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MAKING SCIENCE IN PANAMA

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INDICASAT AIP

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GOBIERNO NACIONAL
REPÚBLICA DE PANAMÁ

Excellency Ricardo Martinelli Berrocal
President of the Republic of Panama

Dr. Rubén Berrocal
National Secretary of Science, Technology and Innovation (SENACYT)

PANAMA AS AN INTERNATIONAL SCIENCE HUB

Panama: Forging A Path Toward International Science Hub

By Dr. Ruben Berrocal

I am delighted to write an introduction to this special edition of the Journal of Alzheimer Disease (JAD).

As the JAD continues to serve as one of the most prolific, highly cited and recognized publications on Alzheimer's and neurodegenerative disease (ND), I am pleased to share with you some of our perspectives and developments in this important field of study and where Panama might offer solutions.

While we witness exciting breakthroughs in fighting neurodegenerative diseases like Alzheimer's disease and Parkinson's disease, more must be done. Perhaps now more than ever, it is critical we continue apace to eradicate these diseases through new discoveries and novel methods.

Dr. Ruben Berrocal, National Secretary of Science, Technology and Innovation (SENACYT). Photo by Rita Marissa Giovani / INDICASAT AIP

Currently, innovations are being sought to find new pathways to a cure. Research on new drug discoveries has shifted focus to the natural world and the critical need to develop biomarkers that can distinguish the normal aging processes from neurodegeneration and other dementias. These findings should prove invaluable to early diagnosis of these diseases—the first line of defense.

In this area, Panama can offer new hope in groundbreaking research and drug developments. In what a recent article in Nature, one of the world's most cited scientific journals, referred to as Panama's "big ambition" in the moment of our "scientific renaissance," we are forging a new direction in drug discoveries, clinical trials and research incubators.

Under President Ricardo Martinelli's leadership, we are aiming high, seeking to become an international hub for science and technology; and be among the leaders in bioscience and biomedicine in our hemisphere. Our rich natural resources and dedicated scientists offer us a means for growth in this field that is second to none in the region.

Neurodegenerative diseases have a complex pathology and etiology and we do not know enough about them. For instance, we have yet to discover a cellular/animal model that accurately replicates their degenerative effects as seen in the human brain. As this field of study becomes more important given our ever-growing and aging populations, the time to find a cure is now.

Neuroscientists in Panama are working to develop cognitive, neurochemical and imaging biomarkers to better understand degenerative diseases, as well as a comprehensive database on brain disorders. In addition, our drug discovery scientists are focusing on identifying novel molecules from marine biodiversity as neuroprotective agents.

Panama is undertaking major investments in the field of science, innovation and technology. We have set aside more than $50 million this year, with a plan to increase that figure to .5% of GDP over the next few years. We are optimistic that given this pledge, and Panama's abundant flora and fauna, we will produce vital solutions to finding new disease-modifying agents among us.

Recently, our goverment signed a memorandum of understanding with a leading U.S. university hospital and research facility to establish a drug discovery center in Panama. And we will continue to seek out mutually beneficial alliances to attract the best and brightest to Panama, further demonstrating our serious commitment.

Investments like these, and cultivating important collaborations, will offer significant contributions that the scientific community must make to solve the dilemmas of the 21st Century. For our part, it is important that we foster a culture of competitiveness in our global economy by creating world leaders in science, innovation and technology. This is our moment, and we are ready to rise to the occasion.

Panama has a profound understanding of what can be accomplished when collective will and ingenuity confront considerable challenges. If not for the global commitment of the brave workers and brilliant engineers who built the Panama Canal, we may have not yet discovered a vaccine for yellow fever. Without unified commitments like these, we often deprive one another of our potential.

Curing neurodegenerative disease is no less daunting a task, but we must continue to seek out new solutions to better understand it, control it and ultimately eliminate it.

And as we will long feel the loss of one of the field's great contributors in Dr. Mark A. Smith, we must continue to pioneer great work, such as his, that pushes the boundaries of contemporary science, medicine and conventional wisdom. In this, we find ourselves in our hour of great potential, and on the shoulders of giants.

