quent treatment of bench surfaces and micropipettor shafts with sodium hypochlorite (household bleach) and the use of separate rooms and separate sets of micropipettors for the preparation of PCR reactions, DNA extraction, and analysis of amplified products.

RESULTS AND DISCUSSION

These workshops have received enthusiastic responses from participating scientists, physicians, and medical technicians. Each course includes 20 participants from throughout the country; for instance, in the most recent Phase I course in Ecuador, participants came from 8 cities representing 15 different institutions. As a result, important contacts and collaborations have emerged between individuals and institutions, at the national, regional and international level.

As a consequence of these courses, several projects have been initiated in such areas as the molecular epidemiology of *Leishmania* in Central America and the molecular diagnosis of tuberculosis. An ongoing study in Nicaragua funded by the European Economic Community involves the identification of Central American strains of *Leishmania* by molecular means (PCR, RAPD, RFLP) and the molecular characterization of putative hybrid strains (2). Pilot projects for the upcoming Phase II course in Ecuador planned for May, 1995, include the molecular diagnosis and epidemiology of tuberculosis, the detection of dengue virus in clinical samples and in the rapid typing of *Leishmania* strains from clinical specimens. Similar courses are currently planned in Bolivia, Honduras, Argentina and Brazil as well.

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POLYCLONALS TO PEPTIDES: A SEARCH FOR THE MAGIC BULLET

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INTRODUCTION

It has been the dream of clinicians to be able to direct the therapy to a specific target organ or disease cell and produce a specific response. This response may vary from stimulation of cells in the endocrine system to cell death in cancer cells. Until the 1970s the only weapons available for this were chemical based on pharmaceuticals. These tended to have a systemic effect, for example Mustine kills cancer cells but is only slightly less toxic to normal cells. The discovery of antibodies and of their unique property of recognising a specific receptor molecule has brought with it the hope that it might be possible to deliver a drug or radioisotope to specific cell type whilst other cells would remain untouched. Hence the idea of a magic bullet guided to a specific receptor on a specific cell by the specific binding sites which will bind only with its expected target.

THE ROLE OF NUCLEAR MEDICINE

Nuclear Medicine has been at the forefront of the clinical application of biotechnology advances into patient care. Nuclear Medicine is the study of the use of radioisotopes in the diagnosis and therapy of disease. It provides unique funciontal information not available with radiology. If the correct isotope is used the progress of a labelled substance can be easily followed non-invasively using a gamma camera. Therefore Nuclear Medicine is an essential partner in turning the products of biotechnology into clinically useful substances. The aim of this report is to review the progress in developing disease specific agents for diagnosis and therapy from standpoint of the Nuclear Physician.

POLYCLONAL IgG

The simplest method available which will enable imaging using antibodies is to take blood from a large number of donors these can be pooled and the labelled. The result will be a non-specific agent but one which will localise at the sites of highest antibody activity. This effectively means site of infection and inflammation.

Preparations of polyclonal human IgG have been used labelled with two metallic radioisotopes both of which can produce good images. The first of these is indium-111 (In-111) which is attached to the IgG via a diethylenepentaacetic acid (DPTA) linker. Trials in Europe and

the United States have shown that it has a high sensitivity and specificity in imaging infection especially in patients with AIDS where a sensitivity of 94% and a specificity of 91% was obtained.

Further work has used a shorter lived isotope which gives better technetium-99m (Tc-99m). This was linked to polyclonal IgG using an iminothioline linker. Unfortunately blood pool activity remains high throughout the test and it has poor results in infections in the chest and abdomen. In the pelvis and limbs however where blood pool activity is less results in identifying infection were similar to those obtained using labelled leucocytes of gallium-67 citrate. In addition it may also be used to identify inflammatory arthritis.

