マレイシア、医療分野
プロジェクト形成調査団報告書

平成３年６月

国際協力事業団

2422

マレイシア、医療分野
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序　　文

１９９０年１月、わが国中山外務大臣とマレイシア国マハティール首相との間の会談に端を発したマレイシア国の保健医療分野に対する要請に基づき、プロジェクト形成調査を実施した。調査団は丸井英二東京大学講師（当時）、現在同大学教授を団長とする５名の専門家から編成され、１９９０年３月２６日から４月１日までの間、現地調査を実施した。ここに、その結果を第一次調査報告として取りまとめた。

第一次調査結果に基づき、日・マ双方において検討を重ねてきたが、さらに具体的プロジェクト形成に向けて調査、打合せを実施するため、長谷川敏彦当医療協力部医療協力課長を団長に、１９９１年４月９日から４月１５日まで現地調査を実施した。その結果を第二次調査報告として取りまとめた。

これら調査に基づき、近く日・マ間に医療協力プロジェクトを開始する予定であるが、同時に本報告書が、今後のマレイシア国に対するわが国の保健医療分野におけるプロジェクト方式技術協力策定のための基礎として活用されることを切望するものである。終わりに、本調査の任に当たられた団員のご協力に敬意を表するとともに、調査に際し多大のご協力を頂いたマレイシア国政府関係機関、在マレイシア国日本国大使館、及び外務省はじめ国内関係機関各位に対し、深甚なる謝意を表する次第である。

１９９１年６月

国際協力事業団

理事　　西　野　世　界

マレイシア医療分野プロジェクト形成調査報告書

＜第一次調査＞

I. 調査の目的

マレイシア国における保健医療分野の現状を把握し、同国の当該分野でのニーズを確認し、今後のプロジェクト形成に向けての情報を収集することを目的とする。

ただし、１９９０年１月、中山外務大臣の訪「マ」時のマハティール首相との会談時に提起された“熱帯医学分野の研究協力”の可能性について留意した。

具体的には、ＪＩＣＡの実施するプロジェクトとして可能であるか、また可能であるとすれば、いかなる形態、分野で実施され得るかについて「マ」国関係者と討議し、関係機関を視察し、合せて今後取りうべき方向性等について討議した。

Ⅱ. 調査団の構成・日程

Ⅱ－1　調査団の構成

団長	丸井英二	総括・保健	東京大学医学部国際交流室講師
団員	佐藤三郎	技術協力	外務省経済協力局技術協力課
〃	千村浩	衛生行政	厚生省大臣官房国際課
〃	浅井孝司	研究協力	文部省学術国際局国際学術課係長
〃	渡辺正夫	協力計画	国際協力事業団医療協力部管理課課長代理

Ⅱ－2　日程と主要面談者

１９９０年

３月２５日（日）　　東　京　→　ＫＬ（移動）

３月２６日（月）

午前：日本大使館打合せ　　辻一等書記官

小池公使

ＪＩＣＡ事務所打合せ　　岡部所長

山下所員

午後：保健省打合せ　　Dr. Khalid Hassan, Deputy Director

IMR（Institute for Medical Research）

Dr. Mak Joon Wah, IMR

Dr. Marzuki, Vector Borne

Dr. Gopal Prathap, Director TB

Michael Ooi Boon Yeow, International Division

En. Wan Badaruddin, Foreign Affairs

Puan Nafsiah bt. Hj. Abu Bakar, International Division

En. Wahab Mohamad, Public Service Dept.

Dr. Abdul Ghani, Deputy Director, Manpower training Div.

Dr. Kadar, Asst. Direcot, Leprosy Center

Puan Nor Fadzillah bt. Yahya

Prime Minister's Department

3月27日(火)

全日：マラヤ大学医学部(UM)視察

Dr. Teoh Soon Teong, Dean, Public Health

Dr. Chua Chin Teong, Deputy Dean, Madicine

Dr. Gan Chong Ying, Social & Preventive Madicine

Dr. Syed Mohd Noori, Surgery

Dr. R. Pathmanathan, Pathology

Dr. Ting Hoon Chin, Medicine

医学部付属病院視察　Dr. Gurmukh Singh, Director

Dr. Khairuddin Yusof, Obstetrics

3月28日(水)

全日：マレイシア国民大学医学部(UKM)視察

Dr. Abdul Hamid Hj. Abd. Rahman, Vice Chancelor

Dr. Khalid bin Kadir, Dean

Dr. Mohd Tahir Azhar, Deputy Dean

3月29日(木)

全日：IMR打合せ　Dr. M. Jegathesan, Director

その他、各部門の責任者

午後：全体討議　IMR所長

UM学部長

UKM副学部長

外務省(Mr. Wan)

辻書記官(大使館)

山下JICA事務所員

3月30日(金)

午前：クアラ・セランゴール(クアラ・ルンプールの北約70㎞)保健所及びその出張所を視察見学

Dr. Harrison, Deputy Director, Department of Health, Selangor State

午後：保健省最終打合せ　Dr. Abdullah, Director General, Ministry of Health

	Dr. Jega, Director, IMR
	辻書記官（大使館）
日本大使館報告	小池寛治公使
	辻　優書記官
	岡部ＪＩＣＡ事務所長
	山下ＪＩＣＡ事務所員
３月３１日（土）	資料整理
４月　１日（日）	ＫＬ　→　東京（移動）

Ⅲ. 調査の内容

Ⅲ－1　調査時の留意点と対処方針

(1) 留意点

1) 分野の特定について

本件は、１９９０年１月の中山外務大臣の訪「マ」時のマハティール首相との会談のフォローとして位置づけられている。

同会談においては、日本にデータの少ない熱帯医学分野の研究協力（共同研究）が提起されている。

2) 学術振興会（ＪＳＰＳ）との区分

現在、ＪＳＰＳはマレイシアと拠点校方式で研究者の交流を行っている。具体的には、下記のスキームで運営されている。

〔日本側〕	〔マレイシア側〕
拠点校（東大医学部）	国立大学長会議
└協力校の設定	└マレイシア理科大

内容的には研究者交流・情報交換が中心であり、機材供与といったハードは付随していない。

もし、研究協力で分野を特定した場合、日本側、マレイシア側ともに関係者が重複して、ＪＳＰＳの協力との区別がつきにくくなることが予想される。

3) 保健省からの他の新規案件（プロ技協）要請

保健省は、ＪＩＣＡが個別専門家派遣で対応してきたサラワク州のサラワク総合病院（救急医療）に関し、ＥＰＵを通じ日本側へ正式に本年３月、プロジェクト方式技術協力の要請を提出している。

つまり、保健省は半島部と地方との保健格差の是正を目標に、具体的な案件を日本側に提示している。

4) マレイシア側の今回の受入れ体制

「マ」側は保健セクター全体へのアプローチとしてとらえ、保健省（チーフコーディネーター）、外務省、経済計画庁、人事院、教育省が参加し、合同会議で"基本的な点"について話を詰めた後に、日本側の希望により視察先をアレンジする意向である。

この基本的な点とは、今までの経緯から日本からの派遣専門家のレベル、派遣

期間、時期、分野等をさすものと思われる。

(2) 対処方針

1) 総　　論

今回の調査にあたり、“研究協力”を前提とする。ただし、その具体的内容は今後検討する。

また、その際は、学振ベースとの区分に十分留意しつつ、内容を検討する必要がある。

このような基本方針から、今回の訪「マ」時冒頭の合同会議では、“研究協力の可能性を検討するため、「マ」国の諸外国との研究協力の事例研究、研究基盤等を視察させていただきたい”と述べるに止どめる。

2) 各　　論

(a) 分野について

研究協力を前提条件とし、学振ベースの協力との区分に十分留意する。

つまり研究者、情報の交流(ソフト)中心の学振ベース協力と、機材供与(ハード)を含みうるＪＩＣＡの技術協力の間に「しきり」を入れる。

具体的には、①分野での区別、②協力レベルでの区別、③日・マ双方の拠点校の区別、④「マ」側関係省庁の区別(ＪＩＣＡは保健省との研究協力とする)等の方策がありうる。

(b) 協力のスキーム

①プロジェクト方式技術協力、ミニプロ型と、②単発専門家(複数派遣も可)による協力型の両方とも可能性はある。

ただし、学振ベースとの区別の意味では、ある程度大型で機材供与も可能な①が望ましい。また、協力開始時期は、今後の推移をみて別途検討する。

(c) サラワク総合病院案件への対応

過去、ＪＩＣＡは本件について、①内容的に役務提供型のニュアンスがある、②外領であるサラワク州から最初の医療分野のプロ技を行うことの是否、③現状のサラワク病院の救急病棟は狭く、プロ技を開始するには無理がある(マレイシアは無償案件の対象国ではない)等の観点から消極的な対応をしてきた。

しかし、保健省から正式要請があったため、今後、本件(研究協力)とは別途に検討することとする。

その際、同病院の救急病棟が１９９１年に増設されることに鑑み、それ以降の協力の可能性を検討するのも一つの方策であろう。

※　本件は１９９１年度の実施協議案件となって協力が具体化した(注)。

Ⅲ－2　大学関係調査結果

(1)　マラヤ大学医学部及び同大学病院（２７日）

（大学側応対者：Dr. Teoh Soon Teong 医学部長、Dr. Chua Chin Teong 副部長他）

丸井団長より本調査団の目的、また、佐藤団員より調査団派遣の背景及びＪＩＣＡ事業について説明を行い、お互いに率直な意見交換を行うこととした。

医学部長よりマラヤ大学の医学研究体制、将来計画等につき説明を受けた後、意見交換に入った。主な意見は以下のとおり（「マ」側発言：＊、「日」側発言：☆）。

＊マラヤ大学医学センター（医学部及び大学病院から成る研究組織の総称）は発展段階にあり、将来計画において、いくつかの研究施設等の設立が課題となっている。本将来計画においては、研修プログラムが一つの重点であり、これを支えるのは建物、機材、マン・パワー（人材）の３つである。人材については、すでにＪＳＰＳとの交流があり、今後も期待がもてるので、機材についてＪＩＣＡの協力を得たい。

☆ＪＩＣＡの協力形態として、最近は機材供与だけというのはごく稀である。ＪＩＣＡの協力はあくまでも「人づくり」が基本であり、人的交流に付随して機材供与を行うことは十分に可能である（機材の規模としてはプロ技協３千～４千万円程度、ミニプロ８百～１千万円程度）。

＊英国の場合、British Council等を通じて、あるいは直接パンフレット等で、どの大学にどのような研修コースがあり、どうすれば参加できるか等の情報が簡単に得られるが、日本の場合は非常に情報が得にくい。大学等のプログラムのみならず、ＪＩＣＡの研修コースにしても何があるのかよくわからない。

☆日本の大学案内（英語版）等は、在マレイシア大使館インフォメーション・センターに完備しているはずである。また、何か学術的な情報を得たい時も随時インフォメーション・センターに問い合わせてほしい。

＊ＪＩＣＡの事業については政府ルートで情報の交換を行っているようだが、マレイシアではＪＩＣＡ事業の情報は大学レベルまで伝わってこない。大学が直接情報を入手する方法はあるか。クアラルンプールのＪＩＣＡ事務所に直接問い合わせてもよいか。

☆通常事業の案内等であれば、直接ＪＩＣＡ事務所に問い合せていただいて結構である。

＊双方互いに３カ月程の期間研修の一貫として受け入れるような医学研修生の交換研修プログラム的なものが可能ではないか。

＊マラヤ大学病院では救急医療室が未だ整備されていない。最近クアラルンプールでは交通事故が増大しており、救急医療体制の確立が重要となっている（クアラル

ンプールでの死因の３位が不慮の事故である）。救急医療に関する面での協力は得られないか。

☆今回の調査は熱帯医学分野における協力を考えており、救急医療については残念ながら今回の目的から外れるので、次の機会に話し合いたい。

その後、研究室及び図書館、標本博物館、大学病院（８７４床）の施設等の視察を行い、さらにマレイシアにおける保健医療体制について説明を受けた。

(2) マレイシア国民大学医学部及びクアラルンプール総合病院（２８日）

（大学側応対者：Dr. Rahman副学長、Dr. Tahir副医学部長他）

Rahman副学長から同大学医学部の概要について説明を受けた。

同大学には現在、付属病院がなく、隣接しているクアラルンプール総合病院（保健省管轄）と研究及び診療面において協力している。副学長によれば、マレイシア政府は第６次マレイシア・プランにおいて同大学病院（８００床）の建設推進を盛り込んでおり、２年後には竣工する見込みとなっている。大学病院設立の総費用は４００百万マレイシアドル（約２３０億円）で、建設費２００百万ドル、設備費２００百万ドルとなっている。マレイシア政府は、現在、この費用のすべての支出を決定したわけでなく、教育省はとりあえず土地整備費５０百万ドルの支出を決定している。副学長は日本側に対し、この大学病院の設備及び人材養成等についての協力を示唆した。

日本側としては、ＪＩＣＡの協力事業の概要を説明し、具体的な研究協力テーマを決め、何らかのプロジェクトがスタートすれば協力できる部分もある旨答えた。

その後、医学部の主要施設及びクアラルンプール総合病院（2,５００床）の視察を行った。

Ⅲ－3 保健省（国立医学研究所）調査結果

(1) ＩＭＲ（Institute for Medical Research）の概要

ＩＭＲは、マレイシア政府の出資により、保健省における医学研究機関としてマレイシア国内に流行する熱帯病に関する研究を目的として、１９００年に設立された。

1) 組　織：

(a) 生化学及び栄養部

①生化学　②遺伝学　③栄養学　④放射線化学

(b) 社会保健部

①社会保健　②疫学及び生物統計学

(c) 医動物学

①ダニ学　②実験動物施設　③医学生態学　④医学博物館
⑤ヘビ飼育施設

(d) 微生物学部

①細菌学　②血清学及び免疫学　③ワクチン生産　④ウイルス学

(e) 寄生虫学部

①フィラリア症研究　②マラリア研究　③寄生虫学

(f) 病理学部

①細胞学　②血液学　③組織病理学　④口腔病学

(g) 国際組織

①東南アジア熱帯病医学連合（SEAMEO－TROPMED；South East Asian Medical Organization of Tropical Medicine）ナショナルセンター（１９６７年より）

②米軍医学研究施設（USAMRU；United States Army Madical Research Unit）（１９４８年より）

③世界保健機関（WHO；World Health Organization）地域熱帯病研究訓練センター（１９７８年より）

④WHOアジア太平洋地域間マラリア訓練事務局（１９８１年より）

(h) その他の施設

①図書館

②応用寄生虫学及び生態学修士課程（D. A. P. & E. ；Diploma in Applied Parasitology and Entomolngy）

③医学微生物学修士課程（D. M. M. ；Diploma in Medical Microbiology）

④臨床検査技師学校

(i) 運営組織

①財　政　②総　務　③サービス

2) 活　動

(a) 研　究

①熱帯病；

(i)人類学及び行動科学　(ii)デングその他のウイルス疾患　(iii)下痢症、食物由来、その他細菌による疾患　(iv)重要な昆虫、寄生虫媒介動物の生態学　(v)マラリア、フィラリア症その他の寄生虫疾患　(vi)栄養障害　(vii)つつが虫病　(viii)蛇咬傷の治療

②が　ん；

(i)頸部がん　(ii)口腔がん　(iii)その他の腫瘍

③血　液；

(i)異常ヘモグロビン

④検査手法の改善；

(i)細菌学的検査　　(ii)生化学的検査　　(iii)免疫学的手法

(b) サービス

①診断のための特殊検査サービスの提供　　②ワクチンの生産とマレイシア国内に対する供給（ツベルクリン、コレラワクチン、腸チフスワクチン、狂犬病ワクチン、蛇咬傷の治療に用いる抗血清）

(c) 研　修

①臨床病理学コース（２年間、医師対象）　　②ＳＥＡＭＥＯ－ＴＲＯＰＭＥＤ コース（D. A. P. & E. ,D. M. M. , ６カ月、ＳＥＡＭＥＯ加盟国の医師対象）

③臨床検査技術コース（３年間）　　④短期研修コース

(2) ＩＭＲの活動について

ＩＭＲは、保健省の政策を推進していく上に必要とされる、基本的かつ科学的な研究を行っていくことを医学研究の基本方針としている。この基本方針の下に、これまでの個別疾病指向の研究に加え、地域保健プログラム実施上の問題研究に焦点をあてる一方、プライマリ・ヘルス・ケアに関連する行動科学的研究（例えば、ＰＨＣプログラムにおけるマラリア対策に関する研究）及び、臨床研究の強化を図ることとしている。

1) １９８９年度ＩＭＲの活動状況については：

(a) １９８９年度研究開発予算（Ｒ＆Ｄ　Funds；Research and Development Funds）によるプロジェクト数（カッコ内）（合計６６プロジェクト）（下線は新しいプロジェクト）

①ダニ学(3)　②動物資源(2)　③細菌学(2)　④行動科学(2)

⑤生化学(3)　⑥臨床研究(5)　⑦昆虫学(5)　⑧血液学(7)

⑨栄養学(4)　⑩ マラリア・フィラリア症(10)　⑪ 医学生態学(2)

⑫ 寄生虫学(2)　⑬ 放射線化学(2)　⑭ 血清学(7)　⑮ 口腔病学(1)

⑯ ワクチン(1)　⑰ ウイルス研究(4)　⑱ 疫学(4)

注）研究開発予算（Ｒ＆Ｄ　Funds；Research and Development Funds）；

Ｒ＆Ｄ　Fundsは、科学技術の発達が経済発展の基礎であるとの政府部内における認識に基づいて、第５次マレイシア計画（Fifth Malaysia Plan）の中で１９８６～１９９０年に各分野の研究に総額MR$４００million（GNPの0.9％に相当）を投入するものであり、科学・技術・環境省（Ministry of Science, Technology and Environment）の所管である。このうち、およそ１０％が医学分野の研究にあてられる。この分野で研究費を獲得するためには、科学・技術・環

境省国家科学技術研究開発会議医学研究プライオリティ委員会〔IRPA(Intensification of Research Priority Areas)Panel on Medical Research, NCSRD(National Council for Scientific Research and Development) Ministry of Science, Technology and Environmen〕による承認が必要である。ちなみに、１９８８年度、ＩＭＲがＲ＆Ｄ Fundsから獲得した予算額はMR$6,821,207である。

(b) １９８９年研究プロジェクト(カッコ内)(合計４０プロジェクト)

①マラリア(7)　②フィラリア症(3)　③デング(1)　④有熱性疾患(1)
⑤腸管疾患(1)　⑥寄生虫疾患(3)　⑦栄養(1)　⑧心血管疾患(2)
⑨がん(2)　⑩性行為感染症(2)　⑪らい(1)　⑫地域保健(1)
⑬つつが虫病(1)　⑭行動科学研究(1)　⑮その他の研究プロジェクト(13)

２) １９８８年の活動の概要

(a) 研　究

文　献	７２篇
レポート	１０篇

(b) サービス

特殊診断検査	517,822件
ワクチン製造	

(c) 研　修

① 医学検査技師	１８８人
(１年目　３６人　２年目　８０人　３年目　７２人)	
② 補助医学検査技師	２９人
③ D. A. P. & E.	１７人
④ D. M. M.	１３人
⑤ その他の医科学者	３２人
⑥ WHOフェロー	２７人

(中国、インド、スリランカ、インドネシア、ソロモン諸島、西サモア、フィリピン、ヴェトナム、バングラデシュ、ネパール、韓国)

(d) 会議(国際会議を含む)	１０件
(e) 海外で研修を受けたスタッフ	４人

3）１９８８年度ＩＭＲ予算の概要

(a) 人件費及び運営経費	$ 9,882,930.00
(b) 研修関係経費	$ 1,390,270.00
(c) 委託費	$ 3,440,079.00
（USAMRU／SEAMEO－TROPMED／WHO／PORIM）	
(d) 研究開発基金（R&D Funds）	$ 6,821,207.00
合　　計	$ 21,534,486.79

(3) ＩＭＲについての総括

ＩＭＲはマレイシア国保健省付属の医学研究専門機関であり、保健省の保健医療政策の推進を研究の目的としている研究機関であることが特徴であると思われる。また、地理的な条件からも明らかなように、熱帯病がマレイシアの保健の大きな問題であろうが、この点においても１９６７年よりＳＥＡＭＥＯ－ＴＲＯＰＭＥＤ ナショナルセンター、１９７８年よりＷＨＯ地域熱帯病研究訓練センター、１９８１年よりＷＨＯアジア太平洋地域間マラリア訓練事務局になる他、応用寄生虫学及び生態学修士課程、医学微生物学修士課程を開催し、専門家養成に努めるなどマレイシア国内あるいは東南アジア地域における熱帯病分野の中心的研究機関として機能しているようである。

また、保健省の保健医療政策推進の基本方針の下に、これまでの個別疾病志向の研究に加え、地域保健プログラム実施上の問題研究に焦点をあてる一方、プライマリ・ヘルス・ケアに関連する行動科学的研究（例えば、ＰＨＣプログラムにおけるマラリア対策に関する研究）及び、臨床研究の強化を図ることが１９８８年年報の冒頭にも述べられている。

このように、ＩＭＲは熱帯病等感染症に関する豊富な経験と資料、高度な専門性を有する一方、ＷＨＯが推進する２０００年健康戦略の中心的戦術であり、かつ、今後の保健医療分野の国際協力に主要な位置を占めるようになることが予想されるプライマリ・ヘルス・ケアの枠内での感染症対策についての研究を進めている点からも、マレイシア国内における教育省（Ministry of Education）－国立大学との間の十分な協力体制の整備も期待し、研究協力あるいは共同研究を行うことにより、わが国自身にも有益な成果が得られるように思われる。

