now being developed for tetanus, diphtheria, AIDS, and many other diseases. Promising data has been obtained. The potential advantages of such controlled release vaccines include improved patient compliance (particularly in the developing world, where patients frequently do not return for repeat injections) and potential higher antibody titers. New routes of entry for polymer-based vaccines are also being considered. Such routes include mucosal (such as oral and nasal)[7] and parenteral (such as subcutaneous and intramuscular)[6]. The paper by Sherwood et al is important for a number of reasons. First, it offers a novel portal of entry—vaginal—which may be useful for the delivery of a number of agents and vaccines. Second, it provides a potential new approach for treating genital herpes and other STD pathogens. It is an important study that should have significant future implications.

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Tissue-specific gene therapy

Mima Predich

Peptide-displaying bacteriophage could emerge as vectors for gene therapy, suggests a recent report in the March 1996 issue of *Nature Medicine* (2:299-305). A group from the University of Texas Southwestern Medical Center (Dallas, TX) describes peptide-displaying phages that have been selected to bind to specific tissues, that peptides may be useful in targeting gene therapy vectors to the cell type of interest. Clinical studies, however, are at least a few years away. "We have a long way to go, but the initial results are very positive, and tissue-specificity is likely to remain one of the key issues in gene therapy," comments principal author Stephen Johnston. Although this method will undoubtedly prove useful, selection of tissue-specific phage was performed in cell culture which, although the phage was cross-tested against other cell types, does not account for all the potential nonspecific binding in vivo. In vivo selection of phage may solve this problem (see "In vivo veritas: Live phage display panning," p.429).

Another recent study at Oregon Health Sciences University (Portland, OR), reported in *Nature Genetics* (12:266-273, March 1996), demonstrates successful correction of a lethal liver gene defect by direct injection of a retrovirus carrying the normal gene into the hepatic portal vein of affected mice or by transplantation of liver cells from wildtype, congenic animals. In both cases, hepatic cells expressing the gene have a selective growth advantage over the mutant cells, resulting in the repopulation of the liver with healthy hepatocytes. Since the selection of corrected liver cells overcomes the low transfer efficiency, a problem that has been responsible for the limited success of previous attempts at ex vivo liver gene therapy, this study is very encouraging. "Our work has implications for the gene therapy of several liver metabolic diseases, and we are hoping to extend our studies to affected humans," says Markus Grompe (Oregon Health Sciences University, Portland, OR), a lead investigator. "We are also very interested in the effect of corrected cells on the development of hepatocellular carcinoma, a frequent occurrence in humans and mice bearing a defect in the fumarylacetoacetate hydrolase (FAH) gene," says Grompe.