Overview of Genetic Services at UP Manila

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The Medical Genetics Unit (MGU) was set up in 1990 as a special project under the Office of the Dean of the University of the Philippines (UP) College of Medicine, in recognition of the need to provide comprehensive genetic services in the country. The MGU was housed at the Department of Pediatrics. In 1991, the Dysmorphology clinic was opened at the Philippine General Hospital (PGH) Out-Patient Department and the Cytogenetics laboratory services were opened at the Pediatric Research Laboratory. In 1996, the Philippine Newborn Screening Project was initiated in collaboration with 24 private and government hospitals. The following year, the Newborn Screening laboratory was established in September to serve as the central laboratory for the project. At the end of 1998, the MGU had clinical services at the PGH and 2 laboratories (cytogenetics and newborn screening) at the National Institutes of Health building.

In 1999, the UP Board of Regents approved the creation of the Institute of Human Genetics (IHG) as one of the component institutes of the National Institutes of Health (NIH). All services of the Medical Genetics Unit were transferred to the IHG. The vision of IHG is to develop a center committed towards the control of genetically-related deaths and disabilities with its mission of (1) promotion of health by understanding the genetic basis of common diseases in the Filipino population through basic and clinical research, (2) provision of services that will allow definitive diagnosis and early detection of potentially treatable genetic conditions, and (3) implementation of educational programs to increase awareness of physicians and the general public with regard to common genetic conditions and their prevention.

Subsequently, the Dysmorphology Clinic at PGH was renamed the Clinical Genetics Clinic. The Molecular Genetics Laboratory and the Biochemical Genetics Laboratory were opened in 1999 and 2001, respectively as part of the expansion of the Institute. All laboratory services were housed at the NIH.

The IHG is the largest provider of genetic services in the Philippines today. It is a central resource committed to making genetic testing available and accessible to Filipinos all over the country. Presently, the IHG has the following units: clinical genetics, cytogenetics, newborn screening, molecular genetics and biochemical genetics. Tightly integrated with these services are research and advocacy.

From a single-member staff in 1990, the IHG now has a staff complement of 68 (Figure 1) - 3 clinical geneticists, 1 biochemical geneticist, 1 endocrinology/metabolic physician, 2 molecular geneticists, 1 chemist, 2 biochemists, 3 molecular biologists, 14 technical support staff, 2 nurses, 1 genetics fellow, 11 university researchers and 27 administrative support staff shared by all units. Figure 2 shows the UP Manila organizational structure and Figure 3 shows the functional chart of IHG.

At present, the faculty of IHG come from the College of Medicine (CM) and the College of Arts and Sciences. The CM faculty are all from the Department of Pediatrics with 3 concurrently research faculty of the NIH.

Figure 1. Staff of the Institute of Human Genetics (Nov 2008).

Clinical Genetics. The Clinical Genetics Unit provides comprehensive clinical and laboratory diagnostic services to families and individuals with, or at risk for, an inherited disease. It offers information and genetic counseling to allow individuals the widest possible choice of options, within the resources available, when making decisions related to their genetic risk. Clinical genetics services are rendered at the Department of Pediatrics of the PGH, which is a 1500-bed tertiary government hospital serving as the University teaching hospital of the UP Manila Health Sciences campus. The out patient service (8 half-day clinics per month) receives referrals from the various departments of the PGH, hospitals from the 17 regions throughout the country, and physicians in private practice. Out of the 8 clinics, two are dedicated for patients with inborn errors of metabolism. The IHG facilitates overseas transmittal of specimens for cytogenetics, molecular and biochemical tests that are only

