DISCUSSION

Chairman SIR ROGER BANNISTER, CBE, DM, FRCP (London)

DR ARCHIE YOUNG, (London): Would Professor Hervey care to comment on the ethics of requiring even volunteers to take the 100 mgs of Anabolic Steroids daily?

PROF G. R. HERVEY: It is a subject of great interest. As you know of course there is a great tradition in physiology in doing things on yourself and one's colleagues. I think the main points here are, first of all, you really do need to know what happens. It is extremely difficult to make reasonable regulations or to give any kind of guidance to athletes unless you have some background of knowledge as to what really happens. These young PE students are, of course, a suitable source of volunteers because they are sufficiently similar to athletes and are people who are taking athletic training seriously. They themselves are very much concerned and interested in the result. As Mr Payne pointed out, for them, as for some of the potential top class athletes, it is a matter of burning interest — "should I take steroids or not?" There are many confronting the situation in which rumour, no more, indicates that you have no chance of making the top grade unless you take steroids in huge quantities and at the same time there is plenty of advice coming to them that to do so is extremely dangerous. What are they to do? I think they, like ourselves feel that if you know the facts you are a lot better off. The other point, of course, is that as far as they were concerned it was effectively common knowledge that many athletes have taken as much and more of the corresponding preparations for very much longer than they were proposing to do, not only without obvious ill-effects but remaining top class athletes throughout. One of the general views I personally hold about the ethics of human experimentation is that, although one may talk about "free and informed consent", neither of these things really exist when you go into it and I think the full responsibility of this comes on the investigator. So, I can only say that I personally thought that this was a justifiable thing to do. Obviously if you took enough people you would not find agreement on a question of this sort.

CHAIRMAN: In America I think the drugs rules have prevented them from using more than 10 mgs; they have traditionally been very much stricter about the use of drugs in trials of this kind.

PROF HERVEY: There are important physiological experiments in animals which have been illegal in this country and have been done in America; this is just one of the facts of life.

CHAIRMAN: Are there any other questions of Prof Hervey.

DR JACQUES ROGGE (Belgium): I suppose in Prof Hervey's experiments the training was the same for everyone?

PROF HERVEY: Yes.

DR ROGGE: From the contact we have with athletes we have the impression that they feel that they can train much more with steroids than without. They say they can work at twice or three times the usual rate of normal training. I think firstly that it is not proved scientifically that the effect of steroids is greater in some sports like shot-putting and weight lifting. The second fact which has to be proved is that it gives more strength. The third question, and I think this is most important, is that they can train more, much more, than they could before.

PROF HERVEY: Yes, I can really only reply that I have heard exactly the same thing said by athletes and I think that there may be a number of people in the audience who could contribute to this. We, of course, were concerned primarily to test whether there is such a thing as an anabolic action or not — which means building up the specific protein constituents of muscle. Even if we had answered that question, which I don't think we have finally, this would still leave open the possibility of all kinds of other actions which steroids might help including perhaps some sort of anti-fatigue, or anti-discomfort effect during the training and I do agree that athletes speak for such an effect. In fact it is one of the things which suggested to us the rather interesting possibility of some kind of inter-action with cortisol and similar natural hormones, and there is just a little evidence in the literature for that. We wondered whether there was some sort of cortisol-protecting or potentiating effect which might be really what is happening, which of course is in no sense an anabolic action.

MR FRANK DICK: It did appear to me to be almost self-evident that if the same training regimen was being given to both the steroid users and the non-steroid users the same training effect would be recorded. I wasn't quite sure what the purpose was of comparing strength if the same strength programme was being used.

PROF HERVEY: Well, I think again I must agree with you that the confusion, if there is any here, is again on this question of anabolism versus any other effects. If there really was such a thing as an anabolic effect one would expect that this would work in everybody. After all males are bigger than females, whether or not they are destined to become athletes. But, of course, you are perfectly right that if we had answered that question, and supposing it was that there isn't satisfactory evidence of an anabolic effect, it would still leave the whole field open as to what effect, if any, these compounds have in athletes and I couldn't agree more, we haven't begun to answer that and our experiments.

MR DICK: What I am asking is, were you expecting to get a greater effect from the same training?

PROF HERVEY: Well, I would hope to be able to say we were not expecting anything, we were trying to be objective, I suppose, if there were anabolic effects so that the man who took the steroids got bigger muscles we would have expected that he would be able to develop more power with those bigger muscles.

