EMGEN Newsletter

Vol. 4, Issue 3, Apr.-May, 2011

INSIDE THIS ISSUE:

Eastern Mediterranean Health Genomics and Biotechnology Network (EMGEN) was created in 2004 with collaboration of representatives of selected center of excellence in (health related) molecular biology, biotechnology & genomics in the Eastern Mediterranean region by recommendations and efforts of WHO/EMRO.

Address:
Biotechnology building, #69, Pasteur Ave., Pasteur Institute of Iran
Tehran, Iran, 13164
Tel: +98-21-66954324
Fax: +98-21-66465132
E-mail: emhgbn@gmail.com, secretariat@emhgbn.net
Website: www.emhgbn.net
Www.emgen.net

Prepared by: Ghazaleh ghavami
Page design: Ghazaleh Ghavami
Editor: Dr. Soroush Sardari

E-Health in the Eastern Mediterranean

The importance of health mapping, in association with health indicators, monitoring and evaluation, as an e-health application is growing at a very rapid rate to support health systems development. WHO has been using mapping techniques coupled with surveillance to monitor the global health situation and present it through user-friendly and modern tools such as geographic information systems. Public health mapping utilizes the technology of geographic information systems to add value to information for public health planning and decision making. The role of health mapping has many aspects and influences the performance of health systems in many ways. It improves the ability of decision-makers, planners, academicians, researchers and health care professionals to organize and link thematic and spatial datasets. It provides the ability to create relations between datasets that may seem unrelated without using the geographical dimension. These links help in discovering and creating new health knowledge which can be translated into action or policies. Mapping enables professionals to understand complex spatial relationships visually, and as planning has an element of informed prediction, mapping can be a powerful tool for forecasting and trend analysis. Communities can share the same knowledge about their own health and development issues.

Access to Eastern Mediterranean Information and Communication Technology (EMRICT)

by email: emrict@listsrv.emro.who.int

Dear Friends and Colleagues,

It gives me great pleasure to address you through this newly established Discussion Group for Eastern Mediterranean Information and Communication Technology or EMRICT. In May 2001 the ICT Focal Points in the Region had their regular meeting at the WHO Regional Office for the Eastern Mediterranean in Cairo and made a number of conclusions and recommendations. One of these recommendations was to establish this listserv and host it on the Regional Office website. Implementation of this recommendation took some time, both in the planning and to enable us to launch it at an appropriate time. An important intercountry meeting is being held now at the Regional Office which has brought together ICT focal points and health statistics focal points in the Region to discuss issues related to application of ICT in management of health data. The objective of the listserv is that it should be used as a vehicle for exchange of information and experience in all areas of health and medical informatics and telematics. We would like it to be a forum for discussion, to present success stories and to ask for advice from other colleagues. We would like it to be the voice of ICT professionals in health care institutions in the Region, a forum to raise issues for decision-makers' consideration and a mechanism for continuous education. With the introduction of the e-health concept and activities in the Region, we intend to be active in support of health care reform and e-government initiatives.
This listserv is part of a more comprehensive e-health website, which we would like to maintain as a community effort with contribution from all ICT professionals in the health sector in the Region.

We look forward to your contributions and feedback.
With kindest regards,
Najeeb Al-Shorbaji

Reference: Use and potential of geographic information systems for health mapping in the Eastern Mediterranean Region. By Najeeb Al-Shorbaji, PhD, Coordinator, Knowledge Management and Sharing, WHO/EMRO

Nested polymerase chain reaction (N- PCR)

Nested polymerase chain reaction (N- PCR) is a modification of polymerase chain reaction (PCR) **Figure 1.** planed to decrease the contamination in products as a result of the amplification of unexpected primer binding sites [1].

PCR is the process utilized to amplify DNA samples **Figure 2.**, through a temperature-mediated DNA polymerase. The products can be utilized for sequencing or analysis, and this process is a main part of several genetics research laboratories, along with utilizes in DNA fingerprinting for forensics and other human genetic cases. Conventional PCR needs primers complementary to the termini of the target DNA. A frequently going on problem is primers binding to incorrect regions of the DNA, giving unpredicted products [1].

N- PCR includes two sets of primers, utilized in two successive runs of polymerase chain reaction, the second set planed to amplify a secondary target within the first run product [2].

As the pointed, N- PCR primers are one that is internal to the first primer pair. The better fragment produced by the first round of PCR is utilized as the template for the second PCR. Nested PCR can as well be carried out with one of the first primer pair and a single nested primer. The sensitivity and specificity of both DNA and RNA amplification can be noticeably amplified by utilizing the nested PCR method. The specificity is particularly improved because this method almost forever eliminates any spurious non-specific amplification products. This is since, after the first round of PCR the non-specific products are unlikely to be adequately complementary to the nested primers to be capable to serve as template for more amplification. Therefore the preferred target sequence is preferentially amplified. Though, the increased risk of contamination is a drawback of this extreme sensitivity [3].

The benefit of N- PCR is that if the incorrect PCR fragment was amplified, the probability is quite low that the region would be amplified a second round by the second set of primers [2].

Based on recent approaches to optimize N- PCR method and overcome the disadvantages of two-round nested PCR, Michael et al. expanded an easy and robust closed single-tube nested PCR method (antisense PCR). The technique utilizes antisense oligonucleotides that carry a 5′ tag and which can potentially hybridize to the 3′ ends of the outer primers, conditional on the annealing temperature. Throughout first cycles, which are done at a high annealing temperature, the antisense oligonucleotides do not hybridize and amplification is directed by the outer primers. Throughout later cycles, for which the annealing temperature is reduced, the outer primers hybridize to the antisense oligonucleotides, expand to make sequences that are mismatched to the amplicon templates, and thus become inactivated, whereas the inner primers hybridize to the amplicon templates and keep on amplification. Antisense quantitative PCR (qPCR) was compared with one-round qPCR for real-time amplification of four PCR targets (*BCR*, *APC*, *N-RAS*, and a rearranged *IGH* gene). It had identical amplification efficiency but produced much less nonspecific amplification. Antisense PCR allows both endpoint detection and real-time quantification. It can substitute for two-round nested PCRs but may as well be appropriate to instances of one-round PCR in which no specificity is a problem [4].