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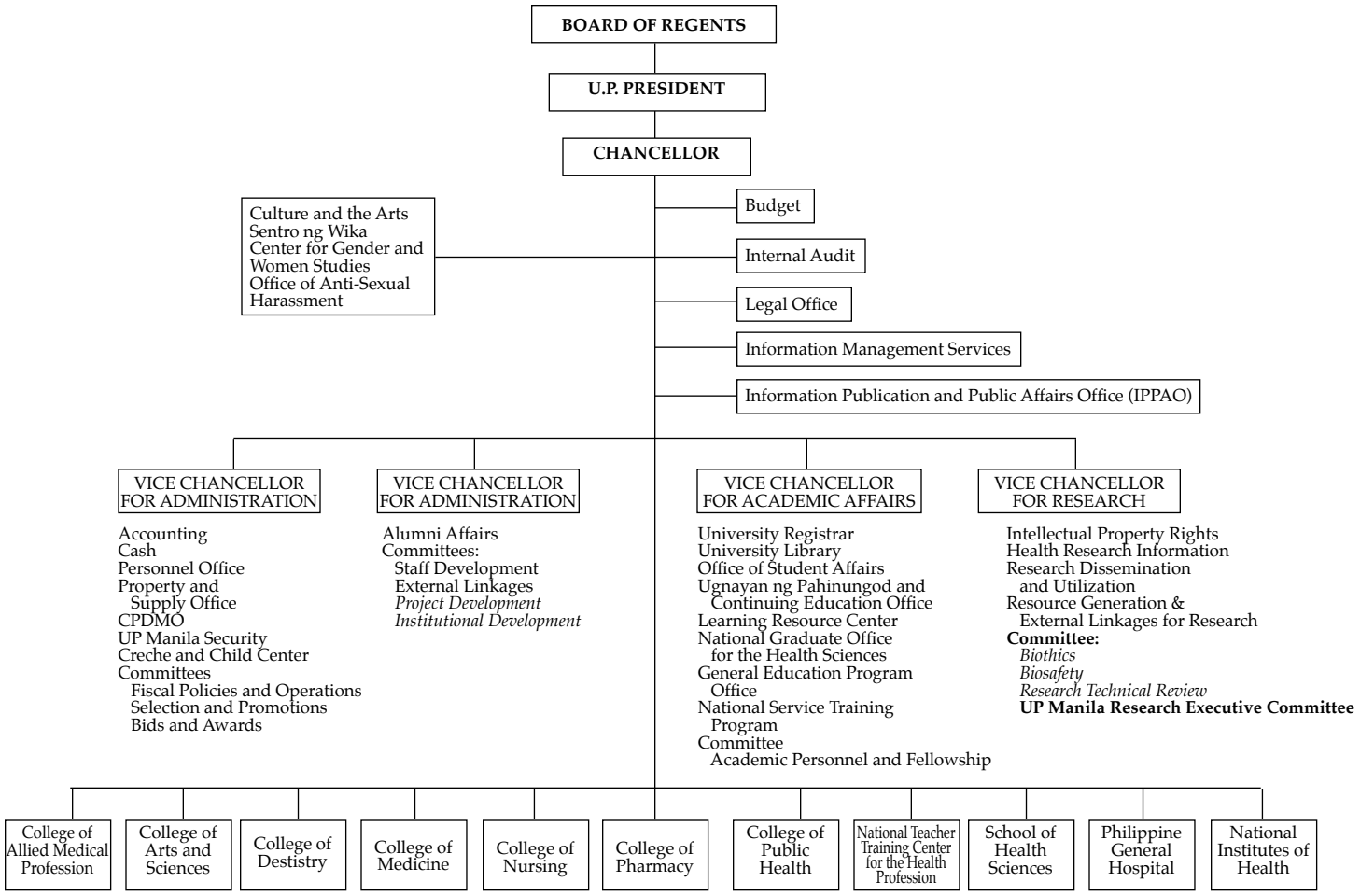

Figure 2. Organizational Chart of UP Manila Administration (Approved by the BOR during its May 30, 2003 meeting)

available in laboratories overseas. Since the establishment of the unit there is an increasing number of patients (inpatient, outpatient and prenatal) referred for consultation (Figure 4). Majority of referred patients are infants aged 0-1 month and the presence of dysmorphic features is the most common reason for referral. Prenatal diagnosis is practiced in a very limited way in the Philippines and was offered only in 2002.[3] To date it is the only unit in the Philippines offering enzyme replacement therapy for lysosomal disorders, i.e. Gaucher disease and Pompe disease.

Cytogenetics. The Cytogenetics Unit performs diagnostic procedures such as routine karyotyping of peripheral blood cells, solid tissues and bone marrow for patients with multiple birth defects, mental retardation, abnormal sexual development, for couples with infertility or multiple miscarriages, and for patients with malignancies and hematologic disorders. Figure 5 shows the annual total number of patients referred for cytogenetic analysis from 1991 to 2007. It also offers high-resolution banding and fluorescence in-situ hybridization analysis for testing for Angelman syndrome, Prader Willi syndrome, Di George/ Velo-cardio-facial syndrome (Microdeletion 22), chronic myelogenous leukemia (BCR-ABL for Philadelphia chromosome), breast cancer and William syndrome.