MR DICK: But surely one gets the same effect from the same training irrespective of whether one is using a steroid or not?

PROF HERVEY: Yes, indeed that seems to be what happens as far as our evidence goes — you may think we did the wrong thing, but I hope I have given you a clear picture of what actually happened.

CHAIRMAN: The same questions and the ethical one arise in relation to Dr Freed's paper. Can we ask if there are any questions in relation to his paper. This was "Top performers taking 10-25 mgs of Dianabol with weight gain and marked improvement in performance".

DR D. S. TUNSTALL-PEDOE: Professor Hervey and Dr Freed both did double blind trials, but in some double blind trials the subjects are not conscious of which is the active drug, not necessarily because of the side effects, but some suggested effects that the drug does have. Were any of the participants in either of these trials absolutely sure whether they were having the placebo or the effective drug?

PROF HERVEY: Yes, again you have put your finger on a very good point. We gave the subjects a questionnaire afterwards which specifically asked them "Did you think that the first or the second period (separate question asked for each) was an active drug", and in fact they did usually get it right, I think mainly on the basis of noticing that they had got heavier. We did not find much consistency in psychological and attitudinal factors, so I think that this is a perfectly valid criticism of the trial. It was not totally double blind, and again one can only say how difficult it is to do this kind of investigation as one would like to.

CHAIRMAN: This has been found in other drug tests, including amphetamines.

DR D. L. J. FREED: This certainly applied to our trial. We challenged all thirteen participants to identify their tablets before we did, and all successfully did so.

MR I. HUTCHINSON: You were making a point, asking if both groups (in our trial with Prof Hervey) were doing the same training. In fact we were doing the same types of training, not the same amount, we had to do as much as we possibly could of the different types, and they were also doing training in their own particular sport on top of that as well.

DR K. N. LLOYD (Cardiff): Could I ask a comparatively simple question of the two speakers? There is a vast discrepancy, of course, in practical results. Prof Hervey's trial, giving a big dose of Dianabol and Dr Freed's a relatively small one, and then of course they were using different groups of people. The students presumably were not working as hard as the active top class athletes.

Could I ask by what method Prof Hervey established that there was no difference in "force", by what method Dr Freed established that there was a 13% average increase in "strength", that I think you referred to?

PROF HERVEY: It is a simple question of muscular strength, isn't it? The tests that were reported this morning, the hand-grip one is a straight forward grip system where you simply grip the dynamometer as hard as you can and there is a non-return pointer which indicates the peak force reached. The subject cannot see that and the test is replicated three times. The main strength test is a static against a weight, and that again is similarly replicated. We also did measurements of impulse on a force platform system which measures the sort of peak force muscle can produce which I

didn't actually include in the report this morning, largely because they were not successfully done on all the subjects. Mr Graham Adamson of Leeds University Physical Education Department was responsible for the strength testing.

DR FREED: Firstly, let me correct a wrong impression; it was not the average improvement I gave you but the maximum improvement. We found a range of improvements while on Dianabol from 0.3% which is really neither here nor there, up to 13%. The average was much lower. The way we measured the improvements was by looking at the athletes' record books and seeing what poundage they were lifting, if they were doing several different types of lifts, week after week, which most of them did; we averaged their improvement.

PROFESSOR M. ANDREJEVIC (FIFA Medical Committee): I wanted to ask you one question about experience with detection. It is very important to know the time when the possibility expires for the detection of traces of anabolic drugs. From a practical point of view it would be very important to know after what delay the urine examination becomes negative.

CHAIRMAN: Can we come on to that later.

DR J. G. P. WILLIAMS: Just to confuse the issue a little bit more, if you are studying grip, using a standard grip dynamometer, you will get an inaccurate record any way, because the standard grip dynamometer depends on movement of two levers together working on a dial to produce a grip, while the strength which the hand develops depends entirely on the initial separation and you are not going to get an accurate recording unless you can separate separation and recording. The standard strain gauge dynamometer doesn't, so in a sense I am afraid that any grip recordings are suspect automatically.