Ⅳ. 調査結果と今後の対応

今回「マ」側は、保健省がチーフコーディネーターとなり、全体の日程をアレンジし、かつ２回の全体会議が開催された。この会議には、「マ」側より保健省の他、外務省、経済計画庁（ＥＰＵ）、人事院（ＰＳＤ）等が出席し、会議の進行は保健省管轄下にある医学研究所（INSTITUTE FOR MEDICAL RESEARCH）が担当した。今般のミッション受け入れに関する「マ」側の基本的スタンスは、とりあえず日本側の意向を聴取するというものであり、「マ」側政府部内ではまだ、具体的な協力対象機関や協力内容等について十分な検討がなされていない状況にあった。

その際、調査団から今回の来訪の主旨を説明し、ＪＩＣＡの協力スキームについても説明を行ったところ、先方は、本件は「マ」首相と中山大臣との会談によって生まれたアイディアであり、重要な案件であることは十分承知している。ただ、「マ」としては、本件を取りあげることにより、従来の日本からのＯＤＡ供与枠が食われることになり、他の案件に影響が出ることを心配する。一般的に、「マ」においては研究協力案件は、プライオリティーがそれ程高くなく、他のプライオリティーの高い案件を競合することも排除しえない。よって、本件は、従来のＯＤＡ枠とは別枠の特別なプロジェクトとして位置づけ、従来のODA枠が減らないよう配慮願いたい旨強調した。

これに対し、調査団より、マレイシアに対する技術協力については、はっきりとした全体の援助額が定まっている訳ではなく、本件を取りあげることにより、他の案件に影響が出るとは思われない旨述べ、また、日本側としては、本件に高いプライオリティーを置いている旨説明した。

また、さらに今後の協力形態として、ＪＩＣＡの技術協力スキーム内で行われることを説明し、日本学術振興会（ＪＳＰＳ）による学術交流プログラムとの違いについても言及した。

これに対し、「マ」側は、上記ＪＩＣＡによる協力形態に同意し、特に、本件協力の具体的な受け皿となる可能性のあるマラヤ大学、マレイシア国民大学、医学研究所（各大学、研究所ともに熱帯病の研究施設をもち、人材もそろっているとの感触を得た。）は、ＪＩＣＡとの協力に意欲的な姿勢を示した。上記大学及び医学研究所は、とりあえずのものであると前置きの上、関心のある協力分野として以下のとおり述べた。

マラヤ大学 …… 熱帯病理学及び公衆衛生分野。

マレイシア国民大学 …… 微生物学分野。

医学研究所 …… 熱帯病、特にマラリア、フィラリア疾病における分子生物学及びバイオテクノロジー分野。

さらに、今後のとり進め方について「マ」側は、具体的な協力対象機関及び協力内容等について内部での意見調整をはかるために、合同調整委員会（JOINT COORDINATION

COMMITTEE)〔保健省を事務局として、外務省、経済計画庁（ＥＰＵ）、教育省、医学研究所（ＩＭＲ）、３大学（マラヤ大学、マレイシア国民大学、マレイシア理科大学）の医学部長にて構成〕を設置して、本変更全を通じてプライオリティーを付した具体的なプロジェクト・リストを作成し、日本側に提示する作業に取りかかりたいとの意志表示があった。

この委員会は、協議結果として１０件の技術協力要請を取りまとめ、ＥＰＵから日本側に正式要請がなされた（Ⅲ－１　(1)－３　５頁参照）。

<第二次調査>

I. 調査の目的

１９９０年３月のプロジェクト形成調査の結果を引きつぎ、国内検討結果に基づきマレイシア国保健省熱帯病研究所を主なカウンターパートとして、ＪＩＣＡの技術協力の枠内で〔新たなプロジェクトの内容〕を検討する。

II. 調査団の構成・日程

II－1 調査団の構成

長谷川 敏 彦 Dr. Toshihiko Hasegawa	国際協力事業団医療協力部医療協力課長 Director, Medical Cooperation Division, Medical Cooperation Department, Japan International Cooperation Agency
力 富 直 人 Dr. Naoto Rikitomi	長崎大学付属病院熱帯医学研究所内科講師 Medical Doctor, Department of Internal Medicine, Institute of Tropical Medicine, Nagasaki University
津 田 良 夫 Mr. Yoshio Tsuda	長崎大学熱帯医学研究所病害動物学部門助手 Research Associate, Department of Medical Entomology, Institute of Tropical Medicine, Nagasaki University
渡 辺 正 夫 Mr. Masao Watanabe	国際協力事業団医療協力部管理課課長代理 Deputy Director, Administration Division,

Medical Cooperation Department,
Japan International Cooperation Agency

Ⅱ－2　日　　程

4／　9（火）	東　京	→	K／L　（ＪＬ７２０）
	１８：００		大使館、ＪＩＣＡ事務所打合せ
１０（水）	９：００		ＥＰＵ打合せ
	１１：００		ＪＩＣＡ事務所表敬
	１４：１５		K／L総合病院視察　（救命救急部門）
１１（木）	９：００		ＩＭＲ打合せ
	１５：００		保健省保健局長打合せ
１２（金）	９：００		ＩＭＲ関連部門打合せ
			Malaria／Filariasis & Biotech.
			Entomology／Insectarium
			Virology
			Nutrition
			Clinical Research／Biochemi.
			Haematology
	１６：００		ＩＭＲ最終打合せ
１３（土）	９：００		ＥＰＵ結果報告
１４（日）			団内打合せ
１５（月）	１０：００		ＪＩＣＡ事務所報告
	１１：３０		大使館報告
	K／L	→	東　京　（ＪＬ７２１）

Ⅲ. 調査の内容

Ⅲ－1　調査時の問題点と対処方針

(1)　過去の経緯

平成２年１月、中山外務大臣がマレイシアを訪れた際、マハティール首相との会談時に、「熱帯病に関連した両国間の医学研究協力の可能性」について提起した。

この発言を受けて同年３月末にＪＩＣＡからプロジェクト形成調査団を派遣し、

1）ＪＩＣＡプロジェクトとして実施可能か（当初、水平的な研究協力が想定されていた）

2）また、可能であればいかなる形態、分野で実施可能か

3）その際、マレイシア側の受け皿はどうか等を検討した。

同調査団は保健省医学研究所（ＩＭＲ）、マラヤ大学医学部、マレイシア国民大学医学部等を視察し、関係者と打合せを実施した。これら調査の結果、結論として、

1）マレイシア国内に関係者による調整委員会を設置し、要請内容を検討する。

2）複数の要請書が「マ」側から出た後、日本側の実施可能性を検討の上、再度議論の上、通常のＪＩＣＡルートでプロジェクトを実施するとの結論となった。

(2)　「マ」側から提出された要請書について

上記の経緯を受けて、本年１０月に「マ」側から要請書（リサーチ　インベントリー）の提出が公信ベースであった。

内容下記のとおり；

1）Strengthening the use of Biotechnology in the Diagnpsis and Management of Tropical Disease-Institute of Medical Research；

2）Cooperative Project in setting up of a Radiotherapeutic and Oncology Service and Training Centre-University Kebangsaan Malaysia（UKM）；

3）The Development of a Centre of Molecular Medicine, University of Malaya（UM）；

4）An expert in Diagnostic Microbiology, UM；

5）Expert in Diagnostic Electron Microscopy　UKM；

6）Establishment of Micro-Vascular Surgical Workshop in UKM；

7）Expert in Molecular Biology, UM；

8）The Study of Motility Disorders of the Large Bowel of man, UKM；

9）An expert in Thyroid Diseases（Benign）, UKM　and

10）An expert in Occupational Health（Industrial Toxicology）, UKM.

(3) 対処方針

1) 要請内容のしぼり込みの方針(選定基準)

(a) 「マ」側の保健政策と合致し、プライオリティーが高い研究開発であること。

(b) 単なる"研究のための研究"ではなく技術移転が可能で、かつ研究成果が「マ」国保健水準の向上に広く寄与すること。

(c) 国内支援機関があり継続的に長期専門家の派遣が可能であること等、日本側で協力可能な内容であること。

(d) プロジェクトデザイン(ログフレーム作り)が可能で、通常のプロ技協のサイズにおさまるもの。

2) 現地調査による再検討

この基準に従い、関係各省(外務省、文部省、厚生省、ＪＩＣＡ)による会議で協力可能な分野を検討したが、いずれも問題があり、かつ成熟度が低いので、上記1)からみて、比較的優位案件である(2)−1)を中心に再度現地調査を行い、協力可能な内容への変更も含めて議論することとする。

3) 今後のスケジュール

平成3年度の「プロジェクト方式技術協力」の立ち上がりを目途とする。

4) その他

(2)−1)案件以外については、要請のしぼり込み基準からみてプロ技協力の規模としては検討しえない。

ただ、「マ」側から強い協力希望があった場合、(a) EPUによる Priority、(b)日本側の対応能力の2点で検討し、専門家派遣、医療特別機材ベースの対応も考慮する。

Ⅲ−2 打合せ結果の概要

(1) 大使館・ＪＩＣＡ打合せ

参加者　専門家チーム

大使館　赤木二等書記官

ＪＩＣＡ　湊次長

内　容　日程の再確認

専門家チームＴ/Ｒの確認

(2) ＥＰＵ打合せ

参加者　専門家チーム

ＥＰＵ

Mr. K. Thillainarajan　Principal Assistant Director,

External Assistant Section, EPU

Ms. Puan Wan Norma Wan Daud

Assistant Director,

External Assistant Section, EPU

大使館　赤木二等書記官

ＪＩＣＡ　湊次長

内　容　　スケジュール調整

日本側から感染症対策の最前線（サイト）視察の希望を表明

過去の経緯のレビュー

日本側の今回の対処方針の説明

→プロ技対応とする。ただし、一つのプロジェクト

その他の単発専門家要望は別途検討

※このラインをＥＰＵ側も了解

(3) ＪＩＣＡ事務所表敬

参加者　　専門家チーム

ＪＩＣＡ　小泉所長、湊次長

内　容　　専門家チームのＴ／Ｒ説明

今後のスケジュール予定

マレイシアでの協力の留意点

(4) Ｋ／Ｌ総合病院視察

参加者　　専門家チーム

Dr. T. Selvarajah

Chief, Accident & Emergency Unit

内　容　　Ｋ／Ｌ総合病院のＡ＆Ｅ　Unitの役割

独立した救命救急部としては、Public Sectorにおけるマレイシア唯一の組織

→Pilot Projectの意味あいあり

外来統計

今後のＡ＆Ｅ　Unitの希望

Pre-Hospital careの教育

今のところ、サラワク総合病院と直接コンタクトは無いとの回答

(5) ＩＭＲとの打合せ

参加者　　専門家チーム

ＪＩＣＡ　湊次長

ＩＭＲ　　Dr. M. Jegathesan　　Director

Dr. Khalid Hassan	Deputy Director
Dr. Mak Jon Wah	Head,Malaria & Filariasis Division

内　容

・保健省の重点項目

Administration , Hospital , Health , Pharmaceutical , Engineering , Dental, Development & Planning , Research

・重点項目の総括

ResearchはＩＭＲが総括（ＩＭＲは D. G. に直結）、その他は本省の課長がProgram Director

・Research 関連予算

ＭＯＨ全体の約１％

・Research の分野

Bio-medical	ＩＭＲ
Health System	Institute of Public Health（ＩＰＨ）
Clinical matter	

・検査所（ Lab.）のシステム

Lab. Label 1　Health Center／Poli clinic
2　District Hospital
3　General Hospital
4　同上（ただし大規模病院）
5　ＩＭＲ（National Reference Lab.の役割）

・検査所の性格

基本的にはＣ．Ｌ．ただしＰＨＬの役割りも持っている。

・その他の Lab.

Food Quality Control Lab.
－７ヶ所
National Pharmaceutical Central Laboratory（ＮＰＣＬ）

・研究に関する予算

１９８６年に、すべてのSector に関するReserach 予算をSpecial fund として拡充した。

・保健省の研究費の査定

Standing Committee for Health Research がＤＧを議長として設置され査定にあたる（ Policy making body ）。

←ＩＭＲはこの事務局

・他のDonnerとの協力

Multi-WHO，SEAMEO

Bi ～日本，ＵＳ，その他　（ただし小規模）

・Logical frameworkの説明

「マ」側のproposalの採点表、かつ概念整理の資料

今後file-upする。

(6) 保健省保健局長との打合せ

出席者　専門家チーム

ＪＩＣＡ湊次長

ＩＭＲ　所長

保健所Dato'Dr. Abdullah保健局長

内　容　・過去の経緯、ＩＭＲとの打合せ結果

・保健省としてのターゲット

マラリア、デンギ、ＨＩＶ

・今後の予想されるスケジュール

・ＪＩＣＡの研究協力の理念、協力形態の説明

(7) ＩＭＲ最終打合せ

出席者　専門家チーム

ＩＭＲ

所長、副所長、Dr. Mak

内　容　・今回のコンタクトで、ＩＭＲをカウンターパートに新しいプロ技協をスタートさせる可能性を確認

・案件内容についての日本側の選択の基準

「マ」側の行政の優先度、ニーズに合っていること。

研究者の研究上の興味と合致していること。

日本側で協力可能な分野であること。

・「マ」側の要請タイトルは"熱帯病研究プロジェクト"となっているが、実際に要望する分野は"生命工学""分子生物学"といった先端分野である。

・大学医学部との協力については実績もあり可能性があること。

・今後のスケジュール

ターゲット別（Gen.,Malaria etc）と分野別（Mol. biology, Entomology etc）のマトリックスの中で日本側の協力可能な分野

を再調整する。

・その他

研究に関する保健省のコミット（行政、予算）は確認された。また、マラリア、遺伝性疾患は、ともに研究領域でも重要分野であることは確認された。

ただ、保健局長は、マラリア、デング熱を強調した。

(8) ＥＰＵ結果報告

出席者　専門家チーム

ＥＰＵ

Ms. Wan Norman

ＪＩＣＡ

湊次長

内　容　・関係機関との打合せの報告

・ＩＭＲとの最終打合せ内容

1）Original Proposal について

Malaria　‥　必要性確認

Genetic disorder　‥　必要性は説明を受けた

Thalasemia は熱帯病であろう。ただし倫理問題で日本国内問題ありか？

2）他の関係部局との打合せ

Malaria, Dengi , ＪＥの重要性確認された。

3）ＩＭＲのスタンス

機材・ローカルコスト（研究費）ではなく、専門家を希望。その際、出来るだけ長期専門家での対応を望む。

・ＩＭＲ以外の９案件について

熱帯病関連案件(3)(4)(5)(7)を中心に(a)プロジェクトへのとり込み、(b) 個別専門家対応の両面で考慮する。

Ⅳ. 調査結果と今後の対応

(1) 調査結果について

マレイシア側からの提案は、今回１０項目にわたる。実際的に、この中で中山外相とマハティール首相の会談により合意された熱帯病についての分野における協力という線に沿い、しかもＪＩＣＡの協力方式に馴染むプロジェクトの内容と提案の priority の順から考えて、IMR(Institute of Medical Research) の案件は実現性が高かった。"Strengthening the use of Biotechnology in the Diagnosis and Management of Tropical Disease" がその題目であり、その内容はマラリアの診断とその媒介蚊の同定、マレイシアにおける遺伝病、特に thalassemia や alpha－1 antitrypsin deficiency についての分子生物学的アプローチを目指している。マレイシアは、医療分野のレベルは開発途上国の中では高く、実際ＩＭＲはＷＨＯが指定するアジアの感染症専門家養成機関であり、ＡＳＥＡＮ諸国から専門家を集めて同研究所においてトレーニングを行っている。しかし、一方では東海岸やサバ・サラワク地方などマラリアをはじめとする感染症の多発地区も残されている。ちなみに、マラリア発生件数は年間５０,０００人といわれる。マレイシアと日本の間には、大規模プロジェクトとしての医学交流は戦後は少なく、今回ＪＩＣＡを通じてはじめてであり、これを良い先例としたいとの希望が関係諸機関全体にあるように思われる。

マレイシア側からの提案に対して、マレイシアの医学研究所 (Institute of Medical Research：IMR) において同研究所所長及び寄生虫学部門、血液学部門、医昆虫学部門代表者との会談が持たれ、今後の日本側との協力の仕方について協議が行われた。ＩＭＲのマレイシアにおける位置は保健省の下にある唯一の研究機関であり、創立は英領であった１９００年に遡り、「ベリベリ」の発見など長い研究の歴史がある。保健省の財政的支持も十分である。同研究所は７部門、２０セクションで構成される。実際に寄生虫学部門、血液学部門、ウイルス学部門、医昆虫学部門、栄養学部門の教室を訪問し設備を見学したところ、かなり高度な設備が揃っており、また研究者の研究レベルも高く、研究と感染症撲滅への熱意が感じられた。Molecular biology に関しては、今まで英国、オーストラリア、カナダなどの英連邦との交流により基礎的知識また技術はあるが、マラリア、遺伝病に対する応用に関してはこれからの段階であり、この方面についての expert が特に日本側に期待される。所長の Jega 氏の希望では予算、設備もさることながら、必要とされるのは expert 即ち人的資源であることが強調された。

以下は各部門を訪問しての討論内容についてである。

1）寄生虫学部門－特にマラリアに関して

マラリア撲滅プロジェクトはマレイシアの重要な国家の保健政策であり、各機関の協力により総合的に対策が行われている。マラリア患者の年間発生数は５０,０００人であり、そのための死亡も少なくない。１９８９年に調査されたマラリアの血清疫学的調査では地区により陽性率が異なり、低流行地区においては1.3％～1.7％の陽性率であるが（Plasmodium falciparumが３３.３％、Plasmodium vivaxが６６.７％）、中等度流行地区での陽性率は２７.２％であった（４８.８％がP. falcipalum、４３.８％がP. vivax、1.8％がP. malarie、5.6％が混合感染）。現在マラリアの診断は主に血液の顕微鏡的診断に頼っているが、本法にも限界がある。一方、血清テストによるマラリア抗体の測定は疫学的調査には向いているが、現在の感染の有無を判定するには未だ十分ではない。またマラリア原虫は発育にstageがあり、血清抗体法による測定に限界がある。最近ではrecombinant DNA技術を駆使してマラリア診断法の開発が進みつつあり、この方法は感度、特異性ともに従来の顕微鏡法より優れており、ＤＮＡprobeによるマラリアの実用的診断法の開発が必要とされる。このような先進的診断法は研究のみに止まらず、国家的マラリア撲滅プロジェクトの一環としてなされ、本法の完成はマラリア撲滅に一役買うであろう。

2）血液学部門

マレイシアの遺伝病の中で、thalassemiaとalphal antitrypsin欠損は潜在的に重要な問題である。Kuala Lumpurにおけるβ－tahlassemiaの頻度は4.1％であった。研究の方法は白血球よりＤＮＡを取り出し、gene mappingやＤＮＡ sequenceを調べることによる。マレイシア国民が多民族的であることを反映して、β thalassemiaはheterogenousな遺伝子変異でおこることがわかった。さらに検出方法を簡便化してスクリーニングに役立てたい。日本ではこの技術はすでに確立されている。スクリーニングに要する費用は約5,０００ＵＳ＄と見積もられる。マレイシア国内で遺伝子操作を行えるのは唯一ＩＭＲだけであり、現在九州大学の遺伝情報研究所のHukumakiらと共同研究を行っている。一方、alphal antitrypsin欠損のマレイシア国内における調査はいまだ行われていないが、１９８４年から１９８７年にかけての調査では、１２歳以下の遷延性黄疸児の１５－２０％が血清中のalphal antitrypsinレベルが低かった。また、骨髄性白血病の遺伝子レベル解析も進んでいる。以上に示すように、マレイシアにおいても遺伝疾患の重要性は益々脚光をあびる問題であろう。しかし、多民族国家であり潜在的民族的問題を抱えるマレイシアにおいて、遺伝子に関する医療に伴う倫理的問題を国家レベルにおいてクリア出来ていない現状があり、ＪＩＣＡのプロジェクトとしてこれに関与することには問題があると思われる。

3）ウイルス学部門

ウイルス部門においては現在４つの感染症に注目している。１番目はＡＩＤＳであり、２番目はＢ型肝炎、３番目は日本脳炎、４番目にデング熱である。まずＡＩＤＳはマレイシアで大きな問題とはなっていないが、ＩＭＲのウイルス部門がサーヴェイランスセンターとなって、今後のマレイシアにおけるＡＩＤＳの動向を監視していきたいとの意向がある。Hepatitis Bは、国民全体のcarrier rateは５～１０％である。特に薬物中毒患者では7.5～17.6％と高い保有率を有す。マレイシアにおけるHepatitis Bの撲滅プログラムは新生児、薬物中毒患者、病院関係者の３つに絞られ、これらを対象としたＨＢワクチンによる予防が進行中である。

日本脳炎は大きな問題となっていない。疫学的調査によれば毎年３７～９２人の患者発生が見られるが、血清診断により確定された日本脳炎は年間１０～３５人である。これはマレシアの全ウイルス脳炎の１８～６２％にあたる。男女比は６：４で男性にやや高率で、年齢的には４歳以下の小児が３２.５％と多いが死亡率は低いといわれる。

