

percent by weight of proteins found in human blood plasma are protease inhibitors. For diseases caused by an imbalance of proteases and their inhibitors, a dose of extra inhibitor may become the most appropriate treatment.

Animal studies have now demonstrated the effectiveness of several chemically synthesized inhibitors in countering emphysema, Powers reports. In emphysema lung material is progressively destroyed by a protease released from white blood cells. An inhibitor called alpha<sub>1</sub>-PI normally protects the lung from such digestion. But a small number of people are genetically deficient in the inhibitor, and in a much larger number smoking has inactivated alpha<sub>1</sub>-PI.

Powers and colleagues have synthesized chains of amino acids that can substitute for the natural inhibitor. They bind at the same position on the enzyme (called elastase) that destroys the lung material elastin. One effective inhibitor is a chloromethyl ketone (CH<sub>3</sub>OCOCH<sub>2</sub>CH<sub>2</sub>CO-Ala-Ala-Pro-ValCH<sub>2</sub>Cl). Powers also reports inhibition by a trifluoroethyl ester of a nitrogen-containing peptide chain.

"Synthetic elastase inhibitors have considerable potential for the treatment of emphysema," Powers says. The ketone described above is orally active in protecting rats from experimentally induced emphysema. A related inhibitor has been shown effective in hamsters by other researchers. Although no toxic effects have been observed, Powers remains doubtful that those very reactive compounds will survive the stringent safety requirements for human pharmaceuticals.

"It is likely, however, that many future drugs will be irreversible enzyme inhibitors," according to Powers. He points out that at least one common medicine — aspirin — already falls into that category. Aspirin permanently inactivates an enzyme involved in prostaglandin biosynthesis. Another inhibitor is being used in Europe for treating a disease in which protease leaks from the pancreas into plasma. Squibb is testing a reversible protease inhibitor as treatment for hypertension.

One strain of bacteria, *Pseudomonas aeruginosa*, causes hemorrhagic pneumonia by doubly inducing an imbalance of elastase and its inhibitor. The bacterium produces elastase to break down lung tissue and also inactivates the body's natural inhibitor. Powers has designed an inhibitor to that bacterial elastase.

An imbalance between the protease that breaks down collagen and its inhibitor is suspected of being responsible for arthritis and chronic pulmonary fibrosis. A protease-inhibitor imbalance is probably involved also in the muscle tissue degradation characteristic of muscular dystrophy. In that case the protease is still unknown. The challenge to the chemists is to continue custom-synthesizing inhibitors as researchers identify more and more proteases out of control. □

## Inexpensive proposal to aid global ills

### 1978 U.S. SPENDING (Net)

Spending priorities	\$ (Billions)	% More Than Spent on ODA
Official development aid (ODA)	\$ 4.8	
Flowers, seeds and potted plants	5.0	104
Barbershop, beauty parlor and bath services	5.9	123
Spectator amusements	7.4	154
Pets, cable TV, lotteries, camping, photo studios and film processing	7.6	158
Watches and jewelry	9.3	194
Nondurable toys and sports supplies	11.7	244
Cleaning, polishing and misc. household supplies	16.4	342
Tobacco products	17.9	373
Radio, TV, records and musical instruments	19.5	406
Alcoholic beverages	30.9	644

ODC

*Selected personal-consumption choices made by individuals contrasted with government expenditures to aid developing nations.*

With the buying power of the American dollar seeming to diminish daily, protectionist strategies — spend the dollar at home, not abroad — now prevail. But spending more to aid the economies of developing nations is probably a much better remedy to America's long-term fiscal woes, says the Overseas Development Council in a new study. And the investment in developing economies need not break the pocketbook. ODC's recommendation for near-term U.S. spending increases — roughly \$3.07 billion in fiscal year 1981 — represents but a fraction of America's annual discretionary spending.

"Three quarters of the world's people live in the developing world, where even such basic needs as food, shelter, health, education and jobs are not met," says Father Theodore M. Hesburgh in his introduction to "The United States and World Development: Agenda 1980" (published for the Overseas Development Council, whose board Hesburgh heads). "A false dichotomy has been drawn in recent years between those who say that meeting these 'basic needs' is the most important objective and those who say that reform of the international economic system must take place before any other development progress is possible," Hesburgh says. "The question is not which ... to pursue, but rather how to pursue them both."

How and where science and technology might be harnessed to provide for these interrelated goals — basic needs and a restructuring of the world's developing economies — was tackled at a United Nations conference in Vienna last year (SN: 8/18/79, p. 126). Hesburgh, the U.S. ambassador to those negotiations, donned a slightly different hat this week to explain how fostering development of those goals — with money, policy changes or R&D — will also benefit the donor. For example, he said that any long-term solution to domestic U.S. problems — such as energy, unemployment or the economy — must involve the developing world.

Not only is the developing world the fastest growing market for U.S. exports —

up 18 percent a year over the past decade to total 38 percent of all 1978 U.S. exports — but one of the major sources of strategic materials for the United States (including 82 percent of its tin, 56 percent of its aluminum, 45 percent of its cobalt and 39 percent of its tungsten).

While the United States vocally supports economic efforts to aid developing nations, its annual expenditures amount to only 0.10 percent of its GNP, among the lowest in the developed world. Bearing in mind that the United States, particularly the Congress, has adopted a tight-pocket posture over foreign aid, "Agenda 1980" offers inexpensive short-term proposals for bolstering the economies of developing nations. □

## Sex and violence: Pornography hurts

Sexual attacks against women — our newspapers, magazines, novels, movies and television shows are full of such incidents. Considering the long history and continued prevalence of this kind of violence, it might seem that little can be done to curb it. But the situation may not be so bleak. Social scientists are beginning to pinpoint the many factors associated with violence, and the National Institute of Mental Health recently has concluded that an understanding of the conditions that lead to sexual attacks against women should be a major goal of research. Some of that research was presented last week in Montreal at the annual meeting of the American Psychological Association.

Pornography and its possible role as a causative factor in eliciting violent behavior against women is one of the many areas currently being investigated. And the findings contradict much previous research. Ten years ago, the Presidential Commission on Obscenity and Pornography concluded that there was no relationship between exposure to erotic pres-

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