PROF HERVEY: Well I will really have to bow to that, I am sure we didn't get an accurate recording. The idea here, of course, was to try and use available methods for measuring firstly the capacity to do work which is measured by these leg and body presses and so on when the number of presses is multiplied by the load carried; secondly, the maximum sustained force which you could produce, of which grip is only example. I think the leg press is actually a more effective measurement. Thirdly, we did the impulse measurement given by the force platform. They are all standard methods, and I am very conscious of the general implied criticism here. It is classically difficult to prove a negative. That is to say, to show that you showed no difference means that there really was no important difference, or to be more specific, what this amounts to is deciding what are the confidence limits within which your finding of no significant difference actually falls. This is something that I so far cannot do quantitatively and I have been trying to get my physical education colleagues to try and give some sort of description from their experience of what the confidence limits of any results by these kind of measurements are, and I found them really very cagey about it. Again, I think the criticism has to be accepted.

DR RAY WATSON (Eastbourne): I would like to make a slight observation on Prof Hervey's study in relation to the oxygen uptake graph that you showed. In fact you showed that there was no increase but you were using litres per minute as the unit, and in fact you have gone to great lengths to show that there is an increase in body weight as a result of taking the drug. Surely if you would use the units of millilitres per kilogram per minute, which is an accepted unit for oxygen consumption, this would have actually shown a decrease in oxygen uptake. I think this is rather an important observation to make because athletes who are dealing in sustained aerobic events would probably take the hint that the drug is of no use at all in terms of oxygen uptake. I think you probably missed a golden opportunity there.

PROF HERVEY: I do not know whether that requires much comment, though the point is fairly clear. It is a general physiological point, of course, as to what you should "correct" measurements to, and I think very often the correction factor could just as well be described as a falsification factor. In this kind of case whether it is useful to correct the body weight depends very much what you think the weight consists of which, of course, is specifically an open question at this stage of the trial.

MR J. A. JORDAN (Birmingham): This question may be directed to Prof Hervey, or to anyone else here. Most of the discussion, so far, has been on the effect of steroids on males. Now, I am a gynaecologist and I have been approached by one or two females who are already taking steroids, whether they are on oral contraceptives or not haven't enquired. Would any member of the audience like to comment on experience with women who are taking the pill? Two or three of these girls who are already taking steroids did complain of menstrual disorders and other associated problems, and this to me presents quite a grave problem in females who are taking steroids.

CHAIRMAN: I think this is going to come up and possibly Prof Brooks will answer it but can I just quickly ask whether there are any questions of Prof Ljungquist on his trial? This is really on the facts of the presentation of 30% of their top performers admitting to taking drugs.

MR L. DENHAM (High Wycombe): I was concerned particularly about side effects that were mentioned by several speakers and the possible harmful effects of anabolic steroids and particularly speakers mentioned cholesterol levels, the possibility of precipitating latent diabetes and also increased fluid retention. All of these things, it seems to me, suggest the possibility of cardiac involvement, and nobody mentioned any work in that connection. I would be interested to know whether either it has been done or people have thought about it or contemplated doing it because it seems the long term effects are those we should worry more about.

CHAIRMAN: No answers from anybody I'm afraid.

DR FREED: There is only one very limited answer. We did measure the SGPT which as you know tends to rise in liver disease, for what that is worth, and we did see fast rises in SGTP in two of our people, one of them from normal levels up to 35 units/ml and one from normal levels up to 75. We do not know what causes this. Liver damage, tissue damage, or perhaps more likely sheer enzyme induction by an anabolic steroid. That's the only light, and that's not very much.

DR HARKNESS: I would just like to say that it has taken thousands of women years to prove any side-effects as distinct from physiological changes for the contraceptive steroids and I should think the situation with anabolics is going to be even worse, so I would have thought that we need a great deal more data before we are in a position to make any definite statements on increased incidence, but what I think we can do at present is to point to possibilities on the basis of physiological changes.

MR OSCAR STATE (Weight Lifting Federation): I heard a comment a short while ago from Dr Owen that one of the dangerous side effects of taking anabolic steroids could arise when a man who is saturated with them has a sudden emergency operation in a hospital. They tell me that certain anaesthetics could be dangerous even to the point of fatality. I think that is correct – do I quote you correctly Dr Owen? Is there anybody here who could comment on that and support that statement?

DR HARKNESS: I think that we indicated, as did other speakers, that the metabolism of the anabolic steroids goes through the same pathways as drugs, and therefore drug interactions might be expected in the presence of large quantities of anabolic steroids, especially increased effects from a standard therapeutic dose of many compounds. I, think therefore, it would be a very great risk for people going into hospital with doses of hundreds of milligrams of anabolics inside them. I hope that answers the question.