デング熱は発生件数も多く、１９９０年には4,８７９人が罹患し１９８９年を上回った。このうち６４５人がデング出血熱に罹り、うち２１人が死亡した。デング出血熱の死亡率は約3.3％で、１９８８年には1.3％であったのが上昇した。最も患者の多かったのはサラワクの1,４８６人をはじめとして、ペナン６６２人、Federal Territory ６６１人、ジョホール６４３人などであった。１９９０年に１６４のウイルス株が分離された。そのうち８４.１％がtype２ウイルス、１０.３％がtype１、４.７％がtype３、０.９％がtype４であった。そしてtype２デングウイルスはサラワクやセランゴールの流行でも分離され、このウイルスの動向は２年ごとに起こる流行の鍵となると考えられた。そして予防対策としては媒介蚊のコントロールが重要で、そのためのプロジェクトがマラヤ大学との共同研究により行われている。

4）栄養学部門

マレイシアの栄養問題は、開発途上国の共通の悩みである低栄養と先進国が抱える肥満などの過剰栄養の両面性をもっている。現在、地域における食物の栄養学的組成についての基礎的研究や寄生虫による（回虫・鉤虫）栄養問題、また学童や妊娠中におこる貧血やサバ・サラワク地方に存在する地方病的甲状腺腫などの特異的栄養欠之についても研究を行っている。さらに、一般向けとして幼児の栄養、事務職に従事する人を対象とした栄養知識の普及に務めている。さらに食物中に含まれるtoxin(aflatoxin）や夾雑物などについても調査を行い、疾病との関連を究明している。

5) 医昆虫部門

医昆虫部門では、昆虫媒介性疾患としてマラリア、フィラリア、デング熱を研究対象としている。研究内容はかなり実際的で、熱帯病防除の中の昆虫学的な面の研究といった感じが強く、媒介昆虫の防除方法の検討が中心である。例えば、Bacillus thuringiensisによるボウフラ防除の可能性の検討、生長阻害物質（ＩＧＲ）の防除効果に関する実験室内及び野外での評価、殺虫剤（ペルメトリン）によるハマダラカ幼虫の防除の可能性、ネッタイシマカの殺虫剤抵抗性の調査などがあげられる。そして、いずれの研究でも実験室内での検討に止まらず、実際の防除においてどの程度の効果が期待されるかという野外実験による検討も加えられている。

マラリアに関しては、寄生虫部門と協力して研究が行われている。研究対象地域はマレー半島中部で、主要媒介蚊であるAnopheles maculatusの生態に関して調査が行われている。調査の内容としては、記号放逐法による吸血嗜好性や日当り生存率の推定、吸血蚊を用いた吸血源の判定、殺虫剤処理を行った蚊帳使用の効果判定などがある。また、An. maculatusには種内変異が存在し、サバ州の個体群は人マラリアを媒介しないが、マレー半島の個体群は媒介するといわれている。そのため、ハマダラカ類の種内変異に関しては興味がもたれており、電気泳動法を用いた研究（An. donaldi, An. barbirostrisが対象）も行っている。これらのいわゆるSpecies complexの問題に関しては、ＤＮＡ probeを用いた研究法が最も有効であるといわれており、An. maculatusに関してこの技術を確立することを強く希望している。マラリアの疫学的研究に関してもある程度興味を持ってはいるが、今のところマレー半島部のマラリアをなくすことが主眼であり、媒介蚊も異なるサバ州における伝ぱん動態と比較して、マラリア伝ぱんの動的側面を多角的に捉えようというような考えはあまりないようである。ただ、An. maculatusの生態的な特徴を明らかにするために、サバ州における主要媒介蚊、An. barabaciensisとの比較研究は行っている。

フィラリアに関しては問題がそれほど大きくないことに加えて、宿主となるサルの一種がゴム園内に多数生息しているため、防除はかなりむずかしいというのが現状のようで、主要媒介蚊Mansonia uniformisの防除手段の一つとして、ＩＧＲの利用が検討されている程度である。

デング熱に関しては、マラリア以上に防除方法の探索の趣が強い。１９８８年より主要媒介蚊であるネッタイシマカ及びヒトスジシマカの幼虫発生状況の全国的な調査を実施してきた。この調査では幼虫発生の程度（House IndexやBretcau Index）と患者発生数の関係といった疫学的な検討が行われているが、基本的には、媒介蚊の発生をいかに抑えるかが中心課題であるようだ。媒介蚊と人との接触や人以外の動物（ペット）の重要性、媒介蚊の伝ぱん能力といった面の詳しい調査を行うことが、防

除の効果判定には必須と思われるが、これらに関してはあまり注意が払われていない。媒介蚊の防除の試みとしては、殺虫剤（マラチオン）のＵＬＶ散布やBacillus thuringiensisの利用などが検討されている。

なお日本脳炎については、昆虫学的にはほとんど興味がもたれていないようである。

Diagnostic serviceの一環として、Kuala Lumpur City Hall Departmentで採集された蚊成虫の種類同定も行っている。

研究スタッフとしては、昆虫学者が３名、これ以外に実験室内での昆虫飼育や実験手伝いを行う人員として１０～１２名がおり、研究補助員は野外での蚊の採集なども行っている。特に重要な施設としては、昆虫飼育室があげられる。大きな建物全体が昆虫飼育用にあてられており、その中に作業用の空間として３～４の大きな部屋が準備されている。したがって、新たな実験を行うためのスペースは十分に用意されているとはいえ、ここで飼育されている主な蚊は、マラリア媒介蚊としてAnopheles maculatus、An. barabaciensisデング熱媒介蚊としてAedes aegypti、Ae. albopictusフィラリア媒介蚊としてAe. togoi、Mansonia uniformis、さらにウイルス分離用及び生物的防除の材料として、Toxorhynchites splendensなどである。

(2) 今後の対応

打合せの過程で、「マ」国保健省　アブドウラ保健局長は、「マ」国における保健医療分野の重要課題としては、マラリア、デング熱、エイズ等の対策が上げられているので、本分野での日本からの協力を歓迎したい旨述べた。

また、調査団は、今後プロジェクトの協力相手となる可能性の高い医学研究所（IMR）で、関係部局（マラリア部、昆虫部、ウイルス部、栄養部、病理学部）との個別打合せを行った上で、ＩＭＲ所長との最終打合せに臨んだが、その際、以下の点が議論された。

1）「マ」国保健省では、研究分野に高い政策的優先度（予算配分）を置いており、保健省、ＩＭＲともにＪＩＣＡの協力形態に対する十分な理解があること等から、ＩＭＲを相手方として、熱帯病に関する研究協力（プロジェクト方式技術協力の規模を想定）を実施する可能性がある。

2）さらに調査団からＩＭＲの要請内容に関し、(a)「ア」局長より、マラリア、デング熱等が重要課題との発言があり、熱帯病研究の必要性が認識されること、(b)遺伝性疾患に関しては、研究の必要性は十分に認識されるものの、その臨床応用については「マ」は多民族国家でもあり多少倫理上の問題に疑問が残ることから、多少日本側で協力可能な範囲につき検討する必要がある、との見解を示した。したがって、調査団の帰国後国内の関係機関に報告の上、ＩＭＲからの要請、今回の協議内容を勘案の上、日本側

として協力可能な分野・内容・範囲を明らかにし、次のステップに移行することになる。

V. 対要面会者リスト

大使館	天木直人	公使
	赤木利介	二等書記官
ＪＩＣＡマレイシア事務所	小泉所長	
	湊	次長

ＥＰＵ	Mr. K, Thillainarajan	Principle Assistant Director, External Assistant Section
	Ms. Puan Wan Norman Wan Daud	Assistant Director, －ditto－
Ｋ／Ｌ総合病院		
	Dr. T. Selvarajah	Chief, Accident & Emergency Unit
ＩＭＲ	Dr. M. Jegathesan	Director
	Dr. Khalid Hassan	Deputy Director
	Dr. Mak Jon Wah	Head, Malaria & Filariasis Division
	Dr. Indra Vythilingan	Staff, Entomology Division
保健省	Dato' Dr. Abdullah	Director General of Health

＜参考資料＞

I. ＥＰＵ主要メンバーリスト

ECONOMIC PLANNING UNIT(EPU)

YB Dato' Mohd Sheriff Mohd Kassim	Director General
Mr. Ahmad Hassan	Deputy Director General Ⅰ (Macro)
Mr. Azizan Hussein	Deputy Director General Ⅱ (Sectional)

EXTERNAL ASSISTANCE SECTION, EPU

Mr. Mohamad Zainol Abidin	Director
Mr. K. Thillainarajan	Principal Assistant Director (Bilateral & Non-Gov't Sources)
Mrs. Nor Fadzilah bte Yahaya	Assistant Director (Bilateral & Non-Gov't Sources)
Puan wan Norma Wan Daud	Assistant Director (Bilateral & Non-Gov't Sources)

INDUSTRY SECTION, EPU

Dr. Abdullah Mohd. Tahir	Director
Mr. Fakhurazi bin Abd. Majid	Principal Assistant Director (Trade & Finance Industry)
Ms. Havinder Kaur	Principal Assistant Director (Science, Technology & Tourism)
Mr. Borhan Sidik	Principal Assistant Director (Light, Small Scale & Heavy Industry)
Mr. Allauddin Hj. Annuar	Assistant Director (Trade & Finance Industry)
Mr. Ong Yew Chee	Assistant Director (Science, Technology & Tourism)

SOCIAL SERVICE SECTION, EPU

Mr. Mohd. Akbar bin Baba	Director
Puan Zainal Abd. Karim	Principal Assistant Director (Education)
Mr. Muhamad bin Hamzah	Principal Assistant Director (Environmental/Solid Waste)

INFRASTRUCTURE SECTION, EPU

Dr. Gan Khuan Ho	Director
Ms. Rosmah bte Hj. Jentera	Principal Assistant Director (Water Supply/Sewage)
Mr. K. Govindan	Principal Assistant Director (Ports)

AGRICULTURE SECTION, EPU

Dr. Abdul Aziz bin Yaacob	Director
Ms. Lin Mui Kiang	Principal Assistant Director (Agriculture)
Ms. Kamariah Ramli	Principal Assistant Director (Fisheries & Poultry)
Mr. Parameswaren	Principal Assistant Director (Rural Industrialization & Agro-Based Industries)

ENERGY SECTION, EPU

Cik Siti Hadzar binti Ismail	Director
Mr. Tham, Ah Fun	Principal Assistant Director (Electricity)
Mr. Mohamad Hanis Abdullah Sani	Assistant Director (gas & Petroleum)
Mr. Irwan Sarigar	Assistant Director (Mineral Resources)

Ⅱ. Institute of Medical Research（ＩＭＲ）について

1. 沿　岸

ＩＭＲはマレイシア国保健省、直かつの医学領域における唯一の中央研究所である。

１９００年にイギリスの統治下で創設され、当時フランスによるサイゴンのパスツール研究所、オランダによるジヤカルタの研究所と並んでイギリスによる東南アジア地域の医学研究のセンターとして、マラリア等の熱帯病の研究、ベリベリ等の栄養学の研究で数々のかがやかしい業績をあげてきた。１９４３～５年には、日本による占領下にあって日本人研究者が所長であった時期もある。クアラルンプール市内に位置し、クアラルンプール総合病院及びマレイシア国民大学医学に接し、新旧いくつかの建物からなる大きな研究所である。

2. 職　員

ＩＭＲ本体で５３７名のうち研究者は７５名、その他ＷＨＯ関係者５名、検査技師学生188名を含めると統計７３０名となる（表１）。

3. 活　動

ＩＭＲの活動は研究、検査、ワクチン生産、研修、国際関係の５分野に別れている（表２）。

4. 組　織

公的機構としては、所長を頂点に８部門からなる。研究はうち５部門２０課で行われている形をとっている（図１）。

しかし実際はマラリア、フィラリアが一つとなっていたり、ワクチン部門の研究がなかったりして、１６課で６６研究プロジェクトが数えられている（表３）。しかし、研究では同時に問題（テーマ）解決型の学際的プログラム形式をとっており、１２プログラム（テーマ）に対応して種々の課がかかわり、２３のプロジェクトを推進している（表４）。

検査はこれらの研究５部門がになっている。

ワクチン生産は、Medical Microbiology 部門のワクチン生産課でこれまで行われてきたが、国の大きさが小さく、生産の採算が合わないので現在は生産を中止し、マレイシア国としては製品を輸入しているとのことであった。研修はトレイニング部門、国際関係は国際関係部門で行われている。

5. 実　績

１９８９年の分野ごとの実績は表５の如くである。

6. 予　算

１９８９年の予算は統計１９４millionマレイシアドルであり、うち純研究費は6.4millionマレイシアドル、外国からのグラント等は1.3millionマレイシアドルであった（表６）。

第６次マレイシア国家計画（１９９１～９５）によると、国家予算を医学研究費として５９.８millionマレイシアドル予定しており、うち17millionマレイシアドルがＩＭＲに予定されている。

表　1

職　員　（１９９０．８）

STAFF OF I,M,R,

MANAGERIAL & PROFESSIONAL GROUP	75
EXECUTIVE & SUB-PROFESSIONAL GROUP	51
CLERICAL & TECHNICAL GROUP	162
SUBORDINATE & MANUAL GROUP	249
TOTAL:	537

WHO REGIONAL CENTRE FOR RESEARCH & TRAINING IN TROPICAL DISEASES AND NUTRITION	1
WHO REGIONAL ANTI-MALARIA TEAM	4
TOTAL	5

TRAINEES MEDICAL LABORATORY TECHNOLOGY	
MEDICAL LAB TECHNOLOGISTS(MLTs)	188

GRAND TOTAL:	730

図 1 組 織 図

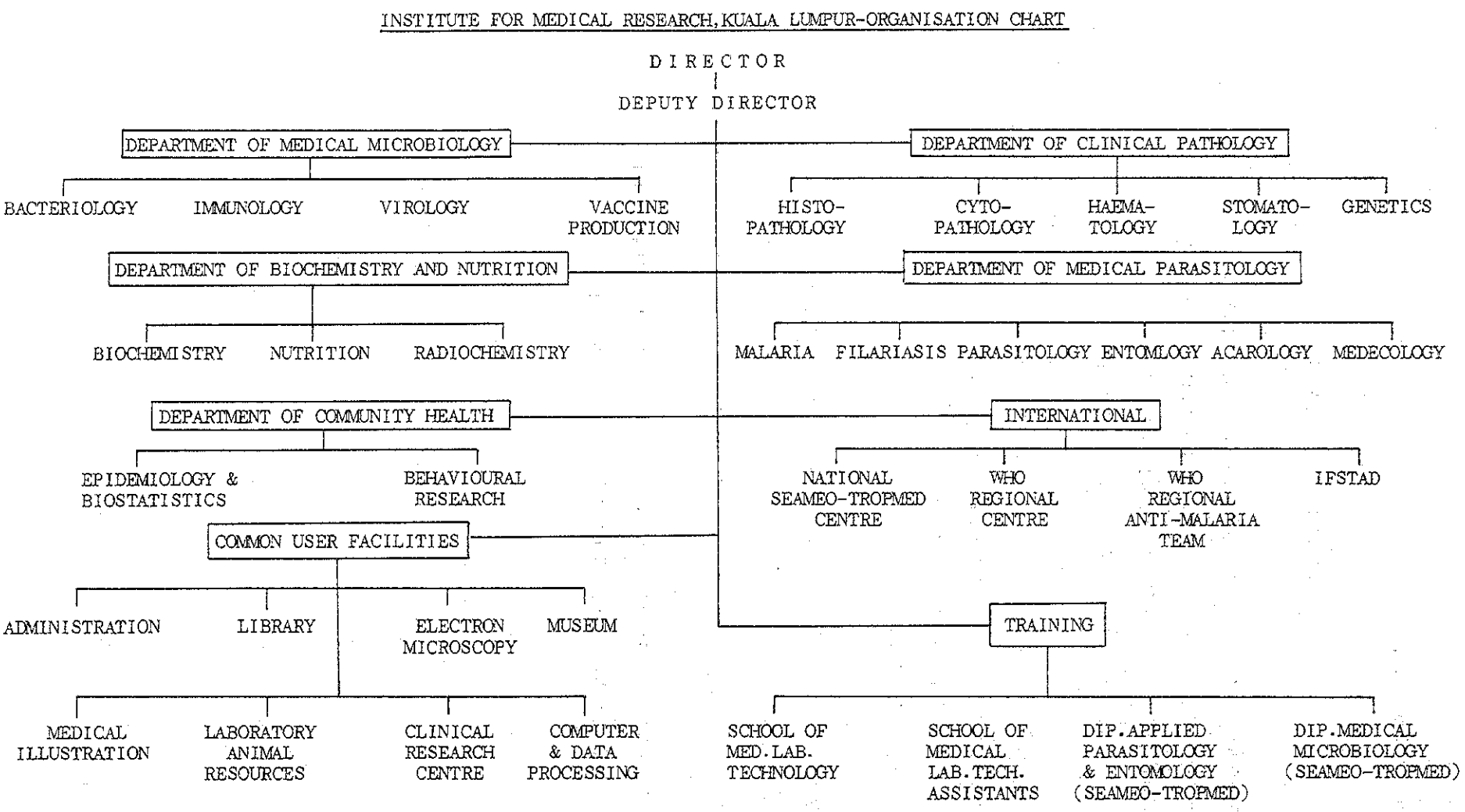
INSTITUTE FOR MEDICAL RESEARCH, KUALA LUMPUR-ORGANISATION CHART
DIRECTOR
DEPUTY DIRECTOR
DEPARTMENT OF MEDICAL MICROBIOLOGY
BACTERIOLOGY
IMMUNOLOGY
VIROLOGY
VACCINE PRODUCTION
DEPARTMENT OF CLINICAL PATHOLOGY
HISTO-PATHOLOGY
CYTO-PATHOLOGY
HAEMA-TOLOGY
STOMATO-LOGY
GENETICS
DEPARTMENT OF BIOCHEMISTRY AND NUTRITION
BIOCHEMISTRY
NUTRITION
RADIOCHEMISTRY
DEPARTMENT OF MEDICAL PARASITOLOGY
MALARIA
FILARIASIS
PARASITOLOGY
ENTOMLOGY
ACAROLOGY
MEDECOLOGY
DEPARTMENT OF COMMUNITY HEALTH
EPIDEMIOLOGY & BIOSTATISTICS
BEHAVIOURAL RESEARCH
INTERNATIONAL
NATIONAL SEAMEO-TROPMED CENTRE
WHO REGIONAL CENTRE
WHO REGIONAL ANTI-MALARIA TEAM
IFSTAD
COMMON USER FACILITIES
ADMINISTRATION
LIBRARY
ELECTRON MICROSCOPY
MUSEUM
TRAINING
MEDICAL ILLUSTRATION
LABORATORY ANIMAL RESOURCES
CLINICAL RESEARCH CENTRE
COMPUTER & DATA PROCESSING
SCHOOL OF MED.LAB. TECHNOLOGY
SCHOOL OF MEDICAL LAB.TECH. ASSISTANTS
DIP.APPLIED PARASITOLOGY & ENTOMOLOGY (SEAMEO-TROPMED)
DIP.MEDICAL MICROBIOLOGY (SEAMEO-TROPMED)

表　2

活　動　分　野

RESEARCH

DIAGNOSTIC & CONSULTATIVE SERVICES

VACCINE PRODUCTION

TRAINING:
- D, A, P, &E,
- DIP, MED, MICROBIOLOGY
- M, L, T,
- A, M, L, T,
- BIOCHEMISTS/BACTERIOLOGISTS/ ENTOMOLOGISTS
- D, C, P, DOCTORS
- OTHERS

INTERNATIONAL:
- W, H, O,
- SEAMEO-TROPMED
- IFSTAD
- OTHERS

表 3

PROJECTS FUNDED UNDER THE R & D BUDGET 1990

DISCIPLINE	NO. PROJECTS
1. ACAROLOGY	2
2. ANIMAL RESOURCES	2
3. BACTERIOLOGY	3
4. BIOCHEMISTRY	6
5. CLINICAL RESEARCH	4
6. ENTOMOLOGY	5
7. HAEMATOLOGY	8
8. HUMAN NUTRITION	4
9. MALARIA/FILARIASIS	7
10. MEDICAL ECOLOGY	2
11. PARASITOLOGY	3
12. RADIOCHEMISTRY	3
13. SEROLOGY	5
14. STOMATOLOGY	1
15. VIRUS RESEARCH	7
16. EPIDEMIOLOGY	4
TOTAL:	66

表 4

IMR RESEARCH PROJECTS 1990

PROGRAMME	NO. PROJECTS
1. MALARIA	2
2. FILARIASIS	1
3. DENGUE	1
4. FEBRILE ILLNESSES	1
5. PARASITIC DISEASES	1
6. CARDIOVASCULAR DISEASES	1
7. CANOER	3
8. SEXUALLY TRANSMITTED DISEASES	1
9. COMMUNITY HEALTH	1
10. SCRUB TYPHOS	2
11. ALLERGY	1
12. OTHER RESEARCH PROJECTS	8
TOTAL:	23

表 5

実　績（1989）

RESEARCH

PAPERS PUBLISHED			− 49
REPORTS			− 11
SERVICES			
SPECIALISED DIAGNOSTIC TESTS/REFERRAL SERVICES			− 464,840
VACCINE PRODUCTION	Tuberculin	88.6L	
	Cholere Vaccine	84.8L	
	Typhoid Vaccine	148.0L	

TRAINING

1. MEDICAL LABORATORY TECHNOLOGISTS		−188
1 ST YEAR − 72		
2 ND YEAR − 33		
3 RD YEAR − 83		
2. DIPLOMA IN APPLIED PARASITOLOGY		− 15
$ENTOMOLOGY		
3. DIPLOMA HIN MEDICAL MICROBIOLOGY		− 14
4. OTHER MEDICAL SCIENTISTS		− 20
5. W.H.O. FELOWS		− 39
REP. OF CHINA	− 2	
INDIA	− 4	
SRI LANKA	− 9	
INDONESIA	− 12	
PHILIPPINES	− 1	
VIETNAM	− 2	
KOREA	− 2	
BRUNEI	− 2	
IRAN	− 2	
MACAU	− 1	
BURMA	− 1	
PAPUA NEW GUNIEA	− 1	

SCIENTIFIC MEETINGS HELA AT THE IMR

NATIONAL & INTERNATIONAL	− 6

STAFF TRAINING OVERSEAS

LONG-TERM	− 3
SHORT-TERM	− 18

表 6

BUDGET FOR 1989

i)	From the Malaysian Government : For personal emoluments and operating expenditure.	$ 10,399,675.00
ii)	Training and Scholarship Allowances : For trainees attending the IMR's Senior and Junior courses in Medical Laboratory Technology.	1,286,595.00
iii)	Trust Accounts : USAMRU/SEAMEO－TROPMED/ WHO/PORIM	1,320,218.23
iv)	Research and Development Fund :	6,432,500.00
	TOTAL	$ 19,438,988.23

Ⅲ. マレイシア側からの要請書

PROPOSAL FOR PROJECT-TYPE COOPERATION UNDER THE JICA SCHEME

1. Project Title

Strengthening the Use of Biotechnology in the Diagnosis and Management of Tropical Diseases

2. Preamble

Biotechnology and other molecular biology techniques have in recent years revolutionised research in the medical field, providing better tests and products for the diagnosis and management of diseases. It is imperative that we equip Malaysian medical researchers with these technologies so that they will be able narness these tools in the management and control of tropical and other diseases prevalent in Malaysia.