Dr. Ruben Berrocal is the National Secretary of Panama's Science, Innovation and Technology agency (SENACYT), and also serves as president of the Council of Ministers of Science and Technology for Latin America and the Caribbean.

Dalton, Rex. "Panama's Big Ambition." Nature 27 Jan. 2011: 462-63.

National Secretary of Science, Technolog

Human development of countries such as Panama relies on strategic plans.

Innovation and scientific and technological growth are, undoubtedly, tools that bring about the greatest transformations.

The National Secretariat of Science, Technology and Innovation's (SENACYT's) activities, projects and programs are all intended to strengthen, support, foster and promote the development of science, technology and innovation in order to raise the level of productivity, competitiveness and modernization in the private sector, the government, the academic and research sector and the population at large.

With this vision, SENACYT has become one of the most important national entities for the economic and social development of the country, with the support of research and innovation activities and training specialized human resources in areas of science and technology in Panama.

SENACYT's structure relies on its six directorates: Research and Development (R & D), Business Innovation, Innovation in Learning, Science and Technology Management, Administration and Finance and Infoplazas.

Directorate for Research and Development (R & D): its mission is to strengthen national capacity to conduct scientific research, generate knowledge and facilitate the transfer of technology for promoting human development in Panama.

The objective of this directorate is to implement programs to support research projects, the development of infrastructure and human capital in science and technology. Currently this directorate has a portfolio of 238 active projects and a significant number of projects in the tender and awarding processes.

Directorate for Business Innovation: the Mission of this directorate is to encourage the use of innovation as the main factor for competitiveness in the business sector. Innovation must become the expedite path for Panama to achieve competitive insertion into world economy and equitable territorial development in the country, as has been the experience of nations that have reached rapid levels of economic and human development. Research and technology development are the tools of innovation and this, in turn, is the key for transforming society.

Directorate of Innovation in Learning: its mission is to improve learning of basic science in our schools and help our society to appreciate science. Also, to guarantee that science and technology become long-lasting tools for development needs of children and young people who are interested in science and that society recognizes science as a partner.

We work jointly with the Ministry of Education to transform classes into enjoyable moments that achieve a deeper learning and attract a greater number of students towards science. We also coordinates efforts in universities and research centers for training science and mathematics teachers, in addition to granting funds to individuals or institutions with innovative ideas to improve school learning, within the policies set forth by the Ministry of Education.

SENACYT - Board o

Directorate of Science and Technology Management: it is a platform for supporting and assisting sciences in the country as well as SENACYT's other directorates, by establishing linkages between the

different stakeholders who contribute to building a robust science and technology system that is healthy and consistent.

Worth mentioning among the activities it promotes are IFARHU - SENACYT Scholarship programs; follow-up to the major science, technology and innovation indicators; to promote networking among national institutions, centers and scientists with international programs and networks with a view on raising funds and obtaining cooperation support in areas of science and technology. It also includes the coordination of the process of formulation, updating and follow-up on the National Strategic Plan for the development of science, technology and innovation in the country, and support through the program aimed at promoting scientific and technological capabilities.

f Directors. Photo by Rita Marissa Giovani / INDICASAT AIP

Infoplazas: SENACYT has chosen them to facilitate the population's access to new information and communication technologies (ICTs), particularly for those who have limited resources and are located in areas of difficult access. This will help to bridge the digital gap and incorporate them into the knowledge society. There are currently more than 200 active Infoplazas and new ones are continuously being inaugurating throughout the country.

One of SENACYT's core objectives is to promote the social dimension of research and to promote scientific culture in Panama. In this sense, it has developed and launched the National Strategic Plan for Science, Technology and Innovation 2010-2014 (PENCYT III). This plan has policies consistent with the priority needs of the country, a coherent institutional structure, programs and innovative services and, above all, a system based on articulating actors in the fields of science, technology and innovation. It is for this reason that during 2011 all the calls for proposals are aligned according to needs prioritized in PENCYT2010-2014, proposing solutions that can be translated into benefits to help solve problems faced by the country.