Figure 1. PCR machine

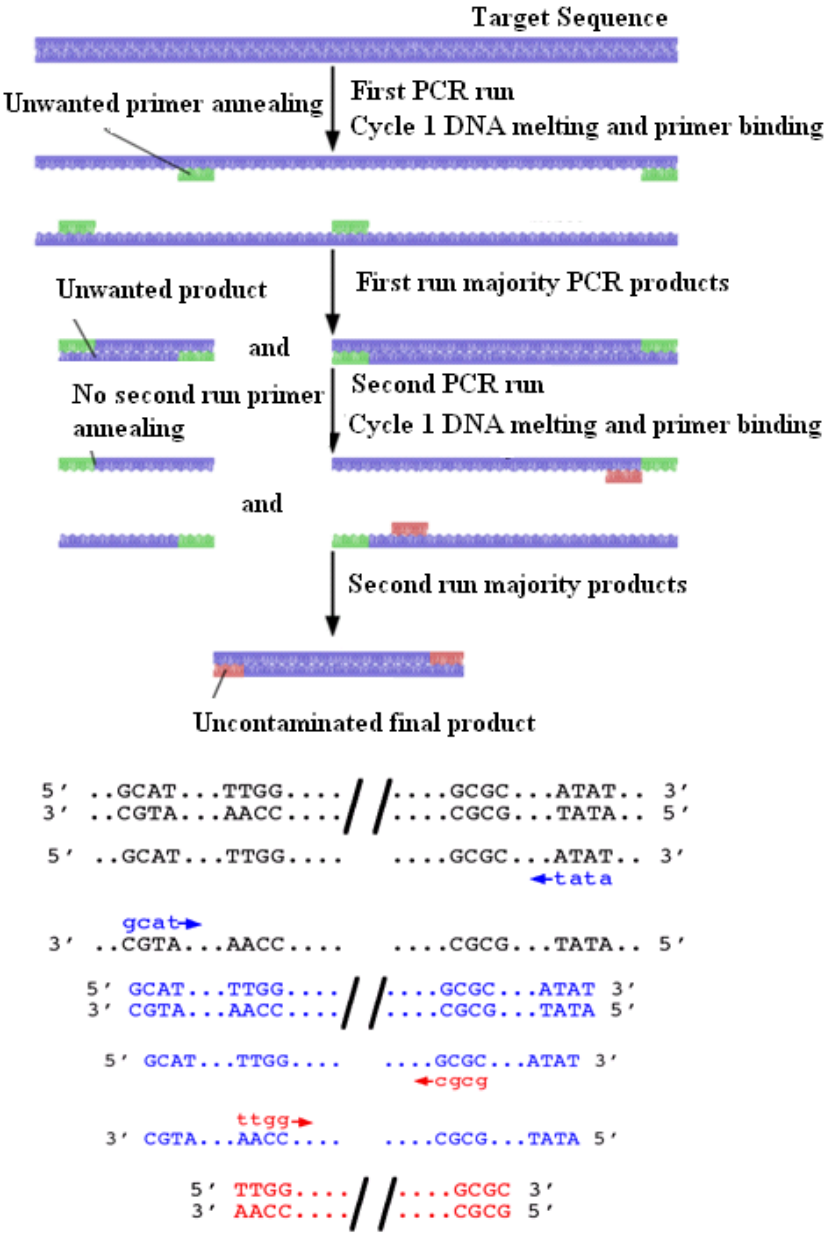


Figure 2. Schematic scheme of (N- PCR) is a modification of PCR procedure, the target DNA undergoes the first run of polymerase chain reaction with the first set of primers, indicated in green. The chosen of alternative and similar primer binding sites gives a selection of products, only one including the intended sequence. The product from the first reaction undergoes a second run with the second set of primers, indicated in red. It is very improbable which any of the unwanted PCR products include binding sites for both the new primers, ensuring the product from the second PCR has little contamination from undesirable products of primer dimers, hairpins, and alternative primer target sequences.

Sample of Nested PCR Protocol

- **For 50 ul reactions, the amounts given are per reaction [5].**

External Round of PCR Master Mix

dNTP mix (2mM each dNTP)	**5 µl**
10x PCR buffer (15mM MgCl2)	**5 µl**
Taq polymerase (0.2U)	**0.2 µl**
dH2O	**25.8 µl**
Primer mix. Forward and Reverse primers. (5 pmoles/µl each)	**4 µl**
Total Mastermix Volume:	**40 µl**
DNA Template	**10 µl**

Internal Round of PCR Nested PCR Master Mix

dNTP mix (2mM each dNTP)	**5 µl**
10x PCR buffer (15mM MgCl2)	**5 µl**
Taq polymerase (0.2U)	**0.2 µl**
dH2O	**35.8 µl**
Primer mix. Forward and Reverse primers. (5 pmoles/µl each)	**4 µl**
Total Mastermix Volume:	**49 µl**
DNA Template (Sample from external round PCR product)	**1 µl**

PCR Machine Cycling Parameters
For Both External and Internal PCR Rounds

1 cycle:	**94°C/30 sec.**
35 cycles:	**94°C/30 sec.** **55°C/30 sec.** **72°C/30 sec. to 120 sec.**
Hold:	**4°C**

References:

1. http://en.wikipedia.org/wiki/Nested_polymerase_chain_reaction
2. http://www.bio.davidson.edu/courses/genomics/method/NestedPCR.html
3. http://www.studentsguide.in/animal-biotechnology/PCR-polymerase-chain-reaction/nested-PCR.html
4. Brisco J M., Bartley A. P., Morley A. A. Antisense PCR: A simple and robust method for performing nested single-tube PCR. Analytical Biochemistry, 409(2) (2011), 176-182
5. http://www.pcrstation.com/nested-pcr/nested-pcr-protocol/

Monoclonal antibodies in biotechnological research

Monoclonal antibodies (mAb or moAb) are monospecific antibodies that are the similar because of creating by identical immune cells which are every clones of a unique parent cell. Given approximately any substance, it is possible to create monoclonal antibodies which specifically bind to that substance; they can then provide to detect or purify that substance. This has become a key tool in biochemistry, molecular biology and medicine. When utilized as medications, the non-proprietary drug name ends in *mab* [1].