DR RUSSELL WRIGHT (USA) – (International Federation of Weight Lifting): In regard to testing, I was wondering how extensively it can be done. Are there facilities generally and is the expense of the equipment reasonable, available internationally, or is it localized to the area near the laboratory?

CHAIRMAN: Prof Andrejevic has asked about the degree of retrospection. There is a question now on the cost of the testing, and then there is the question about women and the use of oral contraceptives and any possible testing in relation to them. So if I could ask Prof Brooks to start by answering those questions.

PROF BROOKS: As to the degree of retrospection, this depends on the steroid that is taken and of course, on the dose in which it is taken. Now, of course, one could draw up a table of the steroid dose used, and in the weeks before competition we could discontinue use, but we don't propose to do that, I think it might be counter-productive. Anyway I think it may be very misleading because we have not stopped producing anti-sera. There is a two fold increase in sensitivity over the last year and we intend to find more new refinements. As to the cost and feasibility of the test, it uses a technique that is in very wide spread use now in hospitals throughout the world. There will be certain areas in the world, for instance South East Asia, where it may be difficult to set up the test, but in other parts of the world it is a very general technique readily available. There are, therefore, many more centres that could do it, provided there is the expertise of drug testing in athletics that would be available as well. I think this is the reason for the International Amateur Athletic Federation's list to provide for this. The third question about the use of oral contraceptives, and indeed the use of anabolic drugs by women, one would imagine that in women if more than small doses were taken there might be side effects, because these hormones have an increased anabolic to androgenic ratio. Apart from any other menstrual effects that they have, they have some residual androgenic action which is large relative to the amount

of natural hormone in a normal woman. Therefore, I think that the dose levels here might be fairly low. However, we have found that there is only one component of an oral contraceptive that interferes and cross-reacts at all with our sera and this only to the extent of 0.8% and at this level it should not at any time reach the confidence limits of the test as at present. We have tested a number of urines also of women on different contraceptive pills, and have never obtained a positive reaction. Of course this test has never been completely exhausted, but we would be very glad to test any components of contraceptive pills that people might like to send us. We would like to extend that range as widely as possible.

CHAIRMAN: Mr Holder, would you like to answer the question on the number of centres that the IAF has in mind including America?

F. W. HOLDER: Yes, we are still in the formative stages here as was mentioned earlier. It was only about a year ago that the possibilities of dealing with these tests came to light, and we have a fairly large number of places listed where there appear to be the technical facilities, but we also need to have people in those areas who understand the whole problem. Not just pure analysis, but the whole problem of doping associated with sport. Our first objective is to get a limited list of about ten centres, maybe starting with about half a dozen in Europe and trying to find four others in other parts of the world. That is our first objective, but this is a little bit in the future yet. We have started on it, but it is going to take a little time, I think we will always have to have a certain amount of patience here, but we are keen to get results.

DR BERTONI (Italian Federation of Sports Medicine, Rome): I have a question for Prof Brooks: In the radio-immuno-assay test, is this specific for all the steroids with alpha-methyl or alpha-ethyl groups in the 17-position? There are so many other steroids where this group is not present. How can we detect these?

PROF BROOKS: The group we are working on now are the intra-muscularly active ones. We are trying to prepare an anti-serum to 19-nor-testosterone as this seems to be the next one to go for, but I would also welcome any guidance on any other particular groups of anabolic steroids that have proved useful in athletics so that we could look at these also. A very large number of anabolic steroids are available but I think most of them would not be selected for use by athletes. Very many of them are disagreeable; they cause gastro-intestinal upsets and so on, and only a very small proportion of the known anabolics steroids have in fact appeared on the market.

DR SHACKLETON: I would like to follow that up by saying that we managed successfully to determine Durabolin in urinary analyses for a considerable period after injection of the drug. I don't at this time wish to say how long we can do it for but it is quite a long time.

PROF BROOKS: I think one point, the intra-muscularly injected steroids will have a longer lasting effect and therefore will be more easily detected for a longer period of time after discontinuation. I think this is an easier prospect, in fact.

DR J. L. BLONSTEIN (London Amateur Boxing Association): I would like to ask Prof Brooks — as we are shortly to have a European Boxing Championships — how long before the championships start does he recommend that we commence our tests? Most of the boxers will reach Katowice between five and three days before the championships begin. Does he think we should start on the tests immediately, or wait until the championships start, or should these boxers have the tests done in their own countries before they leave?