We promote strengthening of human resources and the scientific and technological infrastructure through strategic alliances with the best research centers and international academic institutions to ensure the transfer of knowledge. This includes initiatives such as the establishment of the Center for Innovation and Research Logistics of Georgia Tech in Panama and alliances with the University of Berkeley HAAS School of Business, for developing innovative capacities within our productive sector among others.

Likewise, aware of the great talent that returns to the country, especially those Panamanians that are SENACYT former fellows and/or professionals recently graduated from PhD research programs, we have opened a continuous call to promote inclusion of specialized talent into the local workforce. This call aims at assisting these young researchers with finding employment in a research or technological development institution of the public sector or a private company (universities, research centers and other entities, profit or non- profit, with the capabilities to carry out research and scientific and technological development).

For more information about the SENACYT visit

www.senacyt.gob.pa

INSTITUTE FOR SCIENTIFIC RESEARC

The Institute for Scientific Research and High Technology Services (INDICASAT-AIP) was created in 2002 by the Panamanian Government through the National Secretariat for Science, Technology and Innovation (SENACYT) to promote the development of science in Panama. The national authorities were based on the premise that scientific development is an absolute requirement for the economical and social advancement of the country.

The legal status of the institute is that of a "Public Interest Association" (AIP) since 2007. According to Panamanian law, being an AIP allows the institute to be funded not only by the national government, but it also has the possibility to attract and use research funding from international sources, thus increasing its financial and operational stability.

The INDICASAT-AIP has infrastructures facilities in Panama for scientific research in the fields of Biomedicine, Biology, Biotechnology, Chemistry of Natural Products, Immunology, Neurosciences, Pharmacology, Toxicology, Parasitology, Clinical Trials and other related areas. Additionally, the scientific staff of the institute has been growing steadily for the last years, including highly

Administration. Photo by Rita Marissa Giovani / INDICASAT AIP

experienced technicians and PhDs.

The INDICASAT-AIP has experienced an important improvement and growth during the last years not only with the inclusion of new scientists, but with new state of the art equipment and the establishment of new research ties with many important institutions in the world. The number of research grants obtained has increased, together with the awareness of the National Government of the importance of scientific research to achieve the major goal of becoming a knowledge based economy.

The number of students associated with the institute has been on the rise, along with the number of scientific publications produced by the staff, undergraduate thesis, workshops and other scientific products. To note, INDICASAT AIP offers Scholarships to school students, medical and undergraduate thesis studentes for innovative research.

(www.indicasat.org.pa)

INDICASAT-AIP has two major strategic goals, (1) To have a major impact in the generation of science based knowledge in the country, and (2) To play a key role in the formation of highly qualified and trained national scientists, both of which can be achieved through scientific research in Biomedical sciences and other related fields. Also important is the goal of providing high technology services to the national community to improve health and human development, to reach better academic level in the country, and to obtain higher competitiveness at economy activities by boosting innovation. Finally, INDICASAT AIP also focuses on attaining a social impact through its work.

Scientific structure of the INDICASAT-AIP

The current structure of the Institute includes the following research units:

- *Center for Drug Discovery:* Dedicated to the discovery of new molecules from the Panamanian Biodiversity to develop new medicines.
- *Center for Neurosciences:* Dedicated to research in neurodegenerative diseases, mental illnesses and nervous system pathologies, using behavioral, molecular and epidemiological approaches.
- *Center for Molecular and Cellular Biology of Diseases:* Scientific research in Parasitology, Immunology and Genetics of important human diseases.

H AND HIGH TECHNOLOGY SERVICES

➢ *Centre for Clinical Trials and Translational Research:*
Devoted to Clinical Trials to evaluate safety, efficacy and other important parameters of experimental vaccines and therapeutics.
➢ *Centre for Environmental Science and applied Ecology (2012).*
➢ *Centre for Bioinformatics (2012).*
➢ *Centre for Engineering Medicine (2013).*
Major Research projects at INDICASAT-AIP are:

Center for Drug Discovery

Photo by Rita Marissa Giovani / INDICASAT AIP

Photo by Rita Marissa Giovani / INDICASAT AIP

- Detection, purification, and characterization of novel molecules active against Plasmodium, Trypanosoma, Leishmania and cancer from thePanamanian Biodiversity (terrestrial flora, fungus and marine organisms).