History of Discovery

The thought of a "magic bullet" was first suggested by Paul Ehrlich at the start of the 20th century for a compound could be made which selectively targeted a disease-causing organism, and then a toxin for that organism could be delivered the length of the agent of selectivity. He and Élie Metchnikoff received the 1908 Nobel Prize for Physiology or Medicine for this investigation. In the 1970s, the B-cell cancer multiple myeloma was identified, indeed it was investigated that these cancerous B-cells all produce a single type of antibody (a paraprotein). This was utilized to investigate the structure of antibodies, but it was not thus far possible to create identical antibodies specific to a certain antigen. Production of monoclonal antibodies including human–mouse hybrid cells was explained by Jerrold Schwaber in 1973 and remains extensively cited between those utilizing human-derived hybridomas, but claims to priority have been controversial. The invention was conceived by George Pieczenik, with John Sedat, Elizabeth Blackburn's husband, as a witness and decreased to practice by Cotton and Milstein, and then by Kohler and Milstein. Georges Köhler, César Milstein, and Niels Kaj Jerne in 1975 Winter and his team pioneered the method to humanize monoclonal antibodies,

shared the Nobel Prize in Physiology or Medicine in 1984 for the investigation. In 1988, Greg eliminating the reactions which many monoclonal antibodies caused in several patients [1].

Production

Monoclonal antibodies are classically product by fusing myeloma cells with the spleen cells from a mouse immunized with the preferred antigen. Though, new advances have permitted the utilizing of rabbit B-cells. Polyethylene glycol is utilized to fuse adjacent plasma membranes, other than the success rate is low so a selective medium in which only fused cells can grow is utilized. Pointed consideration refereed to this concept that myeloma cells have misplaced the property to synthesize hypoxanthine-guanine-phosphoribosyl transferase (HGPRT), an enzyme necessary for the salvage synthesis of nucleic acids. The absence of HGPRT is not a challenge for these cells unless the *de novo* purine synthesis pathway is as well disrupted. By exposing cells to aminopterin, they are unable to utilize the *de novo* pathway and turn into completely auxotrophic for nucleic acids requiring supplementation to survive [1].

HAT medium is the selective culture medium as it contains hypoxanthine, aminopterin, and thymidine. Pointed medium is selective for fused cells. Unfused myeloma cells cannot grow since they need HGPRT, and consequently cannot replicate their DNA. Unfused spleen cells cannot grow for an indefinite period for their limited life span. Only fused hybrid cells or hybridomas are capable to grow indefinitely in the media because of the spleen cell partner supplies HGPRT and the myeloma partner makes it immortal [1]. After that, this mixture of cells is diluted and clones are grown from single parent cells on microtitre wells. The antibodies secreted by the diverse clones are then tested for their ability to bind to the antigen for example ELISA, Antigen Microarray Assay, or immuno-dot blot. The majority productive and stable clone is chosen for future use [1].

The hybridomas can be grown for an indefinite period in a sufficient cell culture media, or they can be injected in mice, they create tumors containing an antibody-rich fluid named ascites fluid. The medium must be enriched through selection to further favour hybridoma growth. After attaining either a media sample of cultured hybridomas or a sample of ascites fluid, the preferred antibodies must be extracted. The contaminants in the cell culture sample would consist primarily of media constituents for example growth factors, hormones, and transferrins. On the contrary, the *in vivo* sample is probable to have host antibodies, proteases, nucleases, nucleic acids, and viruses. In both cases, other secretions by the hybridomas for instance cytokines may be exist. There may as well be bacterial contamination. Depending on the complexity of the media required in cell culture, and consequently the contaminants in question, one strategy (*in vivo* or *in vitro*) may be preferable to the other [1].

The production of recombinant monoclonal antibodies includes knowledge, referred to as *repertoire cloning* or *phage display/yeast display*. Recombinant antibody engineering includes the utilizing of viruses or yeast to create antibodies, more willingly than mice. These methods depend on rapid cloning of immunoglobulin gene segments to make libraries of antibodies with slightly diverse amino acid sequences from which antibodies with preferred specificities can be selected. The phage antibody libraries are a variation of the phage antigen libraries first invented by George Pieczenik. These methods can be utilized to improve the specificity with which antibodies identify antigens, their stability in various environmental conditions, their therapeutic efficiency, and their detectability in diagnostic uses. Fermentation chambers have been utilized to generate these antibodies on a large scale [1]. mAbs are presently utilized for many diagnostic and therapeutic aims. The elevated demand for these biopharmaceuticals has caused to the expansion of large-scale manufacturing processes, with productivity developments being mostly realized by optimization of bioreactor systems.

Though, further in recent times, the near the beginning steps of production, previous to bioreactor culture, have been introduced as alternative areas that productivity improvements can be obtained. Progress in the development of mAb-producing cell lines are being created, mainly referring to expression vector design and techniques utilized for transfection, with the intent to generate a reproducible methodology. Choosing the most suitable clones is in addition a vital step that can be progressed, by involving variables other than the expression stage, which is still the general practice. In addition, strategies of cell engineering, though still mostly based on trial-and-error experimentation and not in standard protocols, hold enormous attention to progress cell growth and productivity, in addition to produce quality in the future. Improvements of the primary stages of the production process would not only result in cells with higher expression capacity, but would also speed-up the process expansion [2].