THE HEPATITIS B VIRUS (HBV) INFECTION AND ITS PREVENTION BY A RECOMBINANT-DNA VIRAL SURFACE ANTIGEN (rec-HBsAg) VACCINE

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INTRODUCTION

This paper contains an updated review of the main aspects related to the development and characterization of a yeast-derived rec-HBsAg, which was directly followed by the scale-up production as well as the quality assurance and control of the corresponding vaccine, under GMP* and GLP* standard procedures. Pre-clinical experiencies were carried out in animal models (including the HBV-challenging of immunized and control chimpanzees) and clinical trials were performed by (or archieved in agreement with) health authorities in Cuba and several countries. Double-blind controlled three phase protocols, according to strict ethical and methodological guidelines for clinical trials, demonstrated at least a similar and more often a better performance for the Cuban vaccine than parallel immunizations with other commercially available rec-HBsAg vaccines. These results enabled the patent application and sanitary registration followed by commercialization of millions of doses of the product in more than 15 countries since 1990.

Hundreds of thousands of peoples of different ages, sexes and sexual behaviours, geographic areas and nationalities, ethnical groups and occupations, life styles and risk of exposition, social and economical levels, received the Cuban rec-HBsAg vaccine, including controlled studies and vaccination campaigns in Cuba and abroad (see table).

The first vaccination program in America, including the complete populations of newborn and children up to one year old, primary and secondary schoool children and high infection risk groups, is currently ongoing in Cuba using this vaccine. The program envisages the vaccination of the whole Cuban population under 20 before the year 2 000.

Controlled Studies/	Rt	Age	Vac./ Dose (μg)	N	SRC	GMT	S.E.
Cuban Healt workers (HW) and patients contacts (PC) 0-1-2 mont s	IM	20-46	CV10	86	94-100	90-280	*
			CV20	150	94-100	110-520	**
			SK20	95	87-100	30-60	*
	SC	20-46	CV10	43	100	150-350	***
			CV20	43	100	250-400	***
			SK20	46	91-94	20-30	**
Cuban HW and PC 0-1-6 mont s	IM	38	CV10	20	100	$2e^3$	**
			CV20	15	100	$> 1e^4$	***
			SK20	17	100	$1.5e^3$	**
HW and PC in 5 countries[b] 0-1-2	IM	adults	CV20	805	97-100	51-98[a]	**
			SK20	59	87	11[a]	*
	ID	23	CV2	43	93	39[a]	*
Idem 0-1-6	IM	adults	CV20	107	100	93-95[a]	**
			SK20	59	98	48[a]	**
C ildren: Havana 0-1-2	IM	0[c]	CV10	157	92-96	360-440	*
			SK10	23	89	53	*
Havana 0-1-6	IM	2-12	CV10	143	100	$5e^3$-$17e^3$	*
Moscow 0-1-2	IM	0.5-10	CV10	60	95	83[a]	*
Bogota 0-1-2	IM	1-10	CV10	58	100	100[a]	n.a.
Aged prs[d]. 0-1-6	IM	81	CV20	52	100	78[a]	**
Soldiers: Cuban 0-1-2	IM	19-26	SK20	63	92-100	90-720	**
			CV20	123	95-100	500-$1e^3$	**
Russian 0-1-3		20	CV20	146	95	95[a]	*
African st[e] 0-1-2	IM	14-21	CV20	245	98	96[a]	*
Indians[f] 0-1-2	IM	adults	CV20	60	93-100	73-75[a]	n.a.

*Rt=Route; IM, SC, ID=Intramuscular, subcutaneous, intradermal; Age=Age in years (mean or range); N=Number of persons; SRC=Seroconversion (%); GMT=Geometric mean or range of titers (IU/L); $e^x=10^x$; CV2, 10, 20=Cuban vaccine 2, 10, 20 μg per dose; SK 10, 20=Commercial vaccine 10, 20 μg per dose; S.E.=Side effects: ***20-40%, **10-20%, <10% with symptoms; n.a.= not available; [a](column 7)=% with titers>99.9 IU/L; [b]Colombia, Brazil, Perú, Venezuela and Viet-Nam; [c]Neonates from HBV infected mothers; [d]Cubans; [e]students; [f] and mestizos from South America.*

*Good manufacturing and Good Laboratory Practicess