While certain biotechnology and molecular biology techniques are being utilised by our researchers in their studies, we are still far from being adequate in these fields in terms of technology and equipment. We would therefore like to request for aid in the form of experts, equipment, research grants and training opportunities in these areas through the JICA mechanism.

We have chosen two main areas for support, these being the application of biotechnology techniques to study:

(a) Malaria and malaria vectors;
(b) Common genetic diseases in Malaysia.

Malaria is the most important parasitic disease in Malaysia, with about 40,000 to 50,000 confirmed cases per year, causing considerable morbidity amoung our rural populations.

Certain genetic diseases are relatively more commonly seen in Malaysia, for example, thalassemias and alpha-1 antitrypsin deficiency. Accurate and rapid detection of such conditions are important not only for patient management but also for counselling purposes.

We believe the two areas stated above will also be of interest to our Japanese counterparts in terms of opportunities to study not only malaria which is an important tropical disease, but also challenging medical conditions like genetic disorders.

We append below these two sub-projects for consideration.

3. Proposals for Sub-projects

3.1 Malaria and malaria vectors

3.1.1 Duration of project: 3 years (June 1991-June 1994)

3.1.2 Background:

Malaria continues to be an important public health problem in Malaysia causing considerable morbidity and sometimes mortality. In spite of the control measures taken over the years, the number of cases reported annually has not decreased. In 1987, there were 36,657 cases compared to 50,721 in 1988 (Annual Reports, Vector

Borne Disease Control Programme, Ministry of Health, Malaysia). Plasmodium falciparum is the most common infection followed by P. vivax and P. falciparum, P. vivax and P. malariae were 68.9% and 0.45% respectively.

At present, the diagnosis of malaria is mainly by the microscopic examination of blood films. This method although sensitive and specific, has a number of well-known limitations. On the other hand, serological tests measuring malaria antibodies such as the indirect fluorescent test (IFAT) and the enzyme-linked immunosorbent assay (ELISA) are more useful as seroepidemiological tools as antibody levels reflect exposure or past infections rather than current infections. Thus there is a need to develop better diagnostic tests which are able to detect either the malarial parasite or its antigens present in patients' serum as this will indicate current infections.

With the advent of biotechnology, techniques like recombinant DNA technology can provide new avenues for the development of better and more rapid assays for malaria diagnosis. A number of P. falciparum DNA probes has been developed (Barker et al., 1986; Franzen et al., 1984; Holmberg et al., 1986) and these have shown good sensitivity and specificity when compared to the conventional method of microscopy.

In Malaysia, both human and simian malarias are often found together in the same endemic areas. Natural infections of simian malarias that have been reported include P. fieldi (Eyles et al., 1960a), P. cynomolgi (Eyles et al., 1960b), P. knowlesi (Chin et al., 1965) and P. inui seen in macaque monkeys. It would therefore be useful if species-specific DNA probes could be developed against both human and simian malarias for use as diagnostic as well as epidemiological tools.

Vector control is another important aspect in the management of malaria. Previous observations in the region have indicated the presence of different vector species/sibling species which are difficult to identify based on morphological or cytological criteria, but which differ significantly in vectorial capacity. The development and application of biotechnology/molecular biology techniques to molecular differentiation and identification of arthropod vectors are important for better understanding of the phylogenetic relationship of morphologically closely related species. The rapid identification of vectors and understanding the vector competence at the molecular genetic level will be invaluable in the design of rational vector control strategies.

3.1.3 Project Description:

Objectives:

(a) To produce species-specific DNA probes for human (P.falciparum, P. vivax) and simian (P. cynomolgi) malarias using a cDNA library.

(b) To produce fusion proteins from positive clones for tests with polyclonal/monoclonal antibodies.

(c) To obtain the DNA sequences of useful clones.

(d) To produce synthetic peptides (antigens) for use in diagnosis and epidemiological studies.

(e) To identify ribosomal DNA (rDNA) regions in mosquitoes where potential species differences occur.

(f) To amplify these rDNA regions using the polymerase chain reaction with appropriate primers.

(g) To clone useful fragments into suitable vectors and to sequence the DNA fragments using standard dideoxy sequencing methods, modified for double stranded templates.

ethodology:

(a) Messenger RNA (mRNA) from the various Plasmodium spp. will be obtained using the method of Berger & Kimmel (1987).

(b) cDNA libraries will be constructed in phage and other appropriate systems (Coppel, 1985).

(c) Positive clones and their fusion proteins will be identified using suitable probes eg. ^{32}P- labelled genomic DNA, monoclonal or polyclonal antibodies and characterized to identify sensitive and specific probes for use in diagnosis.

(d) Selected DNA probes will then be field tested against human and mosquito infections to assess their usefulness.

(e) DNA sequences of useful clones can then be obtained by DNA sequencing (Sanger's method).

(f) Synthetic peptides of these clones will be produced using the peptide synthesis technique for use as antigens in an assay to detect species-specific malaria antibodies in patients' sera.

(g) Field specimens of various Anopheline mosquitoes will be collected and rDNA will be obtained.

(h) Certain regions of the rDNA of potential interest will be amplified using the polymerase chain reaction and appropriate primers.

(i) The amplified fragments will then be inserted into a suitable plasmid and cloned into E. coli.

(j) Selected clones will be kept as 'freezer stock' for further laboratory tests.

(k) Sequencing of the selected DNA fragments will be performed using standard dideoxy sequencing methods.

References:

Barker, R.H.Jr., Suebang, L., Rooney, W., Alecrin, G.C. Dourado, H.V. and Wirth, D.E. (1986). Specific DNA probe for the diagnosis of P. falciparum malaria. Science, 231: 1134-1436.

Berger, S.L. and Kimmel, A.R. (1987). Guide to Molecular Cloning. Acàdemic Press.

Chin, W., Contacos, P.G., Coatney, G.R. and Kimball, H.R. (1965). 'A naturally acquired Quotidian type malaria in man transmissible to monkeys'. Science, 150: 1314-1315.

Coppel, R.L. (1985). mRNA cDNA cloning. In: Applications of genetic engineering to research on tropical disease pathogens with special reference to Plasmodia. Eds. Panyim, S., Wilairat, P., and Yuthavong, Y., W.H.O., Geneva.

Elyles, D.E., Laing, B. and Yap, L.F. (1960a). 'Plasmodium fieldi sp. nov. A new species of malaria parasite from the pig-tailed macaque in Malaya. Ann. Trop. Med. Parasit. 36: 242-247.

Eyles, D.E., Coatney, G.M. and Getz, M.E.'(1960b). Vivax- type malaria parasite of macaques transmitted to man. Science, 132: 1812-1813.

Franzen, L., Shabo, R., Perlmann, H., Wigzell, H., Westin, G., Aslund, L., Persson, T. and Petersson, U. (1984). Analysis of clinical specimens by hybridization with probe containing repetitive DNA from Plasmodium falciparum. Lancet, 1: 525-528.

Holmberg, M., Bjorkman, A., ranzen, L., Aslund, L., Lebbad, M., Petersson, U. and Wigzell, H. (1986). Diagnosis of Plasmodium falciparum infection by spot hybridization assay: specificity, sensitivity and field applicability. Bull. Wrld. Hlth. Org. 64: 579-585.

3.1.4 Cost Estimates:

Other than the costs outlined under Section 3.1.8, the Institute for Medical Research, Kuala Lumpur will be responsible for the provision of laboratory space and its maintenance and also the salary of its permanent staff involved in the project.

3.1.5 Source of funding:

This project has not been given any allocation by the Malaysian Government and JICA is expected to be the sole funding agency.

3.1.6 Manpower implications:

The categories of staff involved in this project will include the following:

i) Permanent staff of the Institute for Medical Research, Kuala Lumpur. These are reserch officers, medical laboratory technologists and junior lab assistants (for field work).

ii) We also require 2 temporary research officers (1 of whom should be an entomologist) and 1 temporary technician to be employed under this project grant.

3.1.7 Benefits and Justification:

From this study, we hope to produce specific and sensitive DNA probes and peptides that will enable more rapid diagnosis of malaria and also facilitate more accurate information on the epidemiology of this disease in the country. Also, a better understanding of vector competence of the malaria vectors at the molecular genetic level will enable the design of more effective ector control strategies. These will contribute immensely to the control and management of malaria .

3.1.8 Foreign Assistance Requirements:

(a) Expertise:

2 Consultants - See Appendices I & II (Request for Experts) for details.

(b) Training:

2-3 months duration: Training of 1 permanent research officer (Malaysian) in a Japanese laboratory to acquire the necessary technology for molecular analysis of the mosquito DNA.

(c) Equipment and Operating Costs

	Malaysian $
1) For Year 1	
I. Consummables	
Reagents for mRNA preparation Reagents for cloning cDNA Radioactive labels Nick Translation kits Disposable pipettes, tubes etc. Films & reagents for film processing Glassware Restriction enzymes Reagents for large scale preparation of DNA Cloning and sequencing kits Peptide synthesis kits	150,000

II. Field Trips - Travelling Allowances

5 Trips within Peninsular Malaysia	25,000
5 Trips to East Malaysia (inclusive of airfare)	45,000

III. Manpower:

2 Consultants - M$20,000 per month for 12 months	480,000
2 Temporary Officers (B. Sc. Hons.) - 12 months	26,000
1 Temporary Technician - 12 months	10,000

IV. Training:

1 Short-term (2-3 months) -in Japan in mosquito DNA technology	11,000

IV. Equipment

Small Equipment

Gel Electrophoresis apparatus	3,000
Block-heater	2,000
Vacuum oven	10,000

Large Equipment

DNA Sequencing Apparatus and Computer Software	350,000
Gamma cell blood irradiator	300,000
Sub-total	1,412,000

2) For Year 2:

Consummables	150,000
Field Trips	70,000
Manpower	516,000
Sub-total	736,000

3) For Year 3:

Consummables		150,000
Field Trips		70,000
Manpower		516,000
	Sub-total	736,000

Summary of Budget required for 3 years:

Year 1:		1,412,000
Year 2:		736,000
Year 3:		736,000
	Total	2,884,000

3.2 Development of deoxyribonucleic acid (DNA) probes and oligopeptide technology for the detection of common genetic diseases in Malaysia

3.2.1 Background:

Thalassemias:

Genetic diseases such as the thalassemias are commonly found in Malaysia. A survey on the school children in Kuala Lumpur showed the incidence of the beta thalassemia gene to be 4.1%(1). Mutations giving rise to beta-thalassemias are heterogenous in Malaysia because of the multi racial groups of its population(2).

Parents who are beta-thalassemia carriers are at a one is to four risk of having a child with beta-thalassemia major. Patients with beta-thalassemia major require life long blood transfusions and the cost of maintaining them is high.

Alpha-1 Antitrypsin Deficiency:

No studies have been done so far on phenotyping of the alpha-1 antitrypsin deficency in Malaysian population. However our studies (1984 - 1987) showed that 15 - 20% of prolonged jaundiced cases (in children aged below 12 years)

had low serum alpha-1 antitrypsin levels. It is well known that this lethal hereditary disorder is common in the Caucasian population.

A programme for the rapid and accurate detection of the type of mutations in beta-thalassemia and alpha-1 antitrypsin deficiency carriers using DNA probes and peptide technology is necessary.These techniques when established can be applied in the prenatal diagnosis of common genetic diseases in the country.

3.2.2 Duration of project: 3 years (August 1991-August 1994)

3.2.3 Project Description:

Objectives:

(a) To determine the various types of gene mutations in common genetic diseases such as the thalassemias and alpha-1 antitrypsin deficiency using the DNA sequencer.

(b) To synthesize oligonucleotide probes using the DNA synthesizer for the detection of the analysed mutations.

(c) To develop non radioactive methods to label the synthesized DNA probes for the detection of gene mutations

(d) To synthesize oligopeptides using the peptide synthesizer to detect gene mutations in thalassemias and alpha-1 antitrypsin defiency.

(e) To use the amino acid analyser to analyse the amino acid sequences of the synthesized oligopeptides.

The project is to be carried out for a period of 3 years at the Institute for Medical Research, Kuala Lumpur. The schedule for the 3 years is as follows:

First year:
1) Purchase of equipment
2) Training on the usage of the equipment
3) Lectures and practical training by the experts.

Second and Third Year:
1) Full implementation of project according to proposed methodology
2) Technical asssistance and supervision by experts

Methodology:

Collection of Specimens:

Researchers are to travel to the General Hospitals of each state

in Malaysia including Sabah and Sarawak to collect the specimens.

The specimens collected will be used as follows:

(a) Development of DNA probes.

1. Extraction and purification of DNA
2. Determination of gene sequence of the mutations found in the genetic diseases using the DNA sequencer.
3. Synthesis of DNA probes using the DNA synthesizer in order to detect the mutations in (2).
4. Non radioactive labelling of DNA probes for the detection of genetic mutations.

(b) Development of peptide technology

1. From the known gene sequences, synthesis of oligopeptides by the peptide synthesizer to detect genetic mutations in carriers.
2. Usage of amino acid analyser to assess the oligopeptide sequence synthesized in (1)

References

Khalid Hassan:The thalassaemias: Pathophysiology,Diagnosis and Management: The Family Practitioner 8:39-48 (1985)

Fucharoen S, Fucharoen G, Ata K, Aziz S, Hashim S, K Hassan & Fukumaki Y: Molecular characterization and non radioactive detection of beta thalassemia in Malaysia. Acta Hematologica: 1990 (In press)

Ronald G Crystal: The Journal of Clinical Investigations 85:1343 - 1352 (1990)

The Lancet: 421 - 422 (1987)

F.D.Ledley & S.L.C.Woo:Journal of Inherited Metabolism: 9 Suppl 1: 85 - 91 (1986)

D.W.Cox & T Mansfield: Journal of Medical Genetics: 24: 52 - 59 (1987)

3.2.4 Cost Estimates:

(See Section 3.1.4)

3.2.5 Manpower Implications:

Employment of two temporary research officers:
1) For DNA technology
2) For Peptide technology

3.2.6 Benefits and Justification:

The objectives of the project are to develop a rapid and accurate technique using DNA and peptide technology for the detection of gene mutations found in thalassemias and alpha-antitrypsin deficiency. The cost of maintaining patients with beta-thalassemia is high. Hence the establishment of the two techniques is essential to enable the application of the technology in the prenatal diagnosis of genetic diseases in the future.

The DNA and peptide technology learned by the temporary research officers will enable them to be considered for permanent employment when services for prenatal diagnosis of genetic diseases are set up in the country.

3.2.7 Foreign Assistance Requirements:

a) Expertise: See APPENDIX III & IV
b) Equipment and Consumables:(For justification please see project description)

	Item	Amount
1.	DNA Synthesizer	M$500,000.00
2.	Peptide Synthesizer	$300,000.00
3.	Amino Acid Analyser	$300,000.00
4.	Consumables (for the duration of 3 years) - chemicals, reagents - plasticwares - mononucleotides,amino acids - tagging agents	$300,000.00
5.	Travelling expenses(for researchers & experts for 3 years)	$30,000.00
6.	Manpower (2 persons for 3 years)	$90,000.00
	Total	$1,520,000.00

c) Training:

1.Training for use of major equipment(Items 1,2 & 3)	$60,000.00
2.Experts emolument (2 x 6 mths)	$252,000.00
Total	$312,000.00

TOTAL COST: M$1,832,000.00

4. Summary

request for a project-type cooperation for a period of 3 years from 1991-1994 is made in the area of tropical diseases. Specifically two sub-projects are submitted, one in malaria which is the most important parasitic disease in Malaysia with about 50,000 confirmed cases per year. The other is on common genetic diseases in Malaysia, with special emphasis on thalassemia and alpha-1 antitrypsin deficiency. The primary objective is to strengthen the use of biotechnology in the diagnosis and management of these diseases. A total budget of M$4,716,000 over 3 years is requested.

APPENDIX I

REQUEST FOR EXPERT

I. TITLE OF POST: 1) An expert in biotechnology / molecular biology with expertise (theoretical and practical) in cDNA cloning.

II. MAIN OBJECTIVES/BACKGROUND TO REQUEST:

This project involves the construction of cDNA libraries in phage systems for the production of DNA probes and fusion proteins against various Plasmodium parasites. At present, there are no research officers at the Institute for Medical Research, Kuala Lumpur who have any training in cDNA cloning techniques.

III. ASSISTANCE REQUESTED:

a) The expert will have the following duties:
   1. Assist in the setting up of a cDNA laboratory in the existing Biotechnology unit in IMR,
   2. Teach laboratory techniques involved in the isolation of mRNA, construction of cDNA libraries and production of fusion proteins,
   3. Impart theoretical knowledge on these areas via lectures, tutorials.

b) The expert will be responsible to the terms of reference set up by JICA/EPU.

c) Qualifications, experience and age limits
The expert must be a Ph.D holder with at least 5 years post-doctoral knowledge in molecular biology. He must be able to converse and teach in English and should be between 35-45 years of age.

d) Duration and starting date:
1 expert per year for the three-year period of this project starting June 1991. (3 experts are expected for this project).

IV. COUNTERPART SUPPORT:

The local counterparts to the experts will be:
i) Dr. Mak Joon Wah, Head of the Division of Malaria & Filariasis, IMR
ii) Mr. Chong Hen Kee, Division of Malaria & Filariasis
iii) Dr. Stephen Ambu, Division of Malaria & Filariasis
iv) Ms. Patricia Lim, Division of Malaria & Filariasis
v) Ms. Noor Rain Abdullah, Division of Malaria & Filariasis
vi) Any other Research officer from IMR who will join the working group for this project.

V. There is no previous or current application for funding to other agencies.

VI. Nil

APPENDIX II

REQUEST FOR EXPERT

I. TITLE OF POST: Molecular biologist with expertise in mosquito /Dipteran DNA analysis, restriction mapping and sequencing.

II. MAIN OBJECTIVES/BACKGROUND TO REQUEST:

Since this is a new field of research in Malaysia, it would be necessary that we have the relevant expert present to assist the investigators at IMR in the establishment and development of this project.

III. ASSISTANCE REQUESTED:

a) The expert should have practical experience in studies related to DNA analysis, sequencing DNA, restriction mapping and other basic molecular techniques.

b) The expert will be responsible to the terms of reference set up by JICA/EPU.

c) The academic qualifications of the expert should be a Ph.D with at least 5 years post-doctoral experience in the relevant field. Experience in the molecular aspects of Dipteran species would be an advantage. He must be able to converse and write in English and should be between 35-45 years of age.

d) The selected candidate should be able to start work as soon as funding is approved. Ideally the expert should be present in the laboratory for at least 4-5 months per year (1 expert per year; hence 3 experts are expected for this project).

IV. COUNTERPART SUPPORT:

The local counterparts to the expert will be:

i) Dr. Inder Singh, Head of the Division of Medical Entomology and Ecology, IMR
ii) Dr. Chiang Geok Lian, Division of Medical Entomology, IMR
iii) Dr. Indra Vythilingam, Division of Medical Entomology, IMR
iv) Any other research officers in IMR who wish to participate in this project.

V. There is no previous or current application to other agencies for funding.

VI. Nil

APPENDIX III

REQUEST FOR EXPERT

1. Title of post: An expert in Human DNA technology

11. Main Objectives/Background to the Request:
1.To strenghten application of human DNA technology techniques especially in the development of oligopeptide synthesis of primers and probes for charactertisation of certain genetic diseases especially the thalassemias and alpha-1 antitrypsin deficiency.
2.Practicals

111. Assistance Requested:
a)The terms of reference of the expert are as follows:

1.To assist in the practical application of a DNA synthesizer to materialise the relevant oligonucleotide primers and probes.
2.To provide theoretical background knowledge and also recent advances in the human DNA technology.
3.To organise workshops to workout specific problems for example synthesis of primers for PCR sequencing for certain thalasssemia and alpha-1 antitrypsin.

b)Authority to whom expert will be responsible:

Dr Zakiah Ismail, Head of Biochemistry Division
Dr Henry R Gudum, Head of Hematology

c)Qualifications and experience required and approximate age limits:
1.Qualifications and experience:
Ph.D/M.B.B.S. with experience in human DNA technology especially in oligonucleotide synthesis for use as primers as probes, the use of non-radioactive tagging for the probe assay. The expert should be able to communicate in English.

