neutrophil polymorphs in varying proportions with an admixture of red cells and fibrin. The inflammatory cells frequently showed lysis, and typically there were areas of coagulative necrosis of the parenchyma of the lung and oedematous thickening of the septa of the alveoli. In the three patients who died after clinical resolution of the acute process, there was an organised pneumonia; the exudate in the alveoli had undergone conversion into granulation tissue with focal obliteration of the septal framework of the alveoli. In one case the organisation had proceeded to diffuse fibrosis. By contrast, there were few noteworthy findings in the other organs: one instance of non-bacterial thrombotic endocarditis of the marantic type and two of haemorrhagic infarction of the adrenal glands. Nine of the patients had had underlying disorders for which immunosuppressive treatment had been given, and all 20 cases had serious diseases in addition to legionnaires' disease. Their ages ranged from 43 to 86 years.

The overall picture in the lungs is one of extensive, confluent, bilateral bronchopneumonia which is associated with the bronchioles even when a whole lobe is implicated. The pathogenesis of legionnaires' disease does not therefore seem to parallel pneumococcal lobar pneumonia. On the other hand, the microscopical features in the two diseases are closely similar, with two exceptions: the coagulative necrosis of the lung parenchyma and the oedema of the alveolar septa seen in legionnaires' disease. There is no suppurative destruction of the bronchial system, such as is found in pyococcal bronchopneumonia, nor is there the interstitial inflammatory cellular infiltration seen in viral and rickettsial pneumonias. In all, the morbid anatomy of legionnaires' disease appears to be distinctive—though the diagnosis must always be confirmed by bacteriological and serological studies. On occasions electron microscopical examination of lung tissue may be of additional help; as many as 23 separate bacillary profiles can be seen within a single macrophage. As epidemics of legionnaires' disease become recognised in more parts of the world, more will be learnt about the biological characteristics of the causative organism.

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Hyperlipidaemia advances and retreats

The suggestion that hyperlipidaemia, and especially raised serum cholesterol concentrations, is an important correlate of ischaemic heart disease has led to repeated attempts to lower serum lipid concentrations and so to prevent the disease. The results of such attempts have been mixed. The Coronary Drug Project[1] established that two drugs studied (D-thyroxine and oestrogens) were dangerous, another (nicotinic acid) was unpalatable, and a further agent (clofibrate) unacceptably often caused gall-bladder disease[2]: none prevented recurrent heart disease. The results of the WHO clofibrate trial[3] showed that primary drug prevention of ischaemic heart disease was feasible. Nevertheless, an overall increased mortality outweighed the benefit for the persons studied, who were not especially at risk of heart disease. Evidence from North America and Finland suggests that changes in life style, such as stopping smoking and altering diet, may be beneficial, but the simultaneous changes in the prevalence of the disease make the interpretation of the individual roles of such factors difficult. In a different category are the few patients with severe and genetic hyperlipidaemias, whose health is seriously impaired and in whom vigorous treatment is required.

Extravagant claims made for the usefulness of manipulation of lipid metabolism are now viewed with scepticism, and it was in a guarded mood that the VII International Symposium for Drugs Affecting Lipid Metabolism recently reviewed the state of the art. There was no lack of new work on lipoprotein metabolism, especially on the importance of apoprotein AI and high density lipoprotein (HDL) cholesterol, the concentrations of both of which are inversely correlated with the risk of ischaemic heart disease.[4] Doubt remained, however, about the importance of any alterations that may be induced, and information was also presented suggesting that HDL subfractions may be of crucial importance. Serum concentrations of HDL_2 cholesterol may well prove to be the best index of the efficacy of removal of cholesterol and its catabolism and hence protection from atheroma.

Since the protective role of HDL was rediscovered the diets and drugs used in hyperlipidaemia have been examined to determine their effects on it. Many presentations at the symposium showed that serum concentrations of HDL rise somewhat after treatment with bile-acid-binding resins and with both the clofibrate and nicotinic acid groups of drugs. In contrast, neomycin and probucol definitely reduced HDL; this must be judged a disadvantage on present knowledge. The effect of dietary polyunsaturated fats remains contentious.

One session of the meeting was devoted to large clinical trials in North America. The Multiple Risk Factor Intervention Trial is studying the effects of diet, control of hypertension, and advice against smoking in a selected population at high risk of heart disease, and the Lipid Research Clinics Coronary Primary Prevention Trial is studying the effect of cholestyramine in men with hypercholesterolaemia. An effect on serum lipids has been shown in both trials, but the crucial data on clinical outcome are still awaited. Both the Aspirin Myocardial Infarct Study and the Perantine Aspirin Reinfarction Study had failed to show any benefit, and the main positive finding was a surprisingly high incidence of aspirin-related side effects.

An important contribution was a report from the Minnesota Programme on Surgical Control of the Hyperlipidaemias. This is a careful prospective study of exclusion of one-third of the ileum in hypercholesterolaemia: patients and controls will be followed up for five years with sequential coronary arteriograms. When the results are available there will be answers to the important questions of whether atheroma regresses and whether coronary morbidity and mortality are reduced. This is the first adequate study of surgery in hypercholesterolaemia.