MR F. W. HOLDER: Well, Dr Blonstein has raised a very difficult administrative question. Speaking as a representative of an international body, we have problems which we cannot deal with across frontiers in the same way as they can be dealt with in an individual country. In an individual country maybe you can make your own programmes to some extent about where you do testing and so on. We carry out our tests in the International Amateur Athletic Federation at actual meetings, at athletic meetings where it is accepted that there will be doping control.

CHAIRMAN: I take it that the answer is that it does not make a great deal of difference whether it is three days before or during.

MR OSCAR STATE: Following on a question that I put to Prof Brooks last year when he spoke to our International Congress in Switzerland, I am dismayed to hear certain statements that he made today and Mrs Ward made similar statements. This concerns the length of time that it takes to produce a result of these tests, because time is a very important problem in our international competitions. In our competition we like to have the result of the test as

quickly as possible and certainly no later than twenty four hours because if there is an appeal then there has to be a second test, which of course delays things even further. I would like to know whether there is any chance of speeding up these tests so that we get these results as quickly as possible, otherwise there are great problems. The competition is over, everybody has gone home and after six days we get the result of a second test and have to take action.

PROF BROOKS: I do not at the moment think there is much chance of speeding up more than the one day and a night that I suggested by shift working. I think a lot of the delays are inherent in the technique, periods of equilibration and so on. It may be possible by experimenting with these to use shorter periods of equilibration, with the risk of less precision. We are conditioned by the fact that we have developed these tests working on clinical assays where precision is important. Here, we are more concerned with a 'yes' or 'no', and possibly we could, at the loss of some sensitivity, cut down on the equilibration phase, but we haven't tackled that problem yet.

MR R. J. PICKERING: Both the legislators answer the doctors who have spoken. Are they not conscious, as we from sport are, that there is a grave danger that this congress is looking for legislation to deal with yesterday's problems and not to-morrow's problems? That is to say, there is such an enormous gap between the overwhelming evidence, and the time you gentlemen get to that evidence and discuss it and sift it and come up with a problem which really is yesterday's problem. With anabolic steroids the athletes know which you can test, they know to what extent they are retroactive; they know which anabolic steroids are difficult to test, they know the areas that are going to be even more difficult and I am loathe to suggest it, but when you have a gap of some ten years when medical science cannot come up with any more positive action than banning the drug this contributes in a way to the spread of the problem. Unless you can stamp it out very quickly, and unless you are prepared to share the responsibility with the legislators and the coaches who know what is going on, and do it more quickly, then by the time you get around to it, it really is too late.

CHAIRMAN: There speaks a non-steroid chemist.

PROF BROOKS: I would like to ask Mr Pickering if he could tell us what to-day's problems are? We would like to know which of the steroids you would like us to test. We have tested for the ones which we were told were the problems, now which are the ones which are to-day's problems?

MR PICKERING: Well, I thought Mr State had made it fairly clear that the evidence that is reaching us internationally is that they have found ways now of increasing the production of natural testosterone. That is our problem to-morrow, and I think it has been made clear that the oral anabolic steroids are the easier to detect and those taken intra-muscularly are more difficult to detect.

CHAIRMAN: No, that's not true, I think.

MR PICKERING: I thought that came out of this morning's discussion, but I happily stand to be corrected, but certainly that is the problem where natural testosterone is concerned.

PROF BROOKS: As far as natural testosterone is concerned, if you are taking testosterone, then one of the effects as Dr Harkness showed with any natural hormone is that the gonadotrophins tend to be suppressed, so that therefore one would measure gonadotrophin. Now at the moment measurements of gonadotrophins are only done in the blood, this is an easier technique.

If there was some specific reason it would be possible perhaps to develop a test of gonadotrophins in urine. If one were to present with a high testosterone excretion and a low gonadotrophin excretion, this could only result by taking testosterone by administration or from a tumour of the testis, in which case, presumably, the athlete would like to know and, therefore, this would be one way around this particular problem. As for the drugs Mr State was referring to, those which stimulate the production of testosterone, one would need to know what type of drugs had been taken for this. It is possible that they are anti-oestrogens such as clomiphene, in which case the gonadotrophins would be elevated, or it is possible that they might be drugs with an L.H. action, like human chorionic gonadotrophin, which would be injected intra-muscularly. This would be detected by high values of L.H..