2.Age:Should be between 35-50 years old

d)Duration: 6 months

Starting Date: August 1992

1V Counterpart Support:

Dr Zakiah Ismail, Head of Biochemistry Division
Dr Henry R Gudum, Head of Hematology Division
Ms Norsiah Md Desa
Ms Chin Yuet Meng

V Others: Estimated Emolument: M$126,000.00

APPENDIX IV

REQUEST FOR EXPERT

I. Title of Post: An expert in Peptide Technology

II. Main Objectives/Background to the Request:
To strengthen application of peptide synthesis technology with special reference for
a) thalassemia and alpha-1 antitrypsin deficiency carrier detection
b) production of targeted MAb for a wide range of diagnostics development

III. Assistance Requested :
a)The terms of reference of the expert are as follows:

To assist in the practical application of peptide synthesizer with special reference to thalassemia and alpha-1 antitrypsin

b)Authority to whom expert will be responsible:

Dr Henry R Gudum, Head of Haematology Division
Dr Zakiah Ismail, Head of Biochemistry Division

c)Qualifications and experience and approximate age limits:

1 Qualifications and experience:
Postgraduate qualifications and experience in oligopeptide synthesis technology including amino acid analysis.Peferable an expert who has been working in human proteins and oligopeptides. The expert should be able to communicate in English

2.Age: 40-50 years

d)Duration: 6 months

Starting date: March, 1993

IV. Counterpart Support:

Dr Henry R Gudum, Head of Hematology Department
Dr Zakiah Ismail, Head of Biochemistry Department
Ms Chin Yuet Meng
Ms Norsiah Md Desa

c. Others:

Estimated Emolument: M$126,000.00

I. TITLE OF PROJECT

Cooperative project in setting up of a Radiotherapeutic and Oncology Service and Training Centre for the National University of Malaysia (UKM) Teaching Hospital in Cheras, Kuala Lumpur, Malaysia.

II. BACKGROUND

Radiotherapeutic and Oncology Service in a University setting with an academic emphasis, training of radiotherapist and cancer physician is non existent in Malaysia up to the present time. The Ministry of Health of Malaysia has 2 main radiotherapy centres in Kuala Lumpur (West Malaysia) and Kuching (East Malaysia) giving service for the entire country of 17 million people. Five small private radiotherapy centres (3 in Kuala Lumpur, one each in Penang and Perak) complement the service available to the population. The private sector facilities are only available to the more affluent group of the population. The cancer problem in the country is only second to cardiovascular and related diseases if accidents and paediatric problems are excluded.

2. The Government of Malaysia gives great emphasis on upgrading and improving cancer treatment facilities in the country. In the 6th Malaysia Plan (1991-1995) 3 more radiotherapeutic centres are in the offing to serve the East Malaysian state of Sabah, the East coast State of Kelantan/Terengganu West Malaysia and the southern region of Peninsular Malaysia i.e. Johor. While this development is most encouraging, the need for additional centres is obvious for 2 reasons:

2.1 For a population of 17,000.000 and increasing, up to 10 centres may be the more realistic figure to cope with increasing demand for the service;

2.2 The staffing and equipment of radiotherapeutic centres is at great cost in term of monetary consideration and staff training. The training of radiotherapist has always been

done overseas for long period causing great financial burden to the country. A centre geared for both service, and academic and professional training in the country would be most appropriate at this stage of the country's development. UKM, and the Ministry of Health of Malaysia have always been supportive of each other in ventures to train staff in various medical disciplines at undergraduates and post graduates levels in the past and at present. Radiotherapeutic training has been 'left out' simply because of the enormous cost involved and the lack of adequate number of trained radiotherapist (5 currently in the entire country plus 6 in the private sector).

III. PROJECT DESCRIPTION

3. A 800 bed teaching hospital for the University Kebangsaan Malaysia has been approved by Malaysian Government in the 6th Malaysia Plan. This hospital will have the full complement of all clinical disciplines and supportive service including premises for a radiotherapeutic centre. It is intended that the radiotherapy centre will have at least 2 senior radiotherapists with 2 junior radiotherapists and at least 2 trainees together with the complimentary number of physicists and radiographers and the ancillary staff. The section will require 2 linear accelerators or 1 linear accelerator with 1 cobalt teletherapy unit and complimentary simulation and computerised planning unit.

4. It is also intended to have a modern remote after loading system for brachytherapy of cancer of the cervix, nasopharynx etc. A section for diagnostic imaging with isotope and an MRI is also intended. This section will ultimately not only be the service element of the University but will also be the first training and research department serving the nation. This project will be part of the development of the

Univerisiti Kebangsaan Malaysia teaching hospital and is being planned as such. The implementation and completion of the project is expected to be within a period of 4 - 5 years.

IV. MANPOWER IMPLICATIONS

5. With the establishment of the project, it is envisage that the following manpower required will be provided.

	Existing	Projected
Radiotherapist	2	2
Junior Radiotherapist	0	2*
Trainees	0	2*
Physicist	2	2
Radiographers (Therapy)	2	20*

* Approval with Public Services Department to be negotiated

V. BENEFITS AND JUSTIFICATION

6. The project is a priority in terms of fulfilling a badly needed service and to act as the nucleus for the first training centre for radiotherapist/oncologist in the country.

VI. FOREIGN ASSISTANCE REQUIREMENT

7. The three components sought from the Medical Cooperation are as follows:

7.1 Expertise: Radiotherapist/Oncologist Physicists (Medical Radiation)

For training and joint research ventures.

7.2 Equipments:

i) 2 linear accelerators with electron facilities

ii) Computerised planning unit

iii) CO60 teletherapy unit

iv) CAT scanner

v) Remote after loader

vi) Gamma Camera

vii) *MRI

* In conjunction with Radiology diagnostic department.

7.3 Training:

Short course for the counterpart of up to 3-6 months for various categories of staff in the relevant fields. This would mainly involve the radiotherapist, physicists, radiographers and Isotope techniques. In appropriate cases up to 1 years training my be necessary.

I. TITLE OF PROJECT

Development of a Centre of Molecular Medicine

II. BACKGROUND

Advances in molecular biology in the past decade have enhanced all areas of basic biology and medicine. Many of the recent advances in understanding the pathogenesis of various human diseases, as well as advances in therapy and diagnostics have relied upon the techniques of monoclonal antibodies, recombinant DNA and gene cloning. It is certain that molecular biology will continue to occupy a central role in the future.

2. It is not only important but necessary that every effort be made within the Faculty of Medicine, University of Malaya, to increase awareness and understanding of molecular biology and also to pursue biomedical research projects utilizing these new, incisive and powerful but easy-to-apply techniques.

III. PROJECT DESCRIPTION

3. To set up an integrated, centralized and multidisciplinary Centre of Molecular Medicine within the Faculty of Medicine, University of Malaya.

4. The Centre will have the following functions:

4.1 To become a centre of molecular biology Research within the Fac ulty by bringing together all researchers (staff and postgraduate students) involved in various research projects utilizing the molecular biology approach.

4.2 To become a centre for Postgraduate Training in research at various levels including BSc, BMedSci, MMedSci, M.D., Ph.D. and the various Masters programmes within the Faculty.

4.3 To function as a Development and Evaluation Centre for possible Diagnostic tests relating to those diseases and syndromes where tests based on recombinant DNA technology are available or are being developed. These may include ante-natal diagnosis, malignancies, autoimmune and infectious diseases. The Centre can develop its own tests as well as evaluate commercial reagents and kits.

4.4 To serve as a Resource Centre of Information and Education for clinicians and other researchers constantly being faced with increasing amounts of molecular biology in the scientific literature. It is envisaged that this will be achieved through the following means:

(a) Molecular biology library (books and journals)
(b) Regular weekly seminars/journal club
(c) Technical workshop
(d) Special Symposia by Visiting Speakers

5. The rationale for the Centre of Molecular Medicine could be outlined as follows:

5.1 By bringing together, in the same laboratory, researchers utilizing a similar scientific approach, it will serve to encourage and stimulate daily interaction, discussion and exchanges which is vital to progress of ongoing projects, training of postgraduate students and the initiation and development of new and innovative research ideas.

5.2 By being a centre and source of information, it is hoped that this function will improve awareness and understanding of molecular medicine which, in turn, may generate more interdisciplinary and interdepartmental research projects

(especially those involving the clinical departments). Collaboration with other faculties and the Institute of Advanced Studies in the University of Malaya will also be encouraged.

5.3 To centralize those diagnostic tests which utilize the techniques of recombinant DNA to facilitate test performance, quality control and interpretation.

5.4 By becoming a centre of excellence in molecular medicine, the Centre will also be able to attract scientists of international standing, especially Malaysians currently working abroad, to return and serve the country.

IV. RESEARCH AREAS

6. The tools of molecular biology are currently being applied in various research projects within the faculty. Current projects which could form the core of the Centre's activities are as follows:

6.1 Department of Medicine:
Molecular biology of lymphoid malignancies.
Development of molecular diagnostic and research techniques in haematology and immunology.

6.2 Department of Medical Microbiology:
(a) Molecular characterization of dengue viruses
(b) Plasmid studies in Pseudomonas 'pseudomallei, Helicobacter jejuni and Staphylococcus aureus
(c) Molecular epidemiology of rotavirus infections
(d) Development of monoclonal antibodies to dengue viruses
(e) Production of cDNA clones
(f) Baculovirus expression of cloned genes

6.3 Department of Pathology:

Use of hybridization in Human hepatocellular carcinoma.

In-situ hybridization in Human Papilloma Virus.

Hepatitis B related liver disease.

6.4 Department of Otorhynolaryngology:

Hybridization probes in nasopharyngeal carcinoma.

6.5 Department of Biochemistry:

Production and radiolabelling of monoclonal antibodies and its use in detection, localization and treatment of malignancies.

Product of monoclonal antibodies for specific tumour diagnosis

6.6 Department of Physiology:

Detection of Anticardiolipin Antibodies.

V. MANPOWER

7. There are many local staff who have been trained in molecular techniques in USA, UK, Australia, Japan, etc. and are already actively involved in research using these modern skills. However, it is envisaged that the establishment of such a Centre of Excellence will hopefully attract Malaysian citizens who are currently working overseas due to the present lack of opportunity, to return to Malaysia. It is also envisaged that many more medically qualified staff will join in to work on research of special interests to them.

8. It may be necessary to request for additional experts from Japan and elsewhere from time to time and for duration of several months to 2 years to help to set up certain new aspects which may still be lacking locally and to upgrade our techniques.

VI. BENEFITS AND JUSTIFICATION

9. Under the R&D programme, funds are devoted by the Malaysian Government to research into the application of biotechnology in industry, agriculture, veterinary medicine, and human medicine.

10. The benefits that can be derived from this project includes the following:

- a new dimension of research for academic staff
- foster better research collaboration between Malaysia and Japan
- building up the manpower needs for the country in molecular skills
- increase productivity of medicinal and diagnostic products
- provide better diagnostic facilities
- allow for better patient management
- allow for the commercialization of kits and reagents
- employment of young graduates as research assistants and to offer them opportunities for obtaining higher degrees.

VII. FOREIGN ASSISTANCE REQUIREMENTS

11. The following components are sought from the Medical Cooperation Programme:

11.1 Equipment	-	provision of related equipment for the Centre;
11.2 Expertise	-	despatch of expertise in relevant fields; and
11.3 Training	-	provision of training for the counterpart officers

I. TITLE OF POST

An expert in Diagnostic Microbiology, UKM

II. MAIN OBJECTIVES/BACKGROUND TO THE REQUEST

To assist in the establishment of a Diagnostic Microbiology Laboratory.

III. ASSISTANCE REQUESTED:

(a) Job description/duties for which the expert will be responsible:

To assist in the establishment of a Diagnostic Microbiology Laboratory with infrastructure planning, equipment requirements and manpower needs.

(b) Authority to whom expert will be responsible:

The Dean, Medical Faculty, UKM.

(c) Qualification and experience required and approximated age limits:

Those that have been involved in planning a Diagnostic Microbiology Laboratory. MD/Ph.D with laboratory management experience.

(d) Duration and starting date:

The expert is required for 6 months duration in 1992.

(e) Counterpart Support

Head, Department of Microbiology, Faculty of Medicine, UKM

I. TITLE OF POST

An expert in Diagnostic Electron Microscopy.

II. MAIN OBJECTIVES/BACKGROUND TO THE REQUEST

Electron microcopy has an important role to play in the diagnostic and research aspects of Medical Science. The Faculty of Medicine, University of Malaya has an Electron Microscopy Unit which is located in and managed through the Department of Pathology. It uses a Philips GM10 transmission electron microscope and serve the whole Medical Centre. The use of electron microscopy as a diagnostic aid for the management of patients (of the University Hospital) has been largely concentrated in renal biopsy examinations and rapid diagnosis of viral infections. There has been recent interest in using ultrastructural examinations to help elucidate the histogenesis or differentiation of tumours pathology. However, there is general lack of confidence in the later area due to insufficient experience and proficiency among the staff. The use of the electron microscope in research has been varied but has been limited by the lack of certain technologies.

There have been many recent technological developments in electron microscopy that has brought the study of cell function to the ultrastructural level and which have made an impact on the science and practise of electron microscopy and medical centres in the developed world. The EM Unit here has been interested in many of the new techniques and have made preliminary attempts and studies to adopt some of these, such as immunogold labelling and microwave-stimulated fixation of tissues.

The current limitations to the development of the EM Unit lies in the lack of an expert in diagnostic electron microscopy who can act as a consultant to other staff, academic and scientific, on the interpretation of ultrastructural findings. There is also the need for a person with long experience in electron microscopy who can guide the

staff in developmental work in this area, particularly, in the introduction of new technologies.

III. ASSISTANCE REQUESTED:

(a) Job description/duties for which the expert will be responsible:

- Act as a consultant to other staff of the centre in the interpretation of ultrastructural changes in tissues.
- Provide guidance in the development of new techniques in electron microscopy that will be relevant and beneficial to medical science in this country.
- Provide guidance in research projects and diagnostic areas that require electron microscopical examinations. Many research and diagnostic areas involve tropical diseases that are suitable areas for collaborative research, such as, viral and bacterial infections and parasitic infestations (e.g. hepatitis, human papilloma virus, dengue, sarcocystis, helicobactor, amoebiasis) and renal and neoplastic diseases of high prevalence in South-East-Asia (e.g. IgA nephropathy, amyloid nephropathy, nasopharyngeal carcinoma, hepatocellular carcinoma, lymphoma).
- Undertake teaching assignments related to electron microscopy, such as lectures and practical supervision, to postgraduate students and medical laboratory technologists.

(b) Authority to whom expert will be responsible:
Head, Department of Pathology, Faculty of Medicine.

(c) Qualification and experience required and approximated age limits:

The person should be a medical doctor with a postgraduate research doctorate. He/she should have had sufficient experience (e.g. 10 years) in diagnostic electron microscopy to have served as a specialist in this field. An age range of 45 to 65 years would be suitable.

(d) Duration and starting date:

He/she should undertake this job for a period of 3 years (but a minimum of 1 year is acceptable). He/she can start anytime in 1991.

(d) Any other relevant information:

Should be able to communicate in English.

IV. COUNTERPART SUPPORT

2. Professor Lai-Meng Looi, Department of Pathology, Faculty of Medicine, University of Malaya.

I. TITLE OF PROJECT:

Establishment of A Micro-Vascular Surgical Workshop in UKM, Medical Faculty.

II. BACKGROUND:

Micro-Surgery and Microvascular Surgery is a new field in Surgery. Microsurgery such as microvascular, micro-neural, micro-corneal, micro-fallopin and micro-vasdeferens procedures. It allows reconstructive surgery for replantation, free transfer of flaps, and many types of reconstruction. This requires the acquintion of skill which can only be obtained by using a microsurgical laboratory facilities.

III. PROJECT DESCRIPTION:

2. The project will include the following:

Laboratory Space

(a) Operating microscopes ZEISS OPMI6 with double operation with foot switch control for zoom and magnification. I or more units.

(b) Microsurgical instruments:

- Microneedle holder
- Venel clips
- Microforceps Jeweller No. 5

(c) Rat cages, rat boards etc.

IV. BENEFITS/JUSTIFICATION

3. The project is envisaged to provide training for Microsurgeon to carry on with clinical work. It will also provide avenues for training of postgraduate students and enable research in microsurgery to carried out.

V. FOREIGN ASSISTANCE REQUESTED

4. The following components are sought for the Medical Cooperation Programme.

4.1	Expertise	:	visit by an accomplished microsurgeon to advise on the set up and start a course.
4.2	Equipment	:	provision ZEISS OPM 6 microscope and other related equipment.
4.3	Training	:	provision of training for local counterpart.

I. TITLE OF POST

An expert in Molecular Biology.

II. MAIN OBJECTIVES/BACKGROUND TO THE REQUEST

The application of molecular techniques for the specific and accurate diagnosis of infectious diseases, particularly those caused by viruses (dengue and Japanese encephalitis virus) is making a significant impact in patient management. Molecular biology and molecular techniques is still in its infancy in Malaysia and we need to learn from the expert in the application of these skills in a hospital setting.

III. ASSISTANCE REQUESTED

(a) Job description/duties for which the expert will be responsible:

- An expert in Molecular Biology who has experience in the cloning and sequencing of viruses, or
- who has experience in the expression of cloned genes in expression vector such as baculoviruses.
- The expert should have extensive knowledge of gene cloning and the construction and application of, cDNA probes for the diagnosis of infectious diseases

(b) Authority to whom expert will be responsible:
Head, Department of Medical Microbiology, Faculty of Medicine, University of Malaya.

(c) Qualification and experience required and approximated age limits:

Ph.D or equivalent in the field of Molecular Biology with relevant experience as stated in Job Description. Age Limit: 35-45 years of age preferred.

(d) Duration and starting date:

Minimum of 6 months and up to 2 years, starting anytime in 1991.

IV. COUNTERPART SUPPORT:

6. Prof. S.K. Lam, Professor and Head, Department of Medical, Microbiology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia.

I. TITLE OF PROJECT

The Study of Motility Disorders of the Large Bowel of man, UKM

II. BACKGROUND

Large Bowel Motility Disorders take various forms which include Irritable Bowel Syndrome, Anorectal Sphincteric Dysfunctions, Chronic Constipation, etc. They are seen and treated by traditional healers, faith healers, general practitioners, physicians, surgeons and gastro-enterologists. They are variously labelled and treatment is largely uncoordinated and empirical. Often enough the diagnosis is missed. Patients continue in their misery and suffer in silence. The impression is that this disease afflicts mainly the young and middle aged people in the prime of their lives. This affects the productivity of their work and indirectly affects the economy of the country. It is hoped that proper documentation of the disease and a coordinated approach to the problem would yield a better understanding of the disease and lay the foundation of a rational approach towards proper and more effective management of the patients.

III. OBJECTIVE

i) To study the incidence and epidemiology of large bowel motility disorders in man.

ii) To study the intraliminal rectal pressures and anorectal sphincteric pressures of normal people and to compare it with those suffering from large bowel motility disorders.

iii) To determine aetiological factors for these disorders: e.g. genetic predisposition, presence of and the density of hormonal/chemical receptors in the bowel of the patients, etc.

iv) To formulate a rational approach and treatment for these disorder.

IV. PROJECT DESCRIPTION

2. Patients with colonic complaints have to be investigated for carcinoma of colon. All are subjected to a Colonoscopy with/without Barium Enema.

3. Stool microscopy, stool occult blood and chemical analysis of 24 hr. collection of stool is to be carried out. Rectal pressures and anorectal pressures are measured and recorded. Biopsies of various parts of the colon and rectum are taken for histology and determination of receptors. Anorectal sphincteric and rectum function in defecation are visualised and recorded with the help of X-ray screening and cinematograph. The results are then compared with normal volunteers.

V. BENEFITS/JUSTIFICATION

4. Little research into colorectal diseases are undertaken in this country. Colorectal Diseases may be different in Malaysia as compared to other countries especially of Caucasian origins. Results of this study would help in the set up of laboratory models towards finding a cure or prevention of Colorectal diseases in man.

5. Association with Carcinoma of the colon could be evaluated more objectively with subsequent more effective public education.

VI. FOREIGN ASSISTANCE

(a) Expertise: A Specialist in Colorectal Disease skilled in research.

(b) Equipment: Video-colonoscope, Pressure Monitoring set, X-ray Screening.

(c) Training: Visit to Colorectal Centre for exposure and training in advanced colonoscopy and Research.

I. TITLE OF POST

An Expert in Thyroid Diseases (Benign), UKM

II. BACKGROUND:

Benign thyroid enlargement is seen quite commonly in Malaysia. This takes the form Multinodular goitre, Thyroid adenoma, Thyroid cysts and Thyroiditis. Iodine deficiency has been commonly implicated especially in the case of Multinodular goitre. However, in Malaysia which is a peninsular, seafood diet is readily available. As such iodine deficiency does not seem to be the cause for the high incidence of thyroid enlargement.