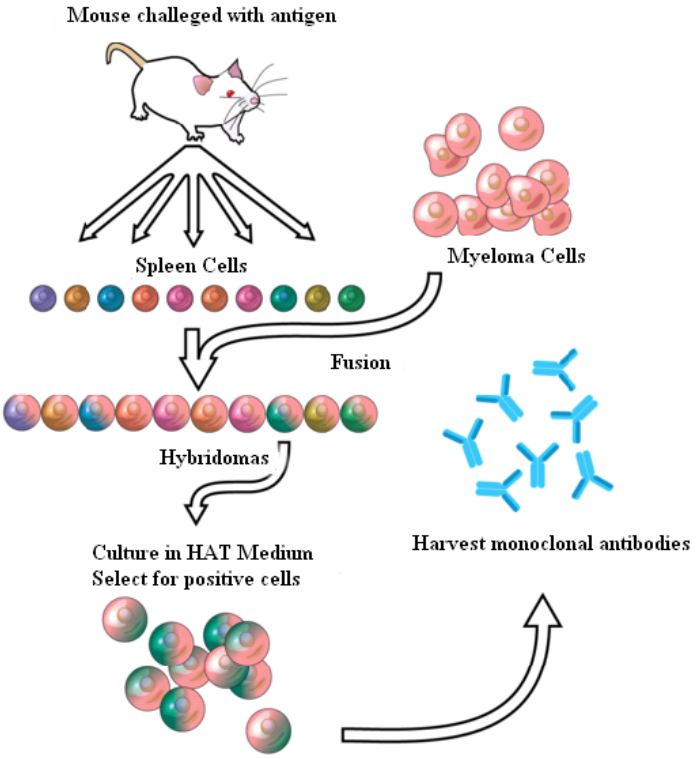


Figure 1. schematic schema of monoclonal antibodies production [1]

Early on, a main challenge for the therapeutic employing of monoclonal antibodies in medical concepts was that initial methods utilized to generate them yielded mouse, not human antibodies. Although structurally analogous, dissimilarities between the two sufficient to invoke an immune response created when murine monoclonal antibodies were injected into humans and resulted in their rapid removal from the blood, systemic inflammatory effects, and the construction of human anti-mouse antibodies (HAMA). To overcoming pointed challenge, the utilizing recombinant DNA has been discovered since the late 1980s [3].

Since the investigation which monoclonal antibodies could be created *in vitro*, scientists have targeted the formation of 'fully' human antibodies to avoid a number of the side effects of humanized and chimeric antibodies. Two successful investigations were identified - phage display-generated antibodies and mice genetically engineered to make more human-like antibodies [3].

Monoclonal antibodies have been created and approved to treat:

- Cancer
- Cardiovascular disease
- Inflammatory diseases
- Macular degeneration
- Transplant rejection
- Multiple sclerosis
- Viral infection

In August 2006 the Pharmaceutical Research and Manufacturers of America reported that U.S. companies had 160 diverse monoclonal antibodies in clinical trials or awaiting approval by the Food and Drug Administration for instance [3]:

1. FOR CANCER TREATMENT

- Bevacizumab
- Cetuximab
- Panitumumab
- Traztuzumab
- Pertuzumab

1. FOR AUTOIMMUNE DISEASES

- Infliximab
- Adalimumab
- Basiliximab
- Daclizumab
- Omalizumab

Monoclonal antibody therapy is employing mAb to specially bind to target cells. This process stimulates the patient's immune system to attack those cells. The first challenge for utilizing mAb, is the making a mAb specific to almost any extracellular/ cell surface target, in this regard numerous research and development currently being performed to generate monoclonals for numerous serious diseases. There are a number of ways that mAbs can be utilized for therapy. For instance: mAb therapy can be utilized to destroy malignant cancerous cells and inhibit tumor growth by blocking certain cell receptors. Immunotherapy expanded as a method with the investigation of the structure of antibodies and the development of hybridoma knowledge, which supplied the first reliable source of mAb. These advances permitted for the particular targeting of tumors both *in vitro* and *in vivo*.

During the development of monoclonal drug development there have been four major antibody kindes developed: murine, chimeric, humanized and human [3].

Immunoglobulin G (IgG) antibodies are huge heterodimeric molecules, about 150 kDa and are made up of two different types of polypeptide chain, named the heavy and the light chain. There are two kinds of light chains, kappa (κ) and lambda (λ). By cleavage with enzyme papain, the Fab (*fragment-antigen binding*) part can be separated from the Fc (*fragment crystalline*) part of the molecule. The Fab fragments include the variable domains responsible for the antibody specificity embedded into constant areas. There are four identified IgG subclasses all of which are included in Antibody-dependent cellular cytotoxicity [3].

The immune system responds to the environmental parameters it encounters on the basis of discrimination among self and non-self. Cancerous cells are not specially targeted by one's immune system since tumor cells are the patient's own cells. Cancerous cells though are highly abnormal, and many present unusual antigens unsuitable for the cell type, its environment. Rest cancerous cells exhibit cell surface receptors which are unusual or absent on the surfaces of healthy cells, they are responsible for activating cellular signal transduction pathways which lead to the unregulated growth and division of the cancerous cell. Antibodies are a main part of the adaptive immune response played a critical role in both in the recognition of foreign antigens and the stimulation of an immune response to cancerous cells. The beginning of mAb method has made it possible to elevate antibodies against specific antigens generated on the surfaces of tumors [3].

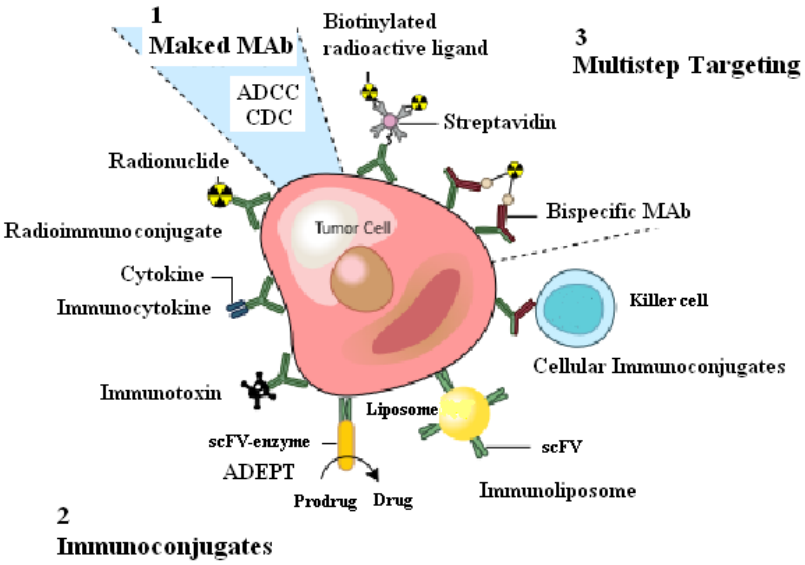


Figure 2. Utilizing mAb for cancer treatment. ADEPT, antibody directed enzyme prodrug therapy; ADCC, antibody dependent cell-mediated cytotoxicity; CDC, complement dependent cytotoxicity; MAb, monoclonal antibody; scFv, single-chain Fv fragment [3]