- Bio-guided cell based screening of marine natural products: Fluorescence Correlation Spectroscopy for study of interactions with G protein coupled receptors regulating blood pressure.

- Inventory and phylogenetic studies on marine sponges associated fungi at Panama's protected areas.

- Exploring the marine biodiversity in Panama: a program for the discovery of compounds with biomedical potential against cancer and infectious diseases.

- Search for new antibiotics, molecular characterization and biological inventory of marine bacteria in Panama.

- International training program in research for the discovery of marine natural products as potential drugs against diseases.

- Established Bioprospection data Bank and state of art technology in Bioassay Systems.

Center for Neurosciences

- Study on Pain Research.

- Effect of psycho stimulants used for treatment of learning and attention deficits on basic associative processes.

- Prevalence of Attention Deficit and Hyperactivity Disorder in the Panama

Photo by Rita Marissa Giovani / INDICASAT AIP

province.

- Neural basis of cognition.

- Molecular neurobiology relating to Neurodegeneration.

Center for Molecular and Cellular Biology of Diseases

Photo by Rita Marissa Giovani / INDICASAT AIP

- Identification of human erythrocyte invasión receptors used by Plasmodium falciparum parasites, as a possibility for new vaccination target.

- Exploratory evaluation of microwave radiation as potential treatment against malaria parasites.

- Studies on the role of heme – heme oxigenase I in hemorrhagic infectious diseases.

- Studies on the role of reactive oxygen species as modulators of vaccine adjuvants.

- Identification of α-galactosyl antigens on the Trypanosome rangeli membrane.

- Studies on the genetic variability of Leishmania sp. In Panama by means of AFLP generated markers.

- Development of a microsatellite panel of Leishmania panamensis for diagnostics, population genetics and molecular epidemiology of the parasite in Panama.

- Evaluation of a diagnostic test for Trypanosoma cruzi based on secreted – excreted antigens, for endemic Chagas disease regions in Panama.

- Genomics and proteomics of human disorders.

SENACYT and INDICASAT-AIP first time jointly supported the special of Journal of Alzheimer´s Disease, on "Drug Discovery for Neurodegenerative Diseases: Challenges and Novel Biochemical Targets" (Guest Editors: Gabriel B. Britton, Mark A. Smith, George Perry, Kumar Sambamurti, Jagannatha Rao KS) – Vol 24, Supp 2, 2011. 19 invited articles from all over the world are published in this special issue. The issue is released on May 30, 2011, 18th Top journal in the world, impact factor is 4.

Centre for Clinical Trials and Translational Research (CCTR) at INDICASAT, Republic of Panama

Photo by Rita Marissa Giovani / INDICASAT AIP

The Centre for Clinical trials and translational research at INDICASAT is a qualified emerging centre for conducting authenticated clinical trials with ethics, training, public awareness and planning in the Republic of Panama. From 2010, we coordinated the first training workshop for Investigators on vaccine and drug handling, legal issues, and good clinical trials practices. We also exposed the potential of our centre in the International Congress on Clinical Trials in Dallas, TX, 2010 for international peer review.

Now we propose to build the first quality based Institute for Clinical trials and translational research by INDICASAT in Panama, in cooperation with GlaxoSmithKline, Novartis, Roche and others by 2011 and we are planning to get accreditation by NIH as a clinical trial centre. We believe that Industry partnershiping with research is an essential part of their committment with the development of Innovation in the Republic of Panama.
This sense is boosting in Panama as many private companies are competing for conducting clinical trials. Since INDICASAT is a public Institute,

we have undertaken the responsibility of building a qualified Institute for Clinical trials and translational research in Panama with quality assurance and International accreditation and the most reliable service to the public in Panama.