CHAIRMAN: I presume that it is the hope of this conference that those like you, who have this advanced or special information, should make it available to those doctors who are prepared to devote their time and energy to this work.

MR PICKERING: Sorry, I meant to ask a question but really we were raising these questions in 1965 and saying what a critical problem it was for us in sport and we still haven't resolved it. In that time there has been massive

increase in the number of people who take them, for whatever reasons they take them, and now it has got beyond the control of the legislators and those coaches who may have felt they had some influence in this sphere.

DR PETER SPERRY: Just to keep my records straight for the day, I think Mr Pickering got a reply from Dr Adams this morning where he did hint that there were ways of increasing natural testosterone. He didn't go into details, presumably these would involve the pituitary axis anyway, but I think that is where you got the fact.

DR SHACKLETON: To answer the last question, I don't think it is really the fault of the analytical chemist because, as Prof Brooks pointed out, it has only really been in the last four or five years that the techniques have become available for measuring the pico-gram amounts of excretory products of these compounds and until 1965 it would have been quite impossible.

DR FREED: I have two points to make on this topic of discussion, Mr Chairman, which lead into each other. The first is in answer to Mr Pickering. It is not easy to accelerate natural chemistry and that is what is holding up these tests. These are techniques available which can give rise to increased speed at the cost of lowered sensitivity. Now, the degree of retrospectivity of this test, which is the crux of the whole thing, depends on sensitivity, and this leads on to my second point which is directed at you, Mr Chairman. I quite understand why Prof Brooks and Mrs Ward are reluctant to spell out in public the length of time after taking anabolic steroids when it is still possible to detect. With all diffidence, may I say that I feel that this, in the long term, is counter-productive? If the athletic world knows that we are afraid to give them the figures then they will also immediately draw the conclusion that our tests are not very good. In the long term I think it would be best for athletes and doctors, and the world as a whole if we let this information out now. How long after a dose of, say, 20 mgs a day can we still detect it? May I ask you for a ruling, Mr Chairman?

CHAIRMAN: I think it is perfectly reasonable that Prof Brooks give this information, and it is a question of which information, which drug, which dose, but I think in general terms I imagine Prof Brooks would be very willing to make a general statement, which I am sure he has no intention to withhold.

PROF BROOKS: Well, yes, it is Dianabol that we have most information on and one can detect a 50 mg dose of Dianabol, which we measure at daily intervals four or five days after a dose, that is to say it varies between individuals. That is a single dose, not a series of doses where it might have gone very much longer. We had a very high value in one subject of 25 nano-grams per ml one week after the last dose; this was on a 100 milligrams dose. The 25 nano-grams per ml was one hundred times our detection limit, so this is quite a lot.

DR SHACKLETON: Well, our results on Dianabol agree with those of Prof Brooks. With one of the injectable drugs, Durabolin, which is a 19-nor-testosterone derivative, we can easily detect one 10 mg injection eight days later, and the only reason that we cannot detect it any later than that is that we did not keep on collecting the urine specimens.

DR FREED: So you think it would be longer than that if you continued?

PROF BROOKS: Yes.

CHAIRMAN: Well, I think the figures are between one and three weeks, and it depends on the dose and on the drug.

PROF HERVEY: I am sorry, I have spoken rather a lot, but this is really a question for Mr Holder. I think there is a nettle to grasp there, and I want to ask whether he has grasped it? Quite apart from the point we have just been discussing on which I wasn't going to close the gap because our people have been involved, I am conscious when talking to athletes of quite a widespread belief that you get the benefit from anabolic steroids, so they believe, at the time when you are doing the training, which may be three or six months before a big event, and that view was voiced again in one of the questions directed to me a few minutes ago. It would seem that if one is going to prevent this effectively, either one has got to convince the athletes, if it is the case, that there is no benefit to be gained from taking the steroids in the training stage, or I am afraid one will have to set up a screening system which by some means will operate more or less all the year round, perhaps whenever these people come to any kind of sports. I think the first possibility there does underline the importance of today's meeting. Of course, the obvious answer to this point in terms of the detection techniques is they did not exist. But I do make this point that, even when techniques did exist many years ago, athletes and others were going around saying anabolic steroids change your body composition in a particular way, and we were not being asked to test this specifically. I think there is a perfectly good point here, and the general moral of this is the one I have been trying to make all along — that if we knew the real facts of this we would be in a much better position to see what can be done about it.

