. B. ABRAHAM and J. MEUWISSEN. Katholieke Universiteit te Leuven, Belgium.

Three azodye carcinogen binding proteins have been purified in our laboratories with sedimentation coefficients of 4·7, 3·5 and 1·7S. The 4·7S protein has a pI of 9·0, a low tyrosine and a high CyS content, a complex absorption spectrum for bound azodye and readily dissociates into subunits.

The 3·5S protein, ligandin, is a relatively small molecule composed of two apparently identical subunits of MW 23,000. It nevertheless binds ligands as diverse as oestrone sulphate, bilirubin and haematin with affinity constants for the first binding site of 10^6 to at least 10^8.

The abundance and wide tissue distribution of ligandin make it of particular interest. An apparent connection with drug metabolizing enzymes indicates that it is more than an intracellular equivalent of serum albumin.

LACK OF SYNERGY BETWEEN N-METHYL-N-NITROSOUREA (MNU) AND CYCLOPHOSPHAMIDE (CP) IN RAT URINARY BLADDER. J. ST. J. WAKEFIELD and R. M. HICKS. Middlesex Hospital Medical School, London.

A single, intravesicular dose of MNU is non-carcinogenic in the normal life span of the rat. By contrast, 4 bi-weekly doses produce bladder tumours from 15 weeks on (Hicks and Wakefield, *Chem-Biol. Interact.*, 1972, **5**, 139). Each dose is followed by necrosis then hyperplasia of the epithelium. Intraperitoneal injection of CP also causes necrosis followed by hyperplasia of the bladder epithelium, but no tumours develop after multiple (12) doses. This suggests that prolonged hyperplasia *per se* is not carcinogenic in the absence of some further stimulus.

Rats given either a single dose of MNU followed by CP, or CP followed by a single dose of MNU, also failed to develop tumours. These results show no co-carcinogenesis with MNU and CP, even though the target tissue for both compounds is the same.

SYNCARCINOGENESIS WITH N-METHYL N-NITROSOUREA (MNU) AND CYCLAMATE IN RAT URINARY BLADDER. J. CHOWANIEC, J. ST. J. WAKEFIELD and R. M. HICKS. Middlesex Hospital Medical School, London.

Cyclamate is suspect as a bladder carcinogen, but reports from different experimentalists are conflicting. In this laboratory, only one animal on a cyclamate containing diet has so far developed a bladder tumour in the absence of any other treatment.

One intravesicular dose of MNU is not carcinogenic but 4 doses are (Hicks and Wakefield, *Chem-Biol. Interact.*, 1972, **5**, 139). Animals which have received one intravesicular dose of MNU are now being maintained on a cyclamate containing diet. Of these, 21 animals have been killed so far and 9 had bladder tumours. These results demonstrate syncarcinogenesis with MNU and cyclamate in the bladder. By contrast, co-carcinogenesis could not be demonstrated with MNU and the cytotoxic, but not carcinogenic, cyclophosphamide (see previous abstract, J. St. J. Wakefield and R. M. Hicks). We suggest that cyclamate may be a weak bladder carcinogen, not normally effective in the life span of the animal.