III. OBJECTIVES

The objective of obtaining the expert is to undertake the followings:

(a) To study the epidemiology and aetiological factors of benign thyroid enlargement.

(b) To discover effective prevention measures for these benign thyroid enlargements.

III. ASSISTANCE REQUESTED:

(a) To seek an expertise in thyroid diseases skilled in research techniques to help formulate a research project with the objectives in mind. Assistance will also be required as to initiate and implement the project. Factors to be looked at would include:

i) looking for viral DNA in resected thyroid tissue.

ii) determination of presence and the density of receptors (TSH, etc.) in resected thyroid tissue.

iii) studying genetic predisposition.

(b) Authority to whom Expert will be responsible

The expert will be responsible directly to the Head of Department and the Dean of the Medical Faculty.

(c) Qualification and Experience Required and approximated age limit

The Expert should be well versed in the management of thyroid diseases. Research experience is mandatory. The candidate would most likely be above 45 years old.

(d) Duration and starting date

One year duration and to be despatched as soon as possible.

IV. COUNTERPART SUPPORT

(1) Assoc. Prof. Freda A. Meah. MBBS (Rang.) FRACS.
Head of Department of Surgery,. U.K.M.
Consultant General Surgeon
Special interest in Endocrine Surgery

(2) Assoc. Prof. Khalid Abdul Kadir (Dato')
MBBS Hons. (Monash) B.Med.Sc. Hons.,
Ph.D (Monash) FRACP
Dean of Medical Faculty, UKM
Consultant Physician and Endocrinologist

(3) Mr. Samuel Tay MBBS (Mal), FRSC (Edin.)
Lecturer, Department of Surgery, UKM

(4) Mr. Abdullah Taha. MBBS (Mal), FRCS (Edin.)
Lecturer, Department of Surgery, UKM.

I. TITLE OF POST:

An expert in Occupational Health (Industrial Toxicology)

II. MAIN OBJECTIVES/BACKGROUND TO THE REQUEST:

The Department of Community Health, Medical Faculty, Universiti Kebangsaan Malaysia (National University of Malaysia) - UKM is beginning a Masters in Community Health program beginning in 1991. One of the areas of specialisation is occupational health. Courses being offered for this area of specialisation include occupational medicine, industrial hygiene, industrial toxicology, ergonomics, occupational epidemiology, clinical occupational medicine and practical occupational health.

III. ASSISTANCE REQUESTED:

(a) Job description/duties for which the expert will be responsible:

i) Review the course content of industrial toxicology.

ii) Prepare manual for course.

iii) Assist in conducting course.

(b) Authority to whom expert will be responsible:

Head, Department of Community Health,

and,

Dean,
Medical Faculty,
(Universiti Kebangsaan of Malaysia)

(c) Qualification and experience required and approximated age limits:

Medical Doctor with Ph.D in Industrial Toxicology, must have held academic positions and been involved in postgraduate training program.

(d) Duration and starting date:

Duration	:	2 months.
Starting	:	December 1991 - January 1992

(e) Must be fluent in English. Knowledge of Bahasa Malaysia would be useful.

IV. COUNTERPART SUPPORT:

Counterpart in Malaysia:

Dr. Krishna Gopal Rampal
Lecturer
Department of Community Health
Medical Faculty
Universiti Kebangsaan Malaysia

Ⅳ. ロジカルフレームワーク（第一次段階）

Tropical Diseases Diagnosis/Research Project in Malaysia　　Provisional (Logical Framework)

Objectives/Activities	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Grading up the Public Health Status in Malaysia through control of Tropical Diseases	New Technology developped by IMR shall be applied in clinical side, and also result shall be confirmed by Health statistic report	Health statistic report	・Strong commitment by Government in Public Health Sector (Finance, Administration) ・Tropical Diseases shall be the important theme in Public Health Sector ・Assurance of the application of the new technology in clinical side
Project Purpose Grading up the diagnosis and research ability of IMR through Molecular/Biotech. in the field of a) Malaria and malaria vectors b) Common genetic diseases	Grading up the diagnosis and research ability in Lab. lebel, and also initiate the clinical application	Project activity report IMR research report Society report	Common understanding of importance of research activity for tropical diseases, especially malaria and genetic diseases. Good communication between IMR and MOH, also back support from Faculty of Medicine of Universities

Objectives/Activities	Verifiable Indicators	Means of Verification	Important Assumptions
Output Production of Malaria diagnosis DNA probes by introduction of new Biotech. Specification of Malaria vectors by usage of Biotech. Establishment of diagnosis method for *gene mutations* (Thalassemias and Alpha-I antitrypsin deficiency) by usage of DNA probes	Production of effective probes Finding out the way for mass-production Cost-effectiveness of probes Applicable easy methodology of diagnosis/identification	Project activity report IMR research report Technical report by Japanese experts Cooperation evaluation report	*Realization of hardware* (i.e. buildings, equipments) and software (i.e. manpower, fund, technology, legal clearance) for the execution of molecular biology experiment Ethical clearance for application of new technology for prenatal diagnosis
Input Expertise service Technical training in Japan and/or in Malaysia Equipment provision Managing fund (Local cost, salary, research fund etc.)		R/D, TIP, Log-frame Yearly activity plan Consulting report Project's activity report	Adequate amount of Japanese input (normal size of Project-type technical cooperation of *JICA) and also Malaysian input* (counterpart, administrative staff, local cost etc.) Clear demarcation of Project's input between Japanese side and Malaysian side Adequate period and amount of Project's input Adequate Project management

HEALTH RESEARCH IN MALAYSIA: PERSPECTIVES OF THE FIFTH MALAYSIA PLAN AND OUTLOOK FOR THE SIXTH

Institut Penyelidikan Perubatan
Kuala Lumpur

CONTENTS

HEALTH RESEARCH IN MALAYSIA : PERSPECTIVES OF THE FIFTH MALAYSIA PLAN AND OUTLOOK FOR THE SIXTH

1. INTRODUCTION

National development, its associated priorities and objectives demand an intensified and coordinated Research and Development (R&D) effort for the achievement of desired economic and social goals. Accordingly, the R&D effort has emerged as a major thrust in national development planning for the Fifth Malaysia Plan (FMP) period.

Briefly, the FMP, with respect to R & D, calls for the strengthening of the management system to enable a more centralised planning and coordinated implementation to meet national objectives and priorities. It also advocates increased allocation for R & D and a balanced distribution of resources to basic, applied and developmental research (see Appendix 1).

In order to implement the above strategies, three plans of action have been adopted:

(a) Creation of a Central Fund for R & D.

(b) Identification of national research priorities, and

(c) Development of a mechanism for intensification of research in priority areas (IRPA).

The separate allocation for the first time of $400 million

for R & D under the FMP is a reflection of the Government's recognition of the role of this activity in national development. The total R & D expenditure in the past was only 0.5% of the GNP, where a figure of 1% was considered the minimum level to effectively support research development of a country. It has been observed that countries which have channeled more funds to R & D have generally emerged better off economically, stronger and more advanced (see Table I). Thus, the current increased total expenditure of 0.9% of the GNP for Malaysia represents a positive step for the country's development.

TABLE I

Country	% of GNP spent on R & D
S.Korea	1
U.K	2.4
U.S.A	2.4
Japan	2.8
W.Germany	3

Policy statements and objectives of the medical and health services are made in all 5-year plans. In the FMP, reference is made to programmes covering "promotive, preventive, curative and rehabilitative services". Apart from general statements, policy and objectives for medical research have

never been defined. The result is that, while a large volume of research has been carried out over the years, there is a general lack of direction and focus. It would appear also that little collaborative effort has taken place. The introduction of the mechanism for intensification of research in priority areas (IRPA) is an attempt in overcoming some of these weaknesses.

2. HEALTH RESEARCH INSTITUTIONS IN MALAYSIA

A survey carried out at the Institute for Medical Research in 1987 revealed that 17 institutions are currently undertaking health research and have been doing so in the last five years (see Appendix 2).

Of these 17 institutions, 10 are faculties or schools within universities, 3 are research institutions of which one is a statutory body, 2 are hospitals, one a training institute and one a coordinating body, namely the Medical Directorate of the Ministry of Defence.

Besides health research, each of these institutions also had other functions. Eleven of the 17 institutions had service and training as their primary functions (64.7%). Five or 29.4% of the institutions had training as their primary function while only one institution (5.9%) had service alone as its primary function.

3. NATIONAL MECHANISM OF COORDINATION FOR RESEARCH

The Ministry of Science, Technology and Environment was set up in 1976 (to replace the Ministry of Energy, Technology and Research) and was given the responsibility of legislating basic principles, overseeing the planning and implementation of more effective, scientific and technological activities and programmes that are also in accordance with the needs of the country.

Policy Statement

1. The National Science and Technology Policy is to promote the utilisation of Science and Technology as a tool for economic development, the improvement of human physical and spiritual well-being and for the protection of national sovereignity being an integral part of the socio-economic development policy of the nation.

2. The National Science and Technology Policy shall focus on the promotion of scientific and technological self-reliance in support of economic activities through the upgrading of R&D capabilites by the creation of an environment conducive to scientific creativity and the improvement of scientific, educational and other relevant infrastructures.

Among its other responsibilities, the Ministry is to:

i. Advance and encourage the development of science and

technology (S & T) so that the quality of living of its population will be improved.

ii. Formulate, study and plan to ensure that the employment of S & T on a large scale will not have negative effects on the population,

iii. Determine that a balance exists between material progress through S & T and the spiritual development of an individual.

iv. Determine that material progress through S & T will not result in the pollution of the natural environment with far-reaching and negative consequences.

In line with increasing importance of science and technology, the government had earlier set up the National Council for Scientific Research and Development (NCSRD/MPKSN) on the 1st November 1975 with the objective of ensuring the scientific activities are in line with national aspirations. NCSRD also functions as an advisory body to the government with relation to S & T. It also serves to implement scientific research activities in the country.

Apart from that, the NCSRD has the following functions:

* Be responsible for the formulation of the science policy of the nation and to undertake an innovate role in relation to science for the progress and modernisation of society.

* To serve as the National Scientific consultative and advisory body to the Government.
* To identify R&D activities consonant with the national development objectives.
* To initiate, coordinate and monitor R&D activities of the nation and to ensure maximum utilisation of resources.
* To develop the country's manpower potential for R&D activities.
* To collect and collate information on R&D, evaluate, print, publish and disseminate documents related to R&D.
* To promote a free interplay in R&D between the private and public sectors.
* To recommend appropriate legislation for R&D activities.
* To provide liaison with other countries in R&D.
* To undertake all other actions or measures as will promote speedy and effective scientific and research development in the country.

The NCSRD consists of members from various fields of science to reflect balanced representation. The members are appointed by virtue of the positions they hold in their respective scientific groups and their ability to contribute to R&D

activities. The post of chairman which is synonymous with that of the Chief Secretary to the Government is a permanent position. The Chairman of the other various committees in the Council are appointed from amongst its members.

To enable it to function smoothly and efficiently, the Council has set up four committees to undertake activities in specific scientific fields. The committees' other duty is to advise the Council on matters pertaining to R&D which contribute to the National Development Plan. These committees are:

i. Agricultural Science Committee
ii. Industrial Science Committee
iii. Marine Science Committee
iv. Medical Science Committee

These committees are able to provide an adequate in-depth study of the various fields in all categories of technological and scientific research. They are also empowered to appoint other members as well as set up sub-committees or Specialized Groups to resolve problems when the need arises.

The Council has also appointed scientists to the sub-committees as part of its effort to achieve total participation in its programmes.

The Medical Sciences Committee in turn has four sub-committees:

i. Primary Health Care

ii. Industrial Health

iii. Nutrition

iv. Medical Research

The Medical Science Committee noted and recommended the following:

I. Public Health

1. Though one of the thrust areas of health care has been communicable diseases, the country is not totally free of these diseases. Therefore, there must be continued interest and involvement in Primary Health Care.

2. Research in Occupational Medicine is lacking and no reliable data is available. Since the country is embarking on accelerated industrialisation, there is an urgent need to conduct research in this area. The establishment of an Institute of Occupational Medicine (or Industrial Health) would provide the necessary infrastructure. Meanwhile as an interim measure, existing institutions could allocate a higher priority to research in Occupational Medicine/Industrial Health.

3. Of great importance, is Health System research. These are evaluation types of research of a specific programme/system. Health System Research provides data, contributing towards planning and implementation and should be given priority.

4. It is noted that there is a changing pattern of diseases towards stress-related diseases. Research should look into diseases related to social, economic and cultural changes e.g. life style, urbanisation, accident, etc.

II. Biomedical Section

1. There should be more cooperative and collaborative multi-disciplinary research programmes.

2. Though biotechnology is a relatively new discipline, it is a very important tool for development. It can be developed as a tool for disease control and should be given the priority due.

3. Field Research is also noted to be an area that needs closer attention.

III. Clinical Medicine

Very little clinical research is observed to be carried in the country; the few research that were carried out are

case studies and drug trials. The basic problems in clinical research are poor medical records and the reliability of diagnosis. Therefore, in order to facilitate and encourage clinical research, there is an urgent need:

1. to upgrade medical records;
2. to provide training at postgraduate level in methodology of research and strict criteria of diagnosis. Advisory services to clinicians for research design and methodology to be set up;
3. to encourage the setting up of clinical medicine research units in hospitals/universities.

R & D Evaluation and Funding Procedures

The funding procedure practised in Malaysia in th past has been pluralistic, each institution submitting their proposal for research independently. Furthermore the research proposal were developed without the benefit of overall policy guidelines. Thus there was neither focus nor coordination. The introduction of the mechanism for intensification of research in priority areas (IPRA) is an attempt in overcoming this weakness. Fig. 1 describes the procedure graphically.

Research proposals which have been formulated according to institutional priorities based, in turn, on the indicative

areas for R&D support (see Appendix 3), undergo first evaluation at the institutional level. Proposals which have been vetted are then submitted to the NCSRD where they are subjected to a second evaluation. Four panels of experts, one each for agricultural, medical, industrial and strategic research, assess the proposals from all institutions for relevance to national priorities, technical and or, socio-economic benefits, cost-effectiveness, interdisciplinary, inter-institutional collaboration and industry involvement.

Supported proposals then become the national R & D programmes and the necessary funds the "R & D Envelope". The programmes and the R & D Envelope will be presented as a package at the budget examination at the next level, namely the Economic Planning Unit and the Federal Treasury. Once approved, the R & D Envelope will be allocated to the institutions where research will be carried out. Monitoring will be carried out at the institutional level with feedback to the central agency. Post-evaluation will also be a joint responsibility.

4. SUPPORT FOR RESEARCH

(Economic Support)

There is a National Science Policy that provides guidelines for orderly development of research in science and technology.

In the past, fund for the actual conduct of R&D cames from the Operational Vote. In good times there are usually no problems. In time of budgetary constraints, a situation can arise where little fund is available for the conduct of R&D after essential overheads have been taken care of.

To overcome this difficulty, a central R&D Development Vote has been created. For the FMP period, the Vote amounts to $400 million. Adding in operational and development votes, the public sector's total expenditure under the FMP for R&D will be $3.5 billion, about 0.9 per cent of the GNP. Of the $400 million, approximately 10% ($40 million) is allocated for Medical Research.

It is now a matter of policy that the right mix (see Table 2) of basic, applied and developmental research must be undertaken. The FMP provides a guideline to ensure adequate and balanced allocation of resources to the various categories.

TABLE 2

DISTRIBUTION OF RESOURCE ALLOCATION TO TYPES OF R & D CATEGORIES

RESEARCH INSTITUTIONS	TYPES OF RESEARCH			DISTRIBUTION (%)
	BASIC	APPLIED	DEVELOPMENTAL	
Universities	40	50	10	22
Govt R & D Institutions	10	35	55	52
Private Sector R & D	5	20	75	26
Total Allocation (%)	18	35	47	100

A listing of indicative areas for support has been developed (see Appendix 3). By consensus, it covers four major areas which are biomedical, health system, health behavioural and industrial health research. These are reflective of national priorities and formed the basis for the formulation of research programmes by the various institutions for the 1988 budget year. This list of indicative areas is, however, currently under review with the 1989 budget in view.

Nine institutions submitted a total of 87 programmes costing $26.135 million for evaluation by the IRPA panel. Of these, 29 programmes (from 6 institutions) costing $10.251 million were eventually supported. The supported programmes cover research

over a time frame of 1 to 3 years. Medical research constitutes 9.2% of all R&D projects supported for commencement in the 1988 budget year (see Table 2).

TABLE 3

RESEARCH PROGRAMMES EVALUATED UNDER THE IRPA PROCEDURE - 1988

Research Areas	No.of Programmes		Cost ($mil)	
	Submitted	Supported (% of total)	Submitted	Supported (% of total)
Agriculture	155	149(38.4)	50.6	37.9(34.2)
Industrial	123	98(25.2)	72.3	54.7(49.4)
Medical	87	29(7.5)	26.1	10.2(9.2)
Strategic	201	112(28.5)	40.3	8.0(7.2)
Total:	566	388(100)	18	110.8(100)

Medical research, at 9.2% of the national R&D allocation, has not changed much in position from previous years where it normally accounts for about 10% of the public sector's R&D efforts.

Besides funding from the R&D Budget, research institutions also received support from the WHO, IDRC, cess from industries, foreign universities and from the private sector (both local and foreign).

5. PRESENT STATUS OF HEALTH RESEARCH IN MALAYSIA

Based on figures available in 1984, a total of about 630 research projects are being undertaken, with most of these being in the Biomedical category (see Table 4).

TABLE 4

HEALTH RESEARCH PROJECTS

		No. of Projects	% of Total
	BIOMEDICAL	400	63.49
	CLINICAL	160	25.40
PUBLIC HEALTH	HSR	70	11.11
PUBLIC HEALTH	COMMUNITY-BASED, BEHAVIOURAL AND OTHERS		
	TOTAL	630	100

5.1 Biomedical Research

There are about 400 biomedical research projects being carried out in the years after 1984. This represents about 60% of the total health research in Malaysia. It covers a wide spectrum of basic and applied research dealing with various aspects of health care and planning, preventive, curative and promotive medicine, wherein the main thrust of the research activities continue to be directed towards endemic diseases such as enteric & gastro-intestinal diarrhoeas, scrub typhus, dengue, filariasis, malaria, febrile illnesses, respiratory infections, cancer, blood disorders, nutrition problems, sexually transmitted diseases, leprosy, schistosomiasis, antibiotic and drug resistance problems in bacteria, parasites, insects, etc., present and future community problems and up-grading or up-dating laboratory methodology used for research, diagnosis and prognosis. Much of the research have direct application to the better understanding of some stage or the other of the disease processes involved, so as to improve their cure, prevention and control, and thereby ensure the better health of the nation.

There is a concentration of effort in biomedical research, probably because the IMR, which is the main medical research institution in the country concentrates its efforts in this particular area. Furthermore, the researchers working in this field are better trained in research techniques.

Biomedical research contributes to the advancement of knowledge and/or better understanding of the various disease processes such as symptomatology, etiology, pathogenesis, diagnosis treatment, reservoirs of the diseases, prevention and control by such processes as immunisation, chemoprophylaxis, insecticide sprays, etc. The elucidation of these processes involve the study of the disease in nature, and in the laboratory after isolation of the causative agents and their maintenance in the laboratory and establishing a suitable laboratory animal model for studies. These studies cannot be initiated without a suitable laboratory methodology being made available - this itself is a challenging full time job.

The benefits of these researches to health care and planning are manifold and some have immediate application in the hospitals and health clinics. Other research in this field includes the prevention and control of the diseases through community health programmes such as nutrition, maternal and child health care, surveillance of diarrhoeas, cholera, STD, insecticide control of disease vectors, mass immunisation against measles, diphteria, etc. and chemoprophylaxis against filariasis, malaria, etc.

Field research is being carried out, but there is a need to do

more of this as the results are directly beneficial to the population. Malaysia is still lagging behind in biotechnology. There is a definite need to develop this area as a tool for diagnosis and control of diseases.

5.2 Clinical Research

There are approximately 160 clinical research projects being carried out in Malaysia and this represents a quarter of the total health research projects in the country.

Clinical research done in this country can be divided into:

i. Drug trials

ii. Application of new procedures on tests on the local population

iii. Analysis of disease patterns

It contributes to an increased understanding of diseases in the country and their diagnosis and therapy.

The two universities, i.e the University of Malaya and Universiti Kebangsaan Malaysia are actively involved in this area of research, as they are heavily committed to research in the course of their work. However, the doctors and specialists in hospitals (other than in UKM, UM, USM) who could theoretically make a valuable contribution in this area are heavily burdened with workload, lack of incentivesd, have to

put up with a poor medical recording sytstem, and are inexperienced in research methodology.

5.3 Public Health

There are approximately 70 public health research projects and this constitutes more than 10% of the health research being carried out in the countey. Areas covered by public health .pa research include environmental and occupational health, family planning, preventive medicine, primary health care, social medicine, health education, special group problems, management, health services research and traditional medicine. The current international interest in traditional medicine is not reflected in our research activities. The interest in environmental and occupational health does not reflect the problems which emerge with rapid industrialisation.

Public health research is very wide, covering all aspects of health of the individual. There are many areas pertaining to health that need to be further researched into. The range of subjects presently covered seem to reflect the individual's interest. A more concerted effort has to be made to cover all aspects of public health as the main aim of the Ministry of Health is to improve the health status of the individual. Health systems research, which provides data contributing towards planning and implementation should be given greater priority. The changing pattern of disease resulting from affluence, eg. traffic accidents, urbanisation, problems of the aged, etc. should be given greater emphasis.