Our Mission

The mission of the Centre for Clinical trials and Translational Research (CCTR) is to provide a synergistic mechanism for the medical fraternity to accelerate the delivery of translational and clinical research to our patients. In turn, INDICASAT basic researchers develop research on biomarkers and kits development in cooperation with medical teams. CCTR provides support to multidisciplinary teams (e.g., MDs, PhDs, nurses, Clinical Research Associates (CRAs), laboratory scientists, pharmacologists) in Panama who are involved in translational and clinical research.

Our Goal

Our goal is to develop a culture of translational and clinical research by fostering collaboration, training researchers, providing institutional support, identifying funding resources, and facilitating delivery of innovative therapies to pediatric, adolescent and geriatric patients through coordination with doctors and other health workers. The CCTR program includes all clinical and translational trials conducted by qualified investigators.

The CCTR works to:

• Expand the breadth of clinical and translational studies to the highest scientific standard and clinical practice ethics.

• Improve upon the current infrastructure for conducting clinical research trials more effectively.

• Establish strong data base of Investigators.

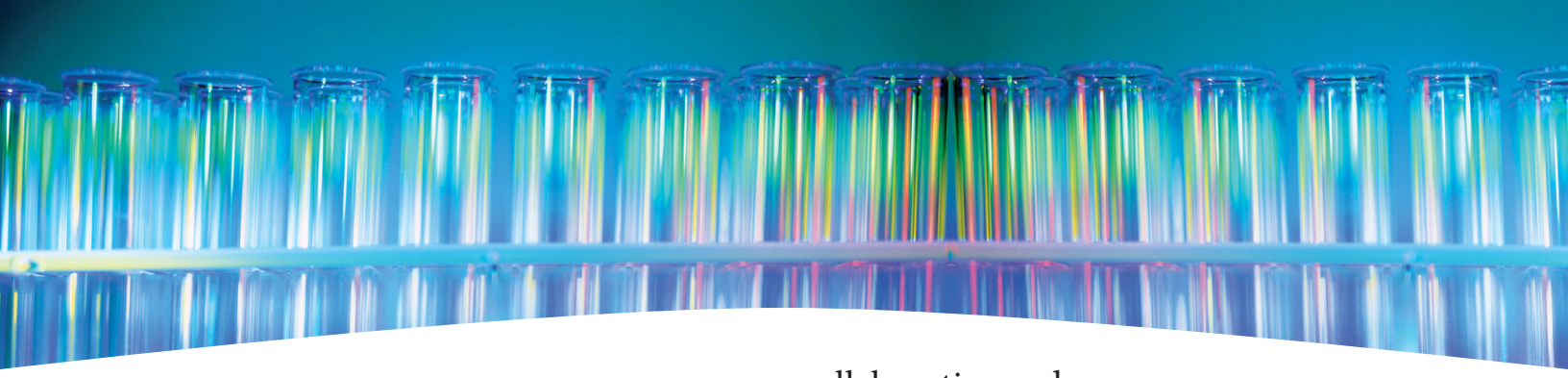
• Train residents, fellows and other investigators in the experimental and biostatistical methodology through a recently developed educational program.
Topics covered include study design, conduct, and analysis of clinical trials related to pediatric and adolescent disorders as well as research ethics and the protection of human subjects.

• Provide patients an opportunity to participate in clinical trials of novel or modified therapies for a range of serious disorders. We ultimately will be able to give all people the benefit of new, better and less toxic medications. As scientists reveal new information leading to innovations in detecting and treating childhood diseases, we will be able to test these promising new treatments and ensure they reach those who most need them.

• Also in the future, we plan to generate drug molecules in Panama and develop relations with pharma industries to make our future research stronger.

• Recently (November 2010), NIH focused in establishing a National facility to train and give accreditation to quality centers all over the world.
The good news is, INDICASAT plans to establish a National facility of Centre for Clinical Trials and Translational Research (CCTR) in Republic of Panama.

For any clinical trials in Panama, please contact Dr.KSJ Rao (kjr5n2009@gmail.com)



NATURE MAGAZINE (20th Jan, 2011)

Securing the future of science funding in Latin America

Many of Latin American governments and science agencies are laying the foundations for the future of science in the region.