Since 2000, the therapeutic market for monoclonal antibodies has developed extremely. The existing "big 5" therapeutic antibodies on the market: Avastin, Herceptin, Humira, Remicade and Rituxan accounted for 80% of revenues in 2006. Experts forecast which the therapeutic antibody market will persist to be dominated by Oncology and AIID segments 82-84 % from 2004 to 2011. In addition, experts note a potential for modify in the balance among Oncology and AIID in the future years. Even as Oncology therapeutics took over the market in 2004, AIID is directed to dominate by 2011 [3].

The enhancing significance of mAbs in therapeutic relevancies, happening in current years, has caused to the quick improvement of methods for their large-scale production. Attempts continue on optimization of mAb production, other than they frequently focus on bioreactor design.

Though, the procedures done before bioreactor culture, for instance transfection of the gene of interest into the cells, choice of the most appropriate clone and adaptation to diverse culture conditions, have been exposed to powerfully impact the expression levels possible to obtain in latter steps. Therefore, optimization should involve and start with these primary stages of creation of a mAb-producing cell line. In addition, these procedures are very time-consuming and, consequently, the ones most responsible for the delays exposed until a mAb becomes commercially accessible. This is a main drawback for biopharmaceutical companies that they success extremely depends on how fast they can introduce their products in the market [2].

References:

1. http://en.wikipedia.org/wiki/Monoclonal_antibodies
2. Costa A. R., Rodrigues E. M., Henriques M., Azeredo J., Oliveira R. Guidelines to cell engineering for monoclonal antibody production. European Journal of Pharmaceutics and Biopharmaceutics, 74 (2010), 127–138.
3. http://en.wikipedia.org/wiki/Monoclonal_antibody_therapy

ABCAR History

In 2005, the HIV/AIDS Regional Program in the Arab States (HARPAS) of the United Nations Development Program (UNDP) commissioned research to examine the potentials for the Private Sector operating in the Arab region to join this region-wide social response to the challenge of HIV/AIDS. The research looked at current, and limited, response to AIDS from private companies in the Arab region and appraised the social and economic rea- sons for the Private Sector to get involved in the AIDS.

In December 2005, business leaders in the Private Sector met in Cairo with other key actors in the AIDS response effort in the Arab region to discuss the most appropriate and cost-effective ways for private companies operating in the Arab region to respond to HIV/AIDS. Following this exploratory meeting, a promising and relatively loose network of companies committed to respond to HIV/AIDS was created. UNDP and the International Labour Organization (ILO) provided the platform for this meeting.

The World Economic Forum on the Middle East which took place in Sharm El Sheikh, in May 2006 presented an excellent opportunity for highlighting the economic challenges that HIV/AIDS represents in the Arab world-a challenge which merits no less attention than that given to its, human, health and social impacts. Under the title: **"Saving Lives, Saving Money - The Private Sector's Response to HIV/AIDS in the Arab Region,"** findings of HARPAS' research assessing the private sector's link and potential response to HIV/AIDS in the region were launched with participation from an eminent panel which included H.E. Mr. Amre

Moussa, Secretary General of the League of Arab States, Dr. Ahmed Abaddi, Director of Islamic Affairs & Advisor to H.M. King of Morocco, Mr. Nejib Zaafrani, Regional Vice-President for Shell EP Intl., Dr. Shereen El Feki, Presenter and Editorial Advisor for Al-Jazeera Inter- national, as well as other influential business representatives from the Arab region.

Subsequently, building on the momentum and outcomes of the exploratory effort and the WEF discussions, the Arab Labour Organization (ALO) hosted in Cairo in June 2006, a Steering Committee Meeting where the net- work members, joined by other private companies interested in the initiative, agreed on the creation of the **AIDS Business Coalition in the Arab Region (ABCAR).**

ABCAR Launch

The official launch of ABCAR was held on 18th May 2007 at the World Economic Forum (WEF) on the Middle East in the Dead Sea, Jordan. The launch session hosted a distinguished panel which included Dr. Gavin Graham, Vice President, Shell EP International; Mr. Michel Bayoud, CEO, Boecker Public Health Group; Mr. Christopher Knight, CEO, Standard Chartered Bank, Jordan; Ms. Nada Al-Nashif, Regional Director, International Labour Organisation; a representative of H.E. Mr. Amre Moussa, Secretary General of the League of Arab States; and Ms. Yousra, Actress and UNDP Goodwill Ambassador. The session was moderated by Dr. Shereen El Feki, Presenter and Editorial Advisor for Al-Jazeera Intl. The panellists showed their support to ABCAR by placing their business cards on a giant red ribbon, symbolising the response to AIDS, at the end of their speeches.

Speaking from a business perspective, Dr. Graham, representative of ABCAR Corporate Chair, emphasized the importance of the private sector to engage in HIV response in the region,

saying that "the increasing incidence of HIV/AIDS across the region poses a serious economic challenge, not any less significant than the human, social and health threats it presents. We hope that the launch today will inspire many more companies to join our initiative to address HIV/AIDS in the workplace and in the communities where we operate".

A press conference was held on the following day, where ABCAR members responded to media inquiries on the initiative. The panel included Mr. Freddy Becker, Policy, Compensation and Benefits Manager, Shell EP International; Mr. Michel Bayoud, CEO, Boecker Public Health Group; and Dr. Khadija Moalla, Regional Coordinator, UNDPs HIV/AIDS Programme in the Arab Region. There has been substantial media coverage of ABCAR in the Arabic press, with more than 50 articles throughout the Arab region raising concerns about the increasing rates of HIV infection rates in the region.