6. SHORTFALLS AND CONSTRAINTS

6.1 Research priorities

Until now no attempts have been made by NCSRD to rationalise research. Research priorities have not clearly defined and made known to researchers. The research being presently carried out is often not oriented towards problem-solving.

There is currently no set of national priorities that have been firmly established due to the fact that no national policy in medical and health research exists. However, efforts in this direction have begun (see Appendix 2).

In addition, the mechanisms for priority-setting vary from institution to institution. Those with priorities do so mostly on an ad hoc basis, and according to perceived needs. This is generally unsatisfactory.

6.2 Review Mechanisms

Review mechanisms for research exist in various forms and are generally weak, particularly so in institutions which have service and training as their primary functions. Therefore, scrutiny tends to be lax and too much leeway is given to the investigators so that accountability

is often insufficient. This applies to technical competence, the proper conduct of projects, as well as financial control.

In addition, accountability has not taken into consideration the utilisation of results.

6.3 Utilisation of Results

There are gaps in medical knowledge but perhaps wider gaps exist between research results and their application. In the local context, the reasons inter-alia relate to the possibility that the results of research may be irrelevant, of the quality, inapplicable (due to , for example, high cost, lack of resources) and inadequately distributed. Even when results do reach potential end-users, programme managers and practitioners may be reluctant to apply, or do not have the capacity of using, such results. Inadequate communication, direction and feedback between the various research institutions and the Ministry of Health has made many of the projects appear of little relevance to the Ministry of Health's objectives and functions of research institutions must meet the priorities of the Ministry of Health.

6.4 Career development

While career structures do exist in various institutions, promotional prospects are limited particularly in institutions other than the universities and the statutory bodies. Aspects relating to career structures such as incentives, recognition, rewards were cited by some institutions to be inadequate.

A clear and well-defined career structure for scientific and medical officers in research is needed. Medical officers who acquire higher degrees in research like scientifically qualified Research Officers do not qualify for specialist allowances in the manner that their counterparts in the clinical specialities. Furthermore, promotional opportunities for advancement are few and far in between and Research Officers especially have to wait many years before their promotion. This situation is true not only of the professional staff but also to a great extent of the technical staff as well.

6.5 Staff development

One of the major shortfalls of the Research Programme has been the lack of a clearly defined and enunciated programme for developing skills, knowledge and

expertise among researchers and technologists in the various specialities, within some non-university research institutions. The absence of formal training programmes and the lack of training opportunities has been a constraint in the efficient conduct research (note that information on the manpower and staff development situation for researches in the universities was not available).

Medical Officers have many opportunities to acquire professional post-graduate training, e.g. MPH, M.Path., etc. However, very few medical officers have received formal research training over the last ten years. This is probably due to the fact that specialist allowances are not given to medical officers with higher research degrees such as Ph.D. and M.D.

Very few opportunities exist for scientific officers outside universities to acquire post-graduate research degrees by way of sponsorship. They have, however, circumvented this difficulty by registering as external students with local universities using the facilities of their institutes for their research, while paying their own tuition fees.

6.6 Inadequate and Inappropriate Manpower

There is also a relative shortage of staff in some areas brought on by the recent economic down-turn and austerity measures such as the freezing of posts. The cut-backs and the desire to trim the civil service across the board will certainly have an adverse effect on the research capabilities of some institutes. The cut-backs and freezing of posts should be done selectively, and not applied to essential research posts. While the service is trimmed back perhaps there is also a need to cut back on some of the bureaucratic measures introduced when the civil service was larger. Researchers should also have adequate administrative and secretarial back up so that time can be more valuably spent on actual research.

A further problem is that many of the technologists are generally trained and have neither the inclination nor perhaps the avenue to become research-oriented technologists. In some areas medical laboratory technologists have to be used to carry out the functions which would be more suitable to field work oriented staff such as health inspectors and health nurses.

6.7 Non-research commitments of institutions

A clear distinction should have been made of the research as opposed to the service and training roles of the various institutions. The contributions of these institutions to service and training have been significant and are often primary so that they take their heavy toll of resources which could otherwise be used for research. The sections which are primarily responsible for these and their personnel must be clearly defined and perhaps there should not be over expectation of their research output with the given inputs.

7. RECOMMENDATIONS

7.1 National Policy in Health Research

A national policy on health research* should be formulated to ensure that such research is consistent with national development, needs and goals, taking into consideration basic and applied research.

7.2 Priorities

In order that research can support national development, the setting of priorities should take cognisance of national needs and goals.

Given the current economic climate and the limitation of resources, it is important to ensure that where possible, research should be societally relevant and be directed towards priority problems of communities. The following recommendations relating priorities are:

7.2.1 It is essential for NCSRD to develop clearly defined national priorities. The NCSRD should appoint a panel of experts to develop and periodically review these priorities.

7.2.2 Particular subsystems should be identified within priority areas which require intensified research in order to allocate resources effectively and efficiently.

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*Health research includes biomedical, clinical, environmental, occupational, mental, behavioural and health systems research.

7.2.3 Institutions should develop their own research priorities in line with national priorities and in the process identify themselves with specific goals and objectives.

7.2.4 Research should be directed towards efforts *inter-alia* to correct deficiencies and gaps in health care systems in order to ensure more effective intersectorial coordination and better management of resources.

7.3 Mechanisms of Coordination

7.3.1 At the national level, these could include:

(i) the establishment of grants committees (appointed by the Medical Science Committee), comprising of experts in a particular field who will make recommendations on the scientific soundness of proposals above a certain amount to be decided, and their conformance to established priorities. These committees would also undertake to monitor progress of funded projects;

(ii) the appointment of external referees who are individuals with recognised expertise in various fields, especially in areas which are highly specialised for which local expertise is not available, and

(iii) the Medical Science Committee itself, which will be the final arbiter on whether a particular proposal should be funded based on the recommendation it receives;

(iv) the introduction of site visits to evaluate the feasibility and progress of projects may be carried out by appropriate personnel appointed by the Medical Science Council;

(v) the provision of guidelines for the review and evaluative procedures within institutions;

(vi) the improvement of the currently-used application form for the evaluation of the scientific soundness and merits of research proposals and the competence of the applicants;

(vii) the establishment of ethical guidelines for human and animal use in research;

(viii) in order to facilitate and ensure that problem-solving research efforts is directed towards priority problems, the Medical Science Committee should:

(a) set aside a proportion of the R & D allocation for identified "research packages" consisting of one or more linked projects based on a systematic analysis of the priority problem

(b) invite applications for these "research packages"

(ix) centres should be identified to provide leadership and training in research of the highest quality ("Foci of Expertise", "Centres of Excellence"). These foci should have local and international linkages. Resources should be channelled to these centres in order to develop and maintain leadership roles, without monopolistic practices;

(x) a directory of active researchers should be maintained to assist others in related fields.

7.3.2 Review and evaluative procedures at the institutional level should follow guidelines established by the NCSRD and should include the following:

i. review of priorities
ii. evaluation of proposals
iii. ethical assessment of proposals
iv. monitoring of progress of approved projects
v. evaluation of research productivity
vi. evaluation of the utilisation of resources
vii. evaluation of utilisation of results

7.4 Utilisation of Research Results

Relevant and applicable results of research should be communicated to managers and practitioners of health -systems to facilitate their utilisation.

Utilisation of meaningful and relevant results can be facilitated by mutual understanding between researchers and end-users and by a change in attitudes. One way to achieve this is to involve the managers in the planning process. Another option would be to improve accessibility in health information to provide managers with information essential for more rational decision

making. In this context, institutions have an important role by identifying gaps in knowledge and facilitating communication of research results in a manner comprehensible to end-users .

7.5 National Research Planning and Evaluative Conferences

The Medical Sciences Committee (MSC) should coordinate a process of planning that is linked to the national 5-year Development Plans. This process should include National Research Planning and Evaluational Conferences which will :

i. be held every 2-3 years;

ii. facilitate the interaction of managers, practitioners, and researchers, in planning and evaluating research;

iii. contribute to systematic analysis for the determination of research priorities and the identification of areas and topics for research;

iv. provide the opportunity for peer review (including the assessment of the utilisability of results) of results of research funded by R & D funds

7.6 Manpower Development

The quality of research is dependent upon the existence

of a critical mass of high calibre competent researchers, and their continuing professional development.

An aggressive, vigorous and far-sighted approach is needed.

Ways by which this could be achieved include:

i. increasing the numbers and categories of trained researchers, in particular systems,

ii. the provision of more opportunities to acquire advanced degree locally or abroad,

iii. the provision of sabbaticals to include non-university research organisations,

iv. the development of a program of continuing education for all researchers to update their knowledge and technical skills through, for example, short courses, scientific meetings, etc.,

v. the intensification of mentor-training system to develop skills and expertise,

vi. allocation of independent funds by the NCSRD for the development of manpower. Universities could be given block funds for research and seed money could also also be separately allocated for the encouragement and development of new and promising researchers.

7.7 Incentives

In order to attract and retain good calibre research personnel, the following incentives should be provided:

7.7.1 promotion should be based on research performance,

7.7.2 career development should be facilitated by the creation of more personal-to-holder posts

7.7.3 financial incentives should be provided for the acquisition of post-graduate degrees while in-service

7.8 Intersectoral Cooperation and Linkages

Collaboration and coordination among the various institutions should be improved so that unnecessary duplication is avoided while optimising the use of available manpower and material resources.

Research institutions should be encouraged to develop local and international linkages for the sharing of resources, training and collaborative research. This is all the more crucial in view of the shortage of resources and bearing in mind the MINIMAX principle.

Intersectoral cooperation shold also be strengthened in solving existing health problems. There should be closer coordination and cooperation between the various sectors carrying out research which may have health impacts. Agencies would include the Agricultural and Veterinary sectors, Science, Technology and Environment. Such collaboration can be on a bilateral basis or through a common forum embracing all the sectors or a combination of both. An example where the desirability of this could be seen right away is the necessity for close collaboration between medical and veterinary sectors in research into zoonotic diseases.

7.9 Alternative Sources for Research Funding

An area where existing policy should be reviewed is research funding. Alternative sources of funding for medical research could be raised from the community, in particular from industry and the private sectors and philatrophic organisations. This would be in keeping with the "Malaysia Incorporated" concept where the private sector would contribute to medical research, the results of which should lead to direct or indirect benefit to the community as a whole including the private sector. Overseas agencies should also be approached in this regard.

7.10 Issues Relevant to Health Information

The availability of unbiased information is essential for effective decision-making and management. To this end, existing systems of data collection, organisation, analysis, evaluation and dissemination should be strengthened.

On the important issue of accessibility to information by health researchers a need exists to declassify "desulitise" when deemed necessary. There is also a need to explain clearly "demystify" research findings and to encourage communication between researchers and programme managers.

7.11. Technology and Its Application

Research has led to the development of medical technologies whose intelligence and appropriate use has aided in the solution of health problems. Evaluation and decisions on acquisition and application of such technologies are both professional and managerial functions and must be given evaluative and cautious consideration before possible application. Technology should be assessed from the point of view of acceptability, cost- effectiveness, clinical and research benefit, safety, manpower and related factors.

8. FUTURE DIRECTIONS OF HEALTH RESEARCH

The allocation of $400 million for R & D in the FMP constitutes a significant endorsement by the government of this activity and its role in national development. It is essential that the impetus to R & D provided by this allocation be improved upon and for this similar allocations ought to be provided for in future development plans.

In the context of health research, R & D should be directed towards the strengthening of the management of health programmes, the improvement of promising technologies, the acquisition and adaptation of new, safer and more effective ones, and the exploration of unknown areas of needed knowledge, all with the ultimate objective of improving the health status of Malaysia.

Concommitant with this, it is essential that there be a strengthening of research management systems to support and ensure centralised planning with a coordinated utilization of resources (infrastructure and manpower) in the most effective manner.

The review of priorities currently being undertaken is a fundamental step in setting the course the future direction health research will take in this country. Once these have been decided upon, it is imperative that they be effectively communicated to researchers. In this context, the role of

directed research thus becomes evident: if researchers are to solve problems related to the country's needs, they should be aware of what the problems are, and areas of studies to be undertaken clearly defined and allocated to them. Conversely, mechanisms should be established so that the results of research reach those who will have most use for them.

In an era of shrinking resources, it is also imperative that any endeavour undertaken be done with the objective of producing maximum benefit to the community at large in the most efficient manner with the minimum of wastage (the so-called MINIMAX principle). In the light of this premise, it becomes apparent that portion of resources allocated for research with short gestation period, and where results obtained are immediately applicable , i.e. applied research should be in preponderance to that for basic research whose benefits may not always be directly used for the good of the community. It has been suggested that the ratio of allocations for applied : basic should be 80% : 20%.

If this premise is adhered to, it would appear that one area of research where results are of immediate value to the health programme manager is Health Systems Research. This is a young discipline and in the light of the above reasons deserves more emphasis and should be accorded high priority for funding.

While attempting to remain at the cutting edge of research through exploration of new frontiers of knowledge may not be the most feasible option for developing countries, it is nevertheless incumbent upon them to exploit to the fullest discoveries that have had a revolutionary impact on our lives. The application of the tools of biotechnology is one such area where Malaysia cannot afford to fall behind in view of the tremendous potential it offers.

The strategies and future direction of health research that are adapted must be such that they contribute to national development and to the concept for better health for all Malaysians for the future.

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APPENDIX 1

DEFINITIONS OF RESEARCH(from Smith)

Research (Oxford Concise Dictionary) is careful research or inquiry after or for or into; endeavour to discover new or collate old facts, etc. by scientific study of a subject, course of critical investigation.

Applied Research

Applied research has been split into strategic research and specific research. Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards practical aims of objectives.

Basic Research

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.

Strategic Research

Strategic research is defined as applied research which is in a subject area which has not yet advanced to the stage where eventual applications can be clearly specified.

Research & Development

Research and Development is a term covering three activities: basic research, applied research and experimental research.

Research and Experimental Development

Research and experimental development comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications.

Experimental Development

This is systematic work drawing on existing knowledge gained from research and practical experience that is directed to producing new materials, products, or devices, to installing new processes, systems and services, ot to imposing substantially those already produced or installed.

APPENDIX 2

INSTITUTIONS CARRYING OUT HEALTH RESEARCH

Universities

Faculty of Dentistry, University of Malaya

Faculty of Science, University of Malaya

School of Chemical Science, USM

School of Biological Science, USM

Faculty of Science and Environmental Studies, UPM

Faculty of Life Science, UKM

School of Pharmaceutical Science, USM

School of Medical Sciences, USM

Faculty of Medicine, UKM

Faculty of Medicine, University of Malaya

Research Institutes

Institute for Medical Research

Veterinary Research Institute, Peninsular Malaysia

(Statutory) PORIM

Hospitals

General Hospital, Kuala Lumpur

Gombak Hospital, DOA

Training Body

Public Health Institute

Coordinating Body

Medical Directorate, Ministry of Defence

TOTAL: 17 INSTITUTIONS

APPENDIX 3

INDICATIVE AREAS OF R & D SUPPORT IN MEDICAL SCIENCE

Overall Objectives

To reduce the cost of health care or morbidity/mortality and to bring about financial returns through marketing of products, e.g. vaccine production.

List of Indicative Areas

1. BIOMEDICAL such as:

   1.1 Biotechnology

   1.2 Infectious Diseases

   1.3 Nutritional, endocrine and metabolic disorders

   1.4 Neoplastic diseases

   1.5 Congenital and Genetic disorders

   1.6 Cardiovascular disorders

   1.7 Diseases of childhood

   1.8 Development and evaluation of pharmacological products

   1.9 Mental Health

2. HEALTH SYSTEM RESEARCH such as:

   2.1 Evaluation and implementation of immunisation

   2.2 Primary health care approach

   2.3 Evaluation of training of health personnel

   2.4 Quality assurance in health care delivery

3. HEALTH BEHAVIOURAL RESEARCH such as:

   3.1 Knowledge Attitude Practice (KAP)

   3.2 Health education

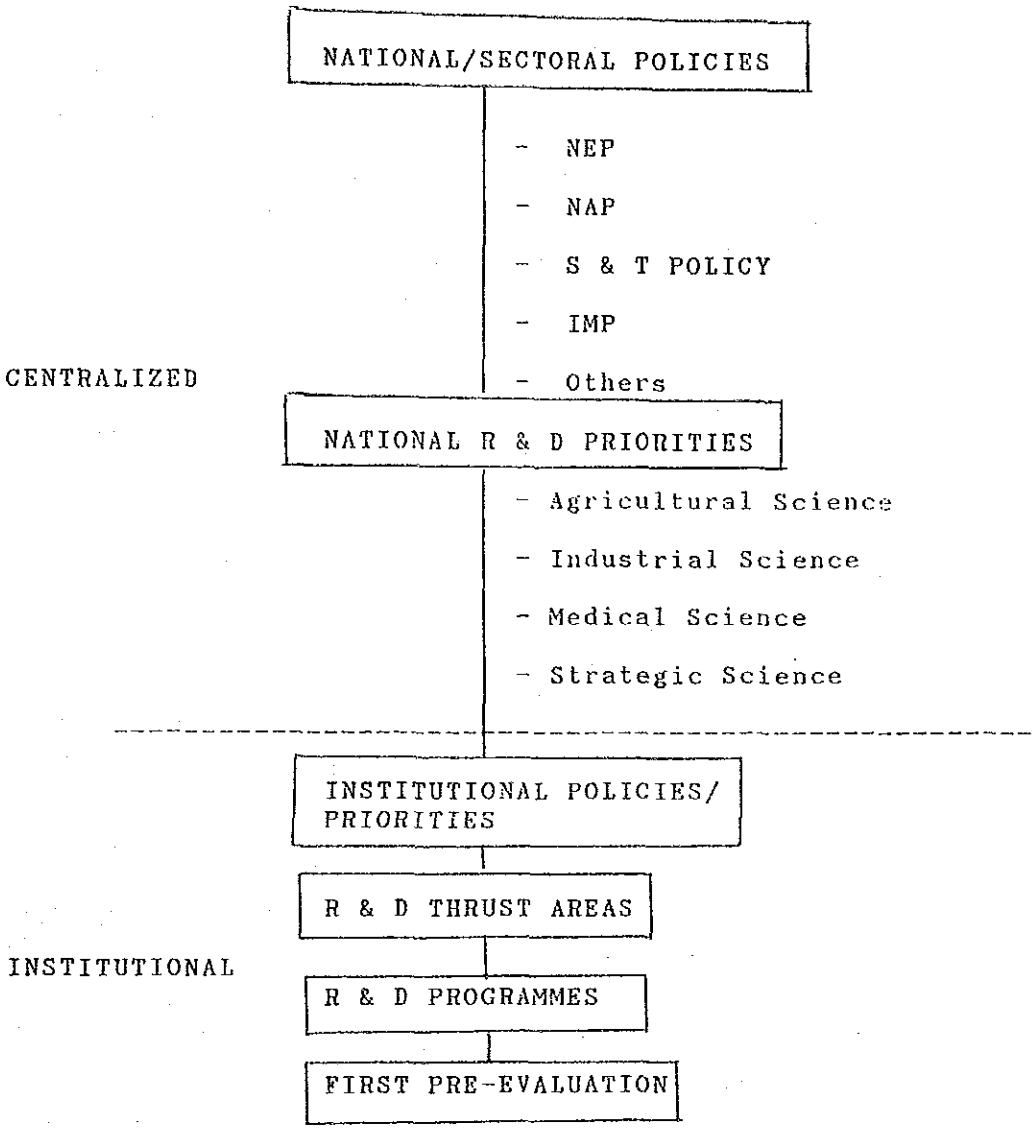
   3.3 Health and poverty

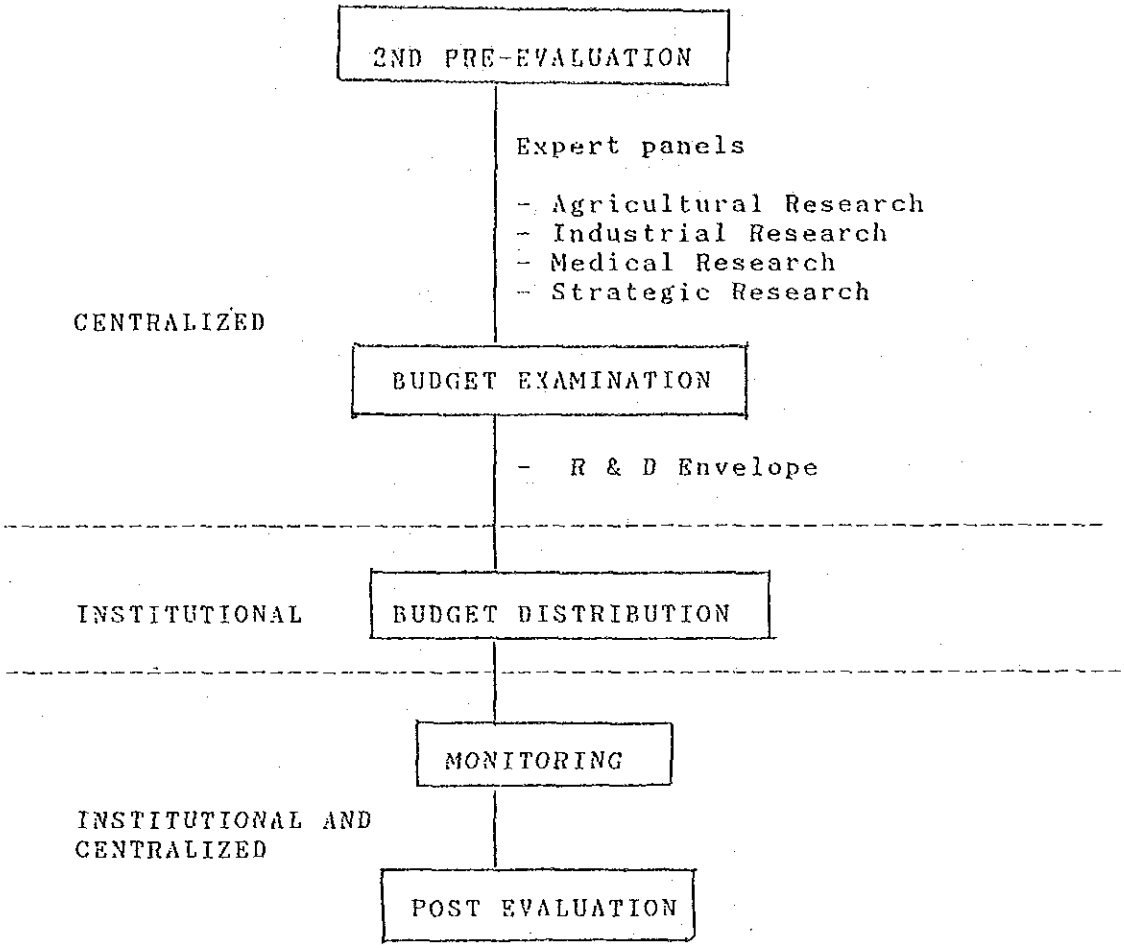
4. INDUSTRIAL HEALTH RESEARCH such as:

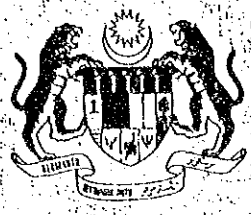
4.1 Industrial Health Hazards

4.2 Ergonomics

FIG 1 - THE R & D EVALUATION AND FUNDING PROCEDURE (IRPA)




2ND PRE-EVALUATION
Expert panels
- Agricultural Research
- Industrial Research
- Medical Research
- Strategic Research
CENTRALIZED
BUDGET EXAMINATION
- R & D Envelope
INSTITUTIONAL
BUDGET DISTRIBUTION
MONITORING
INSTITUTIONAL AND CENTRALIZED
POST EVALUATION



PRIORITY AREAS FOR MEDICAL/HEALTH RESEARCH

KEMENTERIAN SAINS, TEKNOLOGI & ALAM SEKITAR
MALAYSIA

PRIORITY AREAS FOR MEDICAL/HEALTH RESEARCH

1. Introduction

Science and Technology (S & T) was integrated for the first time into overall development in the Fifth Malaysia Plan (FMP). With respect to Research and Development (R & D), the FMP calls for strengthening of the management system to enable more centralised and coordinated planning and implementation; advocates an increased allocation for R & D and stipulates a balanced distribution of resources to basic, applied and developmental research.