The interaction of systemic and biliary lipid metabolism was reviewed in detail by various speakers. Clofibrate and, to a less extent, nicotinic acid induce oversaturation of bile with cholesterol[5] and cause gall stones[2 3]: analogues of these drugs might carry a lesser risk, but that remains only a speculation. Analysis of bile had shown that cholestyramine and probucol should be free of this problem, and chenodeoxycholic acid should actually protect against gall stones while reducing hypertriglyceridaemia.

A bewildering number of dietary modifications (20) and drugs (64, including 18 analogues of clofibrate and nicotinic acid) were discussed at the meeting. Three deserve particular

attention. L-Carnitine is a dietary constituent and is non-toxic: on the theory that part of the disorder in hyperlipidaemia is the result of deficiency of L-carnitine it had been given as a supplement with some biochemical improvement. Compactin is the product of an exhaustive Japanese review of microbial products to find an inhibitor of liver and intestinal cholesterol syntheses. It is extremely potent, being effective in a dose of 15-30 mg daily in hypercholesterolaemia. Efficacy, safety, and clinical usefulness were being tested. Probucol has recently been introduced into Britain, having been available in the United States for three years. It is palatable and moderately hypocholesterolaemic, but the fact that it lowers HDL may limit its usefulness.

What does all this mean for the physician? Clearly there is no place for indiscriminate prophylactic drug treatment in the general community, and health education should focus on cigarette smoking, prudent diet, and screening for hypertension. For the individual with a poor personal or family history, or with appreciable hyperlipidaemia, treatment should invariably be supervised from a specialist clinic—if some of the mistakes of the past are to be avoided.

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Anaesthesia for patients with coronary disease

A patient who has had a recent myocardial infarction is at risk if he needs general anaesthesia. About one-third of patients operated on within three months of an infarct develop a reinfarction in the first postoperative week, and at least half of them die.[1] The incidence of reinfarction falls to around 5% once six months or more have elapsed. The risks are increased when surgery is prolonged and by operations within the thorax or upper abdomen but are independent of the nature of the anaesthetic.[2]

In absolute numbers, a more important problem is the fate of patients with ischaemic heart disease who have not suffered recent infarction. Goldman *et al*[3] looked at the frequency of cardiac complications after non-cardiac surgery in 1001 patients over 40 years old. Of these, 269 were found to have ischaemic heart disease; but, whereas stable angina, old myocardial infarction recognised historically or electrocardiographically, and ST-segment and T-wave changes were found to be of minimal importance in a multifactorial analysis of cardiac risk, in contrast myocardial infarction within six months and rhythm disturbances were high-risk factors. There were 19 cardiac deaths and 39 life-threatening cardiac complications during or after surgery in the group as a whole, and over half of these events occurred in the high-risk patients.

How can the anaesthetist reduce the hazards of anaesthesia and surgery for patients with ischaemic heart disease?[4-6] Preoperative recognition is the first essential, and evidence from the clinical history is often more reliable than reliance on the electrocardiogram. Treatment with hypotensive drugs and beta-adrenergic blocking agents should be continued up to the time of operation and restarted afterwards in all but exceptional cases. During anaesthesia unnecessary cardiac work should be kept to a minimum by limiting increases in the heart rate and the blood pressure. The product of heart rate and systolic arterial blood pressure provides a useful index of myocardial oxygen consumption.[7] Hypotension must also be avoided since coronary perfusion depends on the difference between the aortic and ventricular diastolic pressures. Overdistension of the heart is disadvantageous not only because it decreases coronary perfusion but also because it increases ventricular systolic tension. The anaesthetist should maintain satisfactory arterial oxygenation and keep the carbon dioxide tension as near normal as possible.[8] A packed cell volume a little below the accepted normal figure may be beneficial in patients with ischaemic heart disease, but the increased cardiac output associated with both acute and chronic anaemia is detrimental.

If these recommendations are to be fulfilled patients need detailed monitoring during anaesthesia, and some of the techniques accepted as routine during cardiac surgery should be applied when patients with cardiac disease require operations of any kind. An electrocardiogram is essential, preferably recording from a precordial rather than a standard limb lead.[9] Measurement of the central venous pressure may not provide useful information about the filling pressure of the left ventricle, but it should prevent gross errors of transfusion. More invasive monitoring[10]—using a radial arterial cannula and, possibly, a pulmonary arterial catheter—is probably justified for patients who need surgery soon after a myocardial infarct. These aids make adverse haemodynamic changes more quickly recognisable, and improve the accuracy of both the selection and the control of treatment.

Monitoring should extend throughout the early postoperative period if maximum benefit is to be achieved. The peak incidence of reinfarction is on the third postoperative day,[2] when myocardial viability is threatened by hypoxaemia, hypercoagulability, dehydration, increased metabolic demand, and the biochemical sequelae of acute starvation. Safety depends on vigilance so, ideally, high-risk patients should be kept in an intensive care unit for at least three days after operation as a safeguard against cardiovascular complications.

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