Summary of Meetings and Prospective Activities of ABCAR

On 4 March 2008, ABCAR board members (Shell, SCB, Boecker, CS&T,) finalized the legal establishment of ABCAR. ABCAR was registered later on as a Lebanese NGO, and is now based in Beirut, for administrative flexibility, although future activities will cover the entire Arab region.

Also board members had the opportunity to define the financial contribution and the administrative role of each one of them.

The meeting resulted in developing ABCAR business strategy for the next 6 months, which helped establishing the administrative structure of the organization. Accordingly, new companies such as Total joined, and are to be followed by new ones, both at the regional and international level, where ABCAR will support the implementation of HIV workplace programs.

For this purpose, ABCAR hired experienced consultants to run their Beirut, UAE and Egypt offices. Later on, the ABCAR team held a regional meeting in Beirut on the 28th and 29th of June 2009 to follow up on what has been started in the earlier meeting and to define the work dynamics. Accordingly, ABCAR is being given a total reshape to better serve and suit its prospective customer needs.

ABCAR Partners

ABCAR is technically supported by the International Labour Organization (ILO) and the HIV/AIDS Regional Program in the Arab States (HARPAS) at United Nations Development Program (UNDP).

HARPAS

HIV/AIDS Regional Programme in the Arab States.

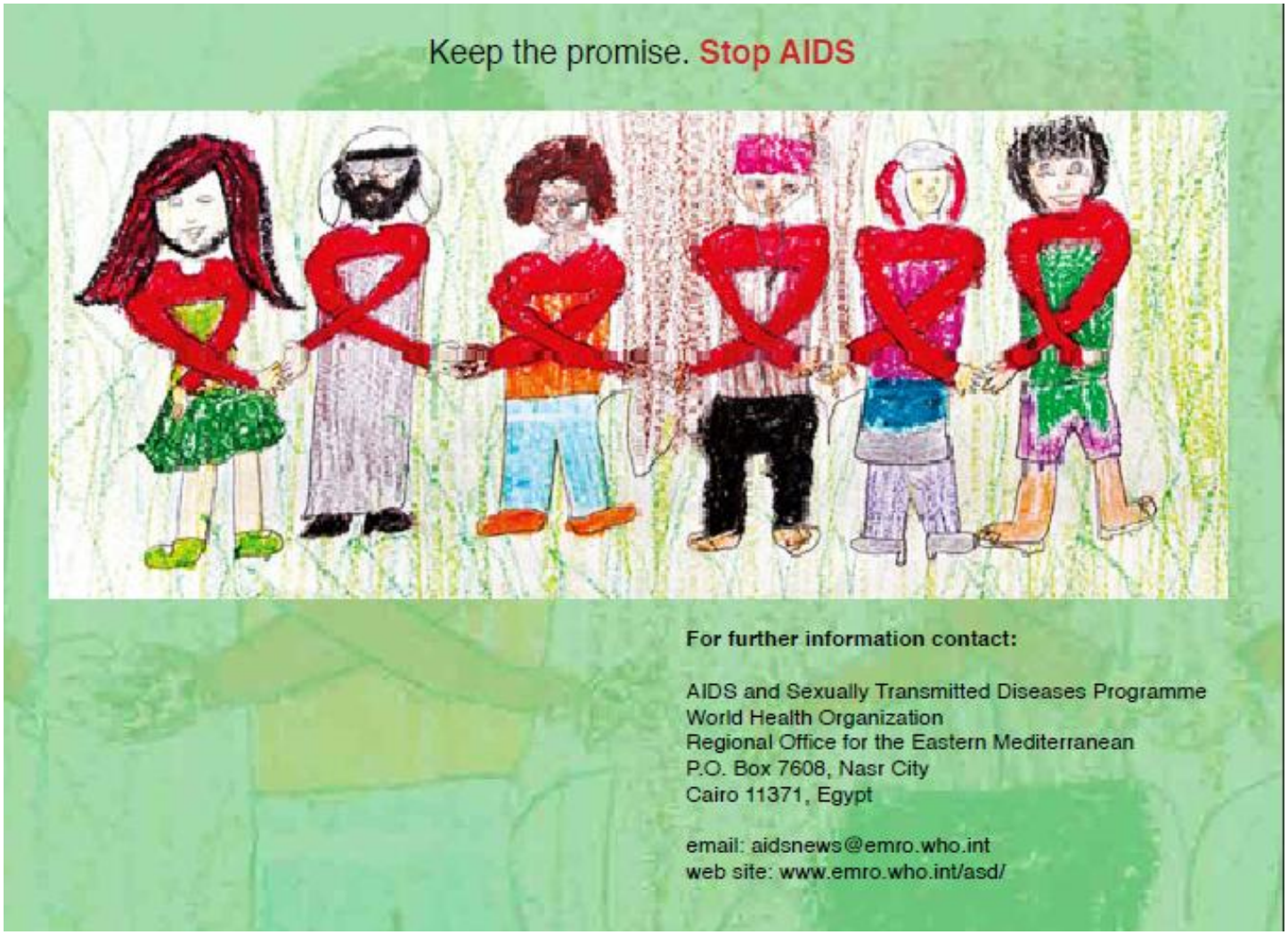
Egypt Regional Office

E-mail: info@abcaronline.org

Lebanon & Other Neighboring Countries

E-mail: h.merhi@abcaronline.org

Reference: http://www.abcaronline.org/English/index.php



Universal Access to HIV prevention, treatment and care is a critical part of human rights.

The World AIDS Day 2010 year comes along with advancements and positive changes in commitment, attitudes and response to the HIV epidemic. However, the pandemic continues with persistent stigma and discrimination against those living with HIV and those most vulnerable to it. It is therefore crucial to dedicate another World AIDS Day to reflect on Human Rights in the context of universal access to HIV prevention, treatment and care.