Numbers aside, there have also been changes in how the region tends to do and view science.

Government policies aimed at encouraging innovation have become more diverse and flexible.

Research is increasingly blended with teaching and is becoming a more collaborative endeavour.

In Panama for example, the national agency for science, technology and innovation (SENACYT) announced a four-year plan that focuses on collaborations with the Georgia Institute of Technology and the University of California, Berkeley, in the United States, while scientists at research institute INDICASAT-AIP recently conducted a 2-year study of marine bacteria to find new antibiotics with international colleagues.

"Panama has [the] advantage of having both Pacific and Atlantic marine biodiversity," says INDICASAT-AIP director Jagannatha Rao. And although the vast majority of research in Latin America has been funded by governments, efforts are now being made to involve industry.

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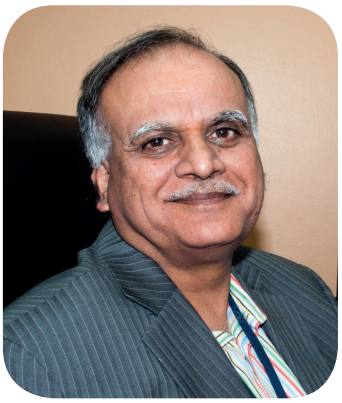

K.S. Jagannatha Rao
Director INDICASAT AIP

SENACYT Innovative program 2011 on Human resource capacity building in Republic of Panama

Institute for Scientific Research and High Technology Services (INDICASAT-AIP), Panama & Acharya Nagarjuna University, India-IFARHU.

The Ph.D. program is the first in Panama to develop scientific capacity building of the highest level.

The program is unique as it is completely conducted in Panama in collaboration with National and International institutions. The Ph.D. program is being offered by Acharya Nagarjuna University, India, through INDICASAT-AIP, Panama.

The degrees will be awarded by the Acharya Nagarjuna University, and the program will be conducted in English only. This Ph.D. program is unique as it runs on the standards of USA/ Europe/Asia in INDICASAT.

Photo by Rita Marissa Giovani / INDICASAT AIP

The program includes course work, techniques training, journal club, monthly seminars, workshops, specialized training schools, international visitors and much more.

The students have to publish three papers in PubMed indexed English journals before the submission of their thesis.

The students have opportunities to obtain external exposure to science through attending International symposia and/or visiting foreign labs for collaborations, depending on meritorious performance.

Admissions are based on three evaluations. First, an entrance examination is conducted, followed by a second interview to assess

the motivation and research capability of students.

The third interview focuses on the students proposed research objectives and methodologies.

The first of these programs started on April 15th, this year, where 14 students were admitted into the program. The university officials, namely, Prof. K.V.Rao, Pro Vice-chancellor, Prof. P.N.Rao, Research Coordinator and Prof. K.R.S. Sambasiva Rao, Chairman of Biotechnology, conducted admissions.

SENACYT supported the program with scholarships to all 14 students. Funding will be administered through the National Institute of Scholarships, IFARHU.

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PANAMA´S BIG AMBITION

NATURE 27 JANUARY 2011 - VOL 469 - 462 - 463

"Science and technology are key components for competitiveness," says Rubén Berrocal Timmons, Panama's science secretary, adding that he wants to make Panama "an international scientific hub". The investment is already in evidence. In March, ground is to be broken on a $20-million science and technology innovation park near Panama City; construction of a $5-million vivarium for the country's research animals is planned for this spring; the government is funding about 100 Panamanians to undertake doctoral studies at universities abroad, with incentives to return to Panama for research careers; and the first complete in-country PhD research programme — in biotechnology — has just begun at INDICASAT-AIP. Observers say that the country's efforts at a scientific renaissance could even serve as a model for other nations.

Paul Collier, an economist who studies capacity building at the University of Oxford, UK, says that Panama's science drive "sounds very positive". The challenge, he says, is "to concentrate resources in a niche — then be the quality escalator in that niche". Panama wants its niche to be biotechnology, with a focus on infectious diseases and bioprospecting — the search for drugs developed from its own rich natural resources.

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