MR F. W. HOLDER: Well, I think ideally one would like to be able to make frequent tests on athletes over long periods, random tests, this would bring the whole thing under closer control, but we have to be quite practical about this. We are moving in stages. We had doubts about putting steroids on our forbidden list at all, because we thought that if we put them on and had no means of detecting them, that it was a waste of time. We actually went beyond that and put them on because we felt that if we didn't put them on, people would feel that this was a type of consent to using them. So, even before we had reliable methods of detecting, we put them on in 1970 and now that there are methods available we are starting to use them and we are starting with our major competitions. As to the further progress, I think it must be in the direction of having them more often at competitions, so that if the same athletes were appearing several times in the course of a season at different places one would gradually be narrowing the time limits between which tests took place and we would be overcoming this problem. I think we would be moving to quite a different area if we started to try and impose random tests just picking on individuals away from competitions, saying "we want to have you tested"; we would run into all sorts of objections there concerning the liberty of the individual, which becomes even wider on an international basis.

DR HARKNESS: I wonder if I could add something to the previous answers to Mr Pickering, because I think this is important. The literature on the anabolics and their biochemistry started in the late fifties and much of this is in the American biochemical literature and it was largely dropped. There was British work in the early sixties but there was no clearly stated need for analytical techniques for detection purposes. I would say that the human sports establishment, if I may use that word, has been much less forceful than the horse racing board.

CHAIRMAN: Well, it is said in Britain that people only take sporting problems seriously if they affect horses!

MR C. W. BRASHER: Didn't Dr Freed get very close to this? Also, one question from Dr Blonstein that it is folly to try to restrict the knowledge of how long it is possible to detect these because the knowledge will very quickly get around, particularly if these various testing centres are going to be set up. The knowledge will spread from them like wildfire. We are here in a situation where the scientists are some years behind the athlete and yet the athletes want as earnestly as the scientists to get rid of the problem, and therefore we are in a balance between how effective the tests are, and how they can be done. It was Dr Blonstein who said "when should they be done?" Surely one thing that would help a little is if there was a specific period before Olympic Games during which athletes would have to appear at the centre, and that the tests were then done right at the very beginning, not just at the time of the competition, as the sex tests are done on the females. One further point, in view of the swing from the artificial to natural testosterone, does this not produce rather horrific thoughts of what might happen if this spreads among women athletes?

PROF BROOKS: As far as time lags are concerned with conveying information between athletes and scientists and so on, I might mention that it could work both ways. The athletes may be very out of date in their knowledge of the times that we can test, if you have a new anti-serum it could be some while before they discover the fact. The question about testing sooner, when they first come into the Olympic village for example, would certainly be an advantage from the completeness point of view, I agree, but it may not apply to all competitions.

CHAIRMAN: Mr Holder, would you like to comment on the feasibility of this, in other words prior to games in which large number of athletes are assembled?

MR HOLDER: I think Mr Brasher's question a very interesting one and certainly one which I am very happy to bring before our appropriate committee to discuss but the number of occasions when one could do this would be very limited, of course, because generally speaking the athletes turn up quite a short time, maybe twenty four hours sometimes, or maybe forty eight hours before a quite big competition, but for the Olympic Games they are very often there for longer periods. It is something we could certainly look at.

DR J. G. P. WILLIAMS: We must bear in mind that there have been occasions when testosterone has been given to athletes during endurance events. For example, there is one instance when it was given in a Davis Cup Match some years ago before the fourth set and it has certainly been used in other stop-start long distance events for example, given at half-time in important football matches. If there is the type of euphoric effect that was suggested this morning for anabolic steroids, and if you test for them two weeks before the competition, the boys will take them on the day of the competition.

MR BRASHER: I was also thinking about these tests when the athlete arrived in the village in addition to the tests at the final competition, of course.

ARTHUR GOLD (British Amateur Athletic Board): Apart from the medical side of this, there is the practicability side and perhaps Mr Holder would elucidate. I did propose at our congress in Rome and I shall continue to propose, as often as I can, the idea that we do have random testing. You see, this is a rule, as far as the International Amateur Athletic Federation is concerned, in regard to eligibility for competition. It is only one of a number of rules and those other rules apply the whole year round, fifty two weeks in every year; professionalism, advertising, all kind of rules. If this is a rule, we should at least accept the principle that anyone wishing to compete under international rules should be prepared to undergo a doping test whenever reasonably called upon to do so. I recognise the difficulty of getting visitors into countries and so on but the fact remains that if we set up in the International Federations a medical flying squad who are authorized to undertake the tests, I think this is the one way in which we are going to deal with this particular group of drugs.