Princess Haya Biotechnology Center

The Princess Haya Biotechnology Center (PHBC) was established at the Jordan University of Science and Technology on the campus of King Abdullah University Hospital, according to the decree number 998/2005 issued by the Council for Higher Education on 03/10/2005.

The center has provided faculty members and graduate students from different disciplines at the university with an excellent, unprecedented infrastructure for experimental research in biotechnology, especially in the fields of genomics and proteomics. Currently, approximately twenty graduate students working towards the Masters degree are conducting research at the center under the supervision of a distinguished group of faculty members from the colleges of Medicine, Science, Medical sciences, Dentistry, and Agricultural Sciences.

The center houses sixteen research laboratories, and occupies approximately 1500 square meters. It is managed by a staff of four employees and eleven distinguished technicians holding the bachelors and Masters Degrees. Despite the urgent need of the Arab World, including Jordan, to benefit from the scientific research in the areas of genomics and biotechnology and from available resources and recent projects such as the Genome Project the lack of the ability to stay abreast of these modern technologies in the biomedical and genetic fields has been one of the serious obstacles in this regard.

Such technologies and data should form the foundation to the protection of citizens from the many genetic diseases the rates of which among Jordanians significantly exceed their corresponding international counterparts and negatively impact the social, health, and economic life in Jordan. In contrast to the situation in the developed countries, where the biotechnology-based industrial sector has become a vital force in their economies, the inability to form the scientific foundation for such a sector has prevented its birth in Jordan and the Arab World.

Since its establishment, PHBC has been a pillar of the scientific activity in Jordan through the cooperation agreements with the local institutions and hospitals dealing with genetic diseases in Jordan and through the continuous scientific activities at the national and regional levels. For instance, the center coordinates and cooperates with the Jordanian organization for the cystic fibrosis, the Jordanian organization for the Down syndrome and the thalasemia center at Princess Rahma Teaching Hospital in Irbid. Recently and as part of its policy to transfer expertise and biotechnologies through continuous education programs, the center hosted a workshop in cooperation with the Red Cross on forensic medicine and its applications. Another workshop on the latest advances in the area of protein technology was hosted in cooperation with the international pharmaceutical industry in Jordan through its R&D cooperation agreements with the national pharmaceutical companies. In accordance with its mission to advance scientific knowledge, the center hosts students from other Jordanian universities to introduce them to the latest research techniques employed by the center. The center has recently expanded its activity beyond the national borders and established scientific cooperation with Arab and other countries. Cooperation is underway with forensic medicine institute in Iraq, the Saint Joseph University in Lebanon, and the Hamdan Bin Rashid Organization for Excellence in the UAE. In addition, the center hosts a number of graduate students from Saudi Arabia.

Furthermore, there are a number of scientific cooperation agreements with the Human Genetics Center at the University of Humboldt in Germany and The Forensic Medicine Center at the University of Western Australia. The center aims to increase awareness of the importance of biotechnology and research in order to help solve the large number of medical and health problems suffered by Jordanian people. In addition, the center seeks to actively participate in creating an advanced biotech industry on a firm scientific and technological base.

For this reason the center has the short term goal for this year of preparing an Oracle database that should become a nucleus for the most advanced center for biotechnology and bioinformatics in the Arab region and will help the center achieve its long term goals. In addition, the center hopes to establish a virology research unit this year in light of the pressing need for such a unit in the kingdom created by the recent rise of incidents in of the Bird Flu and other viral infections in adjacent countries. Philanthropic support is more important than ever, given the economic realities and challenges that face academic centers like PHBC makes the critical difference between maintaining ongoing programs and pursuing new ideas and translating research advances into clinical use for countless individuals who now have or may develop hereditary disorders. Gifts form individuals, foundations and corporations will help to strengthen our role in teaching the next generation of scientists and clinicians. They also provide resources to develop innovative programs in response to community needs. Contributions can be made for general support of our research or designated for a specific purpose or need, such as breast cancer research, cancer genetics, prevention and control and new equipment or facilities.

References:

http://www.just.edu.jo/CENTERS/PRINCESSHAYABIOTECHNOLOGYCENTER/Pages/VisionandMission.aspx

Gene Responsible for Severe Skin Condition Identified in Research on Epilepsy Drug Side-Effect

According to investigation performed in the University of Liverpool and the Royal College of Surgeons in Ireland, Science Daily reported investigator team has been identified a gene that could specify if epilepsy patients starting drug treatment are likely to experience side-effects resulting in blistering of the skin. The drug, named carbamazepine, is generally utilized to treat patients with epilepsy and other diseases for instance depression and trigeminal neuralgia. While successful in treating the majority of patients, carbamazepine can lead to appearing side -effects which range from a mild skin irritation to severe blistering of the entire body. The team, in collaboration with the Welcome Trust Sanger Institute, monitored more than a million variants in DNA across the human genome to find why some patients are more prone to the drug's side-effects than others. Investigation in Taiwan has already showed a gene that predisposes Asian patients to the skin condition, but Liverpool scientists found that this gene could not be utilized to predict the reaction in Caucasian people. Researchers have now discovered a gene, named HLA-A*3101, in Caucasian patients which amplifies the risk of developing a reaction to the drug from 5% to 26%. Scientists are now working with clinicians and drug regulators to find how these novel findings can translate into clinical practice (Science Daily, Mar. 23. 2011).

Arthritis Drug Could Help Beat Melanoma Skin Cancer, Study Finds

An investigation was performed by the University of East Anglia (UEA) and Children's Hospital Boston researches whose promised an effective novel treatment for one of the deadliest kinds of cancer.

Reporting in the March 24 edition of the journal *Nature*, the scientists discovered that leflunomide, a drug usually utilized to treat rheumatoid arthritis, as well inhibits the growth of malignant melanoma. UEA scientists Dr Grant Wheeler and Dr Matt Tomlinson conducted a rigorous screen of thousands of compounds, looking for those that influence the expansion of pigment cells in tadpoles. They discovered a number of compounds that affected pigment cell expansion and have now exposed with their US collaborators at Children's Hospital Boston that leflunomide considerably restricts tumor growth in mouse models. Also when leflunomide is utilized in combination with PLX4720, a promising novel melanoma therapy presently undergoing clinical trials, the influence was even more powerful, causing almost complete block of tumor growth. After that stage is for clinical trials to be conducted into the use of leflunomide to overcome melanoma. Since leflunomide is already licensed to treat arthritis, this procedure should be quicker than standard and a noveltreatment for melanoma could be accessible within around five years (Science Daily, Mar. 23. 2011).