In order to implement the above strategies, three plans of action have been adopted:

a) Creation of a Central Fund for R & D.

b) Identification of national research priorities, and

c) Development of a mechanism for intensification of research in priority areas (IRPA).

To achieve the FMP objective with regards to R & D, the determination of national priorities in research was urgently needed. As an interim measure, a listing of 'indicative areas for R & D support' under the 4 sectors of agriculture, medical, industrial and strategic research were quickly developed to be used for the 1988 funding exercise.

For succeeding years however, it was felt that the list of priorities needed to be reviewed and refined. This task was given to the IRPA Panel of each of the 4 sectors. The IRPA Panel (Medical) recognised that the existing list of priority areas (for 1988) was very broad, perhaps too broad to be really effective in intensifying research. The chairman of the panel appointed a subcommittee to develop a matrix for prioritising research; the 'Jawatankuasa Adhoc Mengenai Keputusan/Keutamaan untuk Program Penyelidikan dan Pembangunan Perubatan.'

2. The terms of reference of Adhoc Subcommittee

To develop system to facilitate the identification of priority areas for medical/health research. This system should take into consideration the following parameters with reference to the various disease conditions/ health problems.

a) ' *Socio-economic Implications — the extent of the problem.*

b) Lack of information

c) Operational weakness

d) Cost and time needed for research

3. Methodology

Techniques used by the subcommittee to develop the priority list included:

Literature and document review
Brain storming
Discussion with clinicians
The subcommittee took guidance from the following resource materials:

(i) *The keynote address "Problem solving research — the Manager's viewpoint" presented by the Director General of Health, Malaysia, Tan Sri Datuk (Dr.) Abdul Khalid b. Sahan at the Conference on Health Research Management.*

(ii) The discussions and recommendations of the Conference on Health Research Management. For details, please refer to the Report of this Conference.

(iii) The report of the Ministry of Health's review of the Health Sector performance of the 5th Malaysia Plan.

(iv) The research strategies of the World Organisation. Please refer to the WHO publication "Health Research Strategy for Health for All by the Year 2000" (WHO/RPD/ACHR/(HRS)/86), a report of a Subcommittee of the Advisotry Committee on World Research, published in 1986.

3.1 Issues Relating to Research Priorities from the Director General of Health's Keynote Address to the Conference on Health Research Management, 16th November 1987, Kuala Lumpur

The Director-General of Health Malaysia, Tan Sri Datuk (Dr.) Abdul Khalid bin Sahan, highlighted, in his keynot address, the need for R & D efforts in the area of health research to be directed towards the ultimate objective of improving the health status of Malaysians. He noted that although health care had definitely benefited from health research, there were still gaps in our knowledge and perhaps even greater gaps between knowledge and its application. Priority should be given for research which will lead to the correction of deficiencies in the health care system and in better management of resources.

Research, he added, should be problem-solving rather than the mere characterisation of problems. It needed to be directed towards the strengthening of the management of health delivery systems, the improvement of promising techniques, the evaluation, acquisition and adaptation of new, safer and more effective ones, and the exploration of unknown areas of needed knowledge.

A system approach to problem-solving was proposed. The health system should be recognised as a system involving many interphasing subsystems; situational analyses should be conducted to identify the subsystems in which knowledge is lacking. Such knowledge would have an important impact on the solution of the problem and would provide leads to managers for decision-making.

Research needed to be more responsive to the needs of health-care managers. The ultimate test for research and their results would be in their usefulness, acceptibility and applicability in the solution of problems. What was needed also was better communication between management and researchers. Such communication should cover research direction, strategies, and priorities and how research findings could be cycled into the development.

3.2 Issues Relating to Research Priorities from the Report on the Conference on Health Research Management, 16-17 Nov. 1987, Kuala Lumpur

In order that research could support national development, the Conference agreed that the setting of priorities should relate directly to national needs and goals. Given the current economic climate and the limitation of resources, it is important that research should be as societally relevant as possible and be directed towards priority problems of communities. In this context, there was strong support for the view that high priority should be given to Health Systems Research.

The Conference recommended that the National Council for Scientific Research and Development should establish clearly defined national priorities. The NCSRD should appoint a panel to develop and periodically review these priorities. Within the priority areas, particular subsystems which require intensified research should be identified in order that resources can be allocated effectively and efficiently.

This meeting also urged institutions and universities to establish their own research priorities in harmony with national priorities, determine their specific goals and objectives and make greater efforts to conduct research of interest to national needs and objectives.

On the related issue of funding priorities, the Conference agreed that allocations for applied research and in particular Health Systems Research should be given priority, although the needs of basic researchers should be given due consideration. Some of proposed criteria for funding research projects were:

i) Consonance with national health priorities;

ii) relevance and value to the community;

iii) gestation periods which were short;

iv) orientation towards problem-solving;

v) scientific soundness and realistic objectives;

vi) high ethical professionalism; and

vii) objective peer review and evaluative processes.

The Conference also recommended that the Medical Sciences Committee of the NCSRD should set aside a portion of the R & D allocation for directed problem-solving research. Such research should address priority problems and involve one or more linked projects. The MSC should invite applications for such research.

3.3 Ministry of Health's Review of Fifth Malaysia Plan

Another event which provided pointers in determining priorities for research, was the Ministry of Health's review of the Health Sector performance for the 5th Malaysia Plan towards the preparation of the 6th Malaysia Plan held in Kuala Lumpur from 16–18 March 1988.

This review of the 5th Malaysia Plan had these objectives:

a) to evaluate the extent to which programmes have responded to the main health related problems of the country;

b) to analyse constraints which have caused programme shortfalls and to suggest ways to overcome them including resource allocation and change to policies, objectives, strategies, procedures and rules.

c) to identify new or emerging needs and issues which need to be resolved.

The review of various health indicators showed areas where improvements were needed and targets could be set. The meeting was also able to identify gaps in knowledge and revealed questions that needed answers that have stood in the way of achieving programme objectives.

The outcome of this meeting therefore helped identify actual priority areas.

3.4 WHO's Research Strategies

The question of "whither research" has not only been looked at by national authorities including our own but also on an international platform as well through the workings of the World Health Organisation.

The WHO is guided in its research strategies by its Advisory Committees on Health Research which exist at both the global and regional levels.

These committees have deliberated extensively on the subject of research priorities, and the global committee came up with its recommendations in 1986 which bears significant relevance to our own considerations. The role suggested for W.H.O. is primarily directed to the following areas:

a) The first priority should be to encourage research directed at the control of disease associated with poverty. The research needed is essentially of the health systems type, as the effective measures are well known: provision of sufficient and safe foods; clean water; adequate sanitary facilities; fertility regulation; immunization and treatment of common infections. Individuals and communities have important roles to play in relation to their own health behaviour and to ensure implementations of the

required measures. The aim of research should be to assist administration and communities to achieve these advances as directly and quickly as possible.

b) Of equal importance would be research directed at the control of diseases, both infectious and *non-communicable, specific to the tropics*. These diseases do not responded adequately to the relief of poverty and the measures referred to under (a) and they should be attacked with all the resources — laboratory, clinical, epidemiological and socio-economic — that can be brought to bear on them.

c) Second only to the primary goal (as above) is research of diseases associated with affluence. This requires investigation of the environment and behavioural influences which have led to the non-communicable diseases predominant in developed countries and threatening to advance in the developing world. In some, the major influences (tobacco, alcohol, occupational hazards, etc.) are already known, and the research required is predominantly concerned with behaviour; in others, the influences are unknown and research, particularly epidemiological, is needed into disease origins.

d) Treatment and care of the sick. Even on the most optimistic assumption about disease prevention, it will be necessary to make extensive provision for the treatment and care of the sick. For this we must rely mainly on biomedical research (which also, of course, contributes significantly to the preventive measures).

e) Delivery of health services. The critical determinants of health should be addressed through health services that are relevant to local needs and cultures and aim to cover entire populations, particularly the most vulnerable groups. How to join with policy-makers and communities in assessing needs, planning, financing and implementing programmes and evaluating them in terms of coverage, efficiency and effectiveness is the challenge to research workers.

The application of these principles will inevitably differ between regions and between countries within the same region, according to many variables: the nature of the predominant health problems; the present level of health; economic resources; cultural, political and religious traditions. However, the aim should be common to all: to focus research where it will result in rapid advance to the health for all goal.

Without neglecting the care of the sick, the strategy places the emphasis on achievement of health through prevention of disease. This approach in the short-and medium-term does not overlook the long-term objectives which WHO has always set for itself, based on recognition of health as a state of complete physical, mental and social well-being.

4. Setting Health Research Priorities

Using these resource materials, the ad hoc subcommittee entrusted with the drawing up of health research priorities listed problem areas requiring attention under 6 broad headings; diseases or conditions under each of these areas were then separately identified (see Table I). Each of these 6 areas were detailed in separate appendices (see Appendices I-VI)**; for each problem area, various priority areas were separately listed and a priority scoring (HIGH, MEDIUM or LOW) was given; in addition, areas of research, with justification, and the types of research desirable were also recommended.

5. Recommended Process of Priority Setting for the Future

Priorities are always changing and there is therefore a need to constantly review them. The conference recommended that the Medical Sciences Committee (MSC) should coordinate a process that will contribute to the national 5 Year Development Plans. This process should include National Research Planning and Evaluational Conferences which will be held every 2–3 years in order to facilitate the interaction of managers, practitioners and researcher in planning and evaluating research, which among other things would contribute to the systematic analysis and the identification of research priorities. The present priority listing is therefore not expected to be static and should evolve with changing needs.

The document was presented to the IRPA Panel (Medical) and the Medical Faculty of the 3 Universities (UM, UKM and USM) were invited to give their comments and suggestions. This was followed by a series of meetings to discuss and adopt the amendments put forward by the universities.

** Full forms of abbrevations used in Appendices 1–6:
HSR: Health Systems Research
HBR: Health Behavioural Research
HER: Health Ecocomic Research

IRPA PANEL (Medical) 1989

1. Y.Bhg. Tan Sri Datuk Dr. Abdul Khalid Sahan (Chairman)
2. YB. Prof. Datuk Dr. Haji Mahmud Mohd. Nor.
3. YB. Dato' Dr. Abu Bakar b. Sulaiman.
4. Dr. M. Jegathesan.
5. En. Lim Ho Pheng.
6. Dr. Indra Pathmanathan.
7. Prof. Anwar Zaini b. Md. Zain.
8. Prof. Dr. Mohd. Roslani.
9. En. Liew Kee Hooi.
10. Dr. Dzulkarnain b. Hj. Ibrahim Ali.

"Jawatankuasa Adhoc mengenai keputusan/keutamaan untuk Program Penyelidikan dan Pembangunan".

1. Dr. M. Jegathesan (Chairman).
2. Dr. Megat Burhainuddin b. Megat A. Rahman.
3. Dr. Lim Kuan Joo.
4. Dr. Indra Pathmanathan.
5. Dr. Lye Munn Sann.
6. Cik Gooi Wan Yegt (Secretary).

25 Sept. 1989.

PRIORITY AREAS FOR MEDICAL/HEALTH RESEARCH

TABLE 1: CLASSIFICATION OF RESEARCH AREAS

	PROBLEM AREAS	DISEASES/CONDITIONS	FOR DETAILS, SEE
I.	Research to facilitate application of available technology to control food/water-borne diseases-nutritional deficiencies, inappropriate fertility and immunisable diseases.	Food and water-borne diseases Nutritional Deficiencies Inappropriate fertility Immunisable diseases Vector-borne diseases	Appendix I
II.	Research in local diseases for which basic knowledge regarding control is still lacking.	Viral Diseases Bacterial Diseases Parasitic non-vector borne diseases Behavioural disorders Neoplasms (geographic/ethnic)	Appendix II
III.	Research in Non-Cummunicable Diseases a) Hazardous factors are known e.g. smoking, alcohol b) Hazardous factors are not known	3. (a) 1. Cardiovascular Diseases — Acquired non-infective 2. Respiratory Diseases 3. Accidents Substance abuse (glue. drug, alcohol) 4. Metabolic disorders 5. Occupational diseases (b) Psychotic dosorders Neoplastic (cosmopolitan)	Appendix III
IV.	Research to reduce morbidity mortality and limit disability for conditions for which prevention is not known.	Endocrine disorder Congenital & genetic diseases *Degenerative Diseases* Metabolic Disorders	Appendix IV
		Transmigration Alternative system of Health (traditional medicine) Resources — availability and deficiency Management of Health Services — community involvement — evaluation of Health Services	Appendix V
V.	Research to meet needs of policy makers and planners	Biotechnology: — Pharmaceuticals — Biologicals — Reagents	Appendix VI
VI.	Research for Technology Development	Computerisation in Health care *Medical Equipment & Instrumentation* (including design, production and maintenance) Appropriate Technology for Health	
VII.	Research in Toxicology	Poisoning by chemicals, natural toxins (e.g. from plants animal or microbial sources).	To ensure safety to the population, and the maintenance of health standards. Appendix VII.

APPENDIX I: RESEARCH TO FACILITATE APPLICATION OF AVAILABLE TECHNOLOGY TO CONTROL FOOD AND WATER-BORNE DISEASES, NUTRITIONAL DEFICIENCIES INAPPROPRIATE FERTILITY AND IMMUNISABLE DISEASES

Priority Areas	Examples of Suggested Areas of Research	Justification	Types of Research Desirable
1. Food and Water-borne diseases	1.1 Factors contributing to the non-availability of clean water and adequate sanitation in high risk population. 1.2 Research to develop affordable and acceptable alternatives in the organisation of health service delivery and technology for the reduction of food and water-borne diseases for example, through: (i) improving techniques to effect desirable behavioural changes (ii) the development of alternative organisational structures including ways to improve interagency and intersectoral coordination. (iii) the development of methods, techniques and equipment to provide clean water and adequate sanitation to disadvantaged groups. (iv) the development of methods, techniques and equipment for the sanitary disposal of human and industrial wastes. (v) identification of sources of diseases causing agent and control in high risk population. 1.3 Development of effective, feasible, appropriate and acceptable surveillance mechanisms, including gathering new information on the survival of specific disease agents in the local environment. 1.4 Ways to improve the quality of food-handling, food preparation and cooking, including new information in support of existing legislation on food-handling and quality control. 1.5 Development of effective cheap and rapid diagnosis method of determination of disease. 1.6 Development of new vaccines and immunisation strategies specifically for typhoid/cholera.	Food and water-borne diseases have not been successfully prevented over the years. The basic reasons are inadequate clean water supply, insanitary disposal of sewage and unhygienic food-handling. Typhoid incidence has increased from 12.5 per 100,000 in 1981 to 15.1 in 1985 and 17.7 in 1986. So too has hepatitis A which roses 14.6 per 100,000 in 1984 to 20.5 in 1985 and 45 in 1986. Incidences of cholera, diarrhoeal disease, dysentery and food-poisoning remain high at 0.33, 2058, 45 and 18.6 per 100,000 respectively. It is targetted that the incidense of diarrhoeal disease be reduced to less than 20 per 1,000 and for those under 5 years of age, there should be a 50% reduction. Cholera should be less than 1 per 100,000, and similarly too for typhoid (less than 1 per 100,000). This target may be achieved through, interalia, provision of clean water and good sanitation, effecting desirable behavioural changes in the community, proper human and industrial waste disposal, proper control food-handling and preparation, effective surveillance and good inter-agency and intersectoral coordination. Malaysia should actively look into conducting its own field trials and vaccination programmes for the 2 diseases mentioned. Both **Salmonella typhi**-Vibrio cholerae have man as the sole host and victim. Therefore, an efficient vaccination programme, besides other methods, should help lower if not eradicate these two diseases.	Clinical Epidemiological HSR HBR HER Biomedical

Priority Areas	Examples of Suggested Areas of Research	Justification	Types of Research Desirable
2. Nutritional Deficiencies	2.1 Factors contributing to the existence of pockets malnutrition in high risk groups, including the role of helminths and malaria infections, in-depth study of feeding practices in children and mothers in these groups. 2.2 Development of affordable, acceptable and appropriate alternative methods and technology to reduce malnutrition in high risk populations for example, through: (i) development of new methods to modify negative beliefs and attitudes contributing to malnutrition. (ii) identification of the appropriate local indigenous foods rich in the most pertinent nutrients (protein, calcium, vitamin A, iron) that can be promoted as nutritious food to high risk groups, and the development of strategies to increase accessibility of these foods to high risk groups, especially in Sarawak, Sabah, Kelantan, Terengganu as well as those living in estates and urban slums. (iii) the development of alternative organisational structures, including ways to improve interagency and intersectoral cooperation for a concerted and coordinated effort to reduce or eradicate malnutrition in high risk population. (iv) ways to increase community participation, involvement and awareness, mobilising community resources and increasing community self reliance. (v) ways to strengthen the food and nutrition education component in the school curriculum and adult education, and improve the nutrition education programme in general. 2.3 Ways to improve current mechanism of surveillance for malnutrition, including ways to analyse the considerable volume of existing date more efficiently, and the dissemination of such findings to the appropriate organisations and agencies for action. 2.4 Relationship between nutrient deficiencies and performance and productivity.	Malnutrition is recognised as a socio-economic and behavioural problem with its contributory factors lying beyond the health sector, mainly due to poverty, food availability and socio-cultural factor. It remains one of the major issues faced by the health sectors since its manifestation occurs mainly as a health or medical condition. *A study in 1979 by the IMR on nutritional status of* communities showed a shortfall of calorie comsumption in 66% of households and a deficit of dietary protein in 34% of households. Kandiah (1976) showed that protein calorie malnutrition, anaemia, vitamin deficiencies were still prevalent in Indian preschool children in estates. Other studies indicate low birth weight among infants of Indian ethnicity. Studies by Chen in 1984 and Anderson in 1977 showed extensive malnutrition among indigenous populations in Sarawak. It is targetted that the daily per capita caloric availability should exceed 2,500 calories while daily per capita protein availability should exceed 70 gms. There should be no third degree malnutrition in children. Nutritional anaemia in pregnant and lactating women, goitre and xerophthalmia should be reduced to lowest attainable level. This target may be achieved through, interalia, improvement of feeding practices in children and mothers in high risk groups *and intervention with appropriate measures when necessary*, modification of negative beliefs and attitudes contributing to malnutrition, promotion of local indigenous foods that are nutritious for high risk groups, better interagency and intersectoral cooperation, steps to increase community awareness and participation, improving programmes on nutrition education be in school and for adults, developing more efficient surveillance mechanisms, and evaluation of programmes and activities implemented.	Epidemiological HER HSR HBR Biomedical Clinical