CHAIRMAN: This, of course, is the crux of the problem, drugs are taken, not at the time of competition. There is no secrecy about levels of retrospection; Prof Brooks has given time limits but these of course will change as fresh anti-sera develop, but the question now is whether the administration ought, and whether it is prepared, to take the steps. It seems to me, as Mr Holder suggested, a matter of introducing truly random tests at more frequent intervals. If it is a big problem then it demands a big solution and it means that the whole attitude towards international administration will have to be changed and this I think is emerging from this discussion.

FRANK DICK: Can I just follow on a point that was made by Ron Pickering early on? Do you realize that this morning we were still arguing whether or not steroids were of value? This afternoon, we have at last got an unequivocal statement as to the period after which one's tests were no longer going to be reliable. Is it at all possible for the Association to make a series of unequivocal statements that (a) steroids are of value to certain types of athlete, (b) what the testing procedures are, so that everybody knows quite openly and there isn't this sort of airy-fairy approach to it? Sportsmen are really very matter-of-fact people and I think we just want to know exactly where we stand.

CHAIRMAN: I think if there were simple answers to your questions, we would not be having a conference here today, which has attracted people from all over the world. Any scientist can go to St. Thomas's, can question Prof Brooks, and I do not believe that any information would be withheld. It takes controlled trials in order to establish matters of this kind. Medicine is extremely complicated; — it is as complicated as athletic training, and I am sure the conference is held so that you can see those who are making statements and you can question them. I remember taking the chair at the conference on Altitude Training last year, and we reached the point at 4.15 in the afternoon when we were asked "Would someone please say, how high you should go? How long you should train? what the benefits are?" I am afraid anabolic steroids is one of these subjects.

HOWARD PAYNE (U. of Birmingham): My athlete's brain is ticking over with all this information and immediately the British athletes are going to point to the Eastern European countries again. They are going to say that Prof Brooks has said that there are over one hundred steroids that people can use, some of them will be very harmful, but only a few of them are on the market. Now, is it not possible for a determined group to get together and produce a steroid from which you have not got a test? Could it be that one of these steroids does not have the 17 or 19 position?

Immediately you spoke about the depression of the gonadotrophins with normal testosterone. I wondered if this too, could not be added to the "cocktail" that the athlete takes. With the testosterone could he not actually take something that would produce gonadotrophins themselves. Also, I think, in a lot of minds to-day is the question of the antihistamines which are non-steroid anabolics. Finally I would like to ask a question, because I know there are some people here who have administered steroids to their athletes, or they have passed on steroids to athletes, and I would like to say to them would they administer steroids to their own sons, or better still, to their own daughters?

PROF BROOKS: There are a large number of very good points there. We would like to know, very much, the identity of steroids that are being used by athletes. This would be a guide as to which steroids to try to develop and sera to. It is possible to produce an anti-serum to almost any substance. This is a very general method and one can certainly attempt to do it although a few cases have proved to be difficult.

DR SHACKLETON: Just to try and answer the last question, I am sure that any country, if it develops such a successful anabolic steroid drug as you are suggesting would be wanting to market this throughout the world and make money from it, — you don't think so?

DR J. G. P. WILLIAMS: As we are moving to the last question, I beg your permission to change the subject, slightly. I would like to correct perhaps a false impression that we had a little earlier. I think Mr State asked a question stating

that he had been told by Dr Raymond Owen that there might be some risk if you had an anaesthetic after taking anabolic steroids. Well, there is a risk in anaesthetics after taking certain types of steroids, but these are the glucocorticoids and are very different from anabolic steroids. There is no documented literature relating to operative or anaesthetic risk in practice following the administration of anabolic steroids although, theoretically, there is a risk because some anaesthetic agents are hepato-toxic and may interact with steroids.

END OF DISCUSSION

In closing the meeting, the Chairman of the British Association of Sport and Medicine, Dr G. G. Browning, FRCP, thanked the participants for their contributions. He welcomed the large number of foreign visitors, in particular the officers of the FIMS and the delegation from Belgium whose visit was planned as the first in a programme of cooperation with our colleagues of the Société Médicale Belge d'Éducation Physique et de Sports.

In conclusion he thanked CIBA Laboratories Ltd., for the generous help and support in all aspects of the symposium.