Boosting Body's Immune Response May Hold Key to HIV Cure

A team directed by Dr Marc Pellegrini from the Walter and Eliza Hall Institute showed that a cell signaling hormone named interleukin-7 (IL-7) reinvigorates the immune response to chronic viral infection, permitting the host to entirely clear virus. Their investigations were released in the February 3 edition of the journal *Cell*.

Current findings to curing chronic infections tend to focus on creating a long-lived immune response to a certain disease. Dr Pellegrini, working with colleagues Mr Simon Preston and Mr Jesse Toe, and collaborators Professors Pamela Ohashi and Tak Mak from the Ontario Cancer Institute, presented that long-lived immune responses to chronic diseases are not forever effective, and has as an alternative concentrated on how the immune response can be manipulated to better fight infection.

Dr Pellegrini said the investigation had provided brilliant advice for novel therapies that could target and boost host immune cells to overcome disease, rather than targeting the disease itself (Science Daily, Feb. 4, 2011).

Math May Help Calculate Way to Find New Drugs for HIV and Other Diseases

The technique already has discovered several potential novel drugs that were exposed to be effective for fighting strains of HIV by scientists at Johns Hopkins University. Utilizing mathematical concepts, Princeton scientists have investigated a method of discovering novel drugs for a variety of diseases by calculating which physical properties of biological molecules may predict their efficiency as medicines. The scientists' technique joins concepts from optimization theory, a field of mathematics which focuses on calculating the best option between a number of choices, with those of computational biology that combines mathematics, statistics and computer science for biology investigation. In the case of HIV, the problem for the Princeton research group was to discover peptides which could stop the virus from infecting human cells. The Johns Hopkins researchers discovered that four of the five designed peptides inhibited HIV and that one of the peptides was mainly potent, even against strains of HIV that are resistant to treatment with Fuzeon. In addition, they investigate that peptides designed by the Princeton scientists were nontoxic to cells. The research was supported by the National Science Foundation (Science Daily, Feb. 4. 2011).

Reference: http://www.sciencedaily.com

Announcement

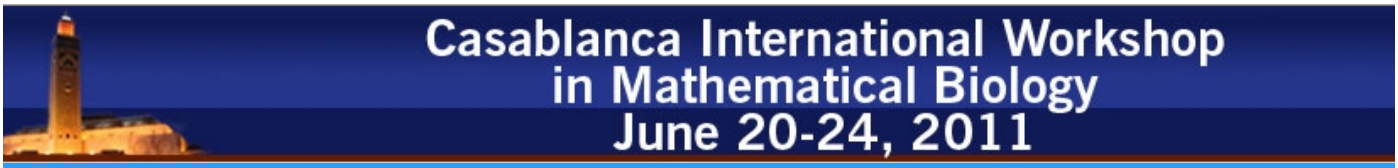
The Scientific integrated solutions academy in cooperation with Nakaa Nanotechnology Network are organizing the international Conference, workshop and Exibition in Nanotechnology ICWEN July 2011 in Cairo, Egypt.

Organized by: ***Nakaa Nanotechnology Network NNN***

The workshop is organized by the Scientific integrated solutions academy in cooperation with Nakaa Nanotechnology Network

The conference will take place over 3 days in Al-Azhar conference center, and will be divided into sections that allow focus on topics in Nanotechnology.

Website: http://www.nakaanetwork.page.tl/
Contact name: Wesam Ahmed Tawfik



This workshop intends to bring together expert researchers from around the world to exchange ideas and share their research results about all aspects of Mathematical Biology in general and the use of optimal control theory in biology.

Organized by: ***University Hassan II, Ben Msik Science Campus***

The major topics of the workshop are (but not limited to) Mathematical Modeling of Infectious diseases, Epidemiology, Virology and Immunology and Cancer modeling.

The workshop will take place over 5 days in Casablanca, Morocco from June 20 to June 24, 2011.

Website: https://sites.google.com/a/asu.edu/cicwmb/
Contact name: Amina Eladdadi & Abdessamad Tridane

Cover Picture

Title: *Tissue engineered vascular graft*

Tissue engineered vascular graft. Tissue engineering was once categorized as a sub-field of bio materials, but having grown in scope and importance it can be considered as a field in its own right. It is the use of a combination of cells, engineering and materials methods, and suitable biochemical and physio-chemical factors to improve or replace biological functions.

Source: *http://en.wikipedia.org/wiki/Tissue_engineering*

Title: *Bioreactor design is a relatively complex engineering task*

Bioreactor design is a relatively complex engineering task, which is studied in the discipline of biochemical engineering. Under optimum conditions, the microorganisms or cells are able to perform their desired function with a 100 percent rate of success. The bioreactor's environmental conditions like gas (i.e., air, oxygen, nitrogen, carbon dioxide) flow rates, temperature, pH and dissolved oxygen levels, and agitation speed/circulation rate need to be closely monitored and controlled. A closed bioreactor used in cellulosic ethanol research.

Source: *http://en.wikipedia.org/wiki/Bioreactor*

Title: *Tissue engineered heart valve*

While most definitions of tissue engineering cover a broad range of applications, in practice the term is closely associated with applications that repair or replace portions of or whole tissues (i.e., bone, cartilage, blood vessels, bladder, skin etc.). Often, the tissues involved require certain mechanical and structural properties for proper functioning. The term has also been applied to efforts to perform specific biochemical functions using cells within an artificially-created support system (e.g. an artificial pancreas, or a bio artificial liver). The term regenerative medicine is often used synonymously with tissue engineering, although those involved in regenerative medicine place more emphasis on the use of stem cells to produce tissues.

Source: *http://en.wikipedia.org/wiki/Tissue_engineering*