Newborn Screening. The Newborn Screening Unit houses the Newborn Screening Center (NSC-NIH) which administers both laboratory and non-laboratory services (follow up, case management, public relations, education, etc.). Thus, in addition to laboratory testing, the NSC advises health care providers about appropriate diagnostic and treatment follow-up for abnormal screening results, evaluates screening outcomes, and provides training and education to health professionals and the general public. The NSC-NIH serves more than a thousand health facilities in Luzon, while the Visayas NSC in Iloilo serves facilities in Visayas and Mindanao. Five conditions are presently included in the screening panel: congenital hypothyroidism (CH), congenital adrenal hyperplasia (CAH), phenylketonuria (PKU), galactosemia (Gal) and glucose-6-phosphate dehydrogenase (G6PD) deficiency. In 2004, the Newborn Screening Act of 2004 (Republic Act 9288) was signed into law creating an opportunity for every newborn to undergo

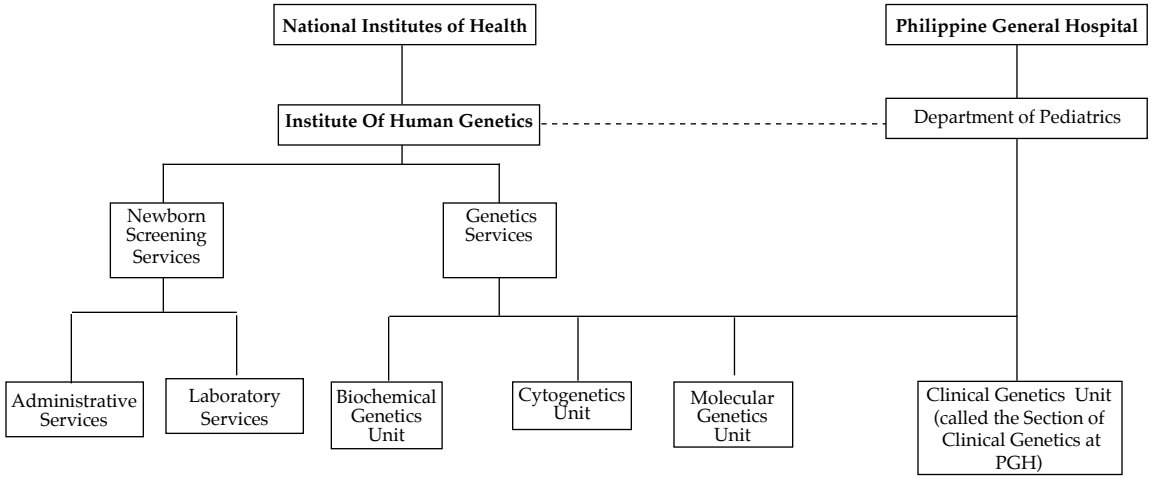

Figure 3. Functional Chart of the IHG

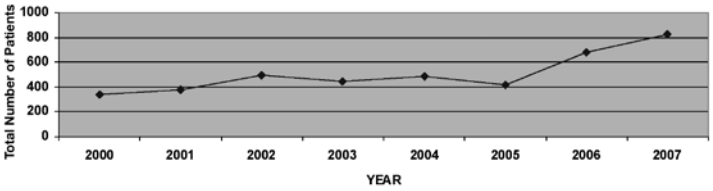

Figure 4. Total number of patients (inpatient, outpatient, prenatal) referred to the Clinical Genetics Unit from 2000-2007.

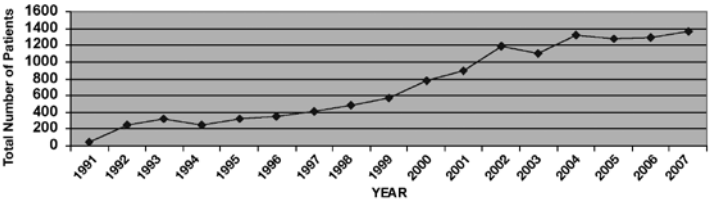

Figure 5. Number of patients referred for cytogenetic analysis from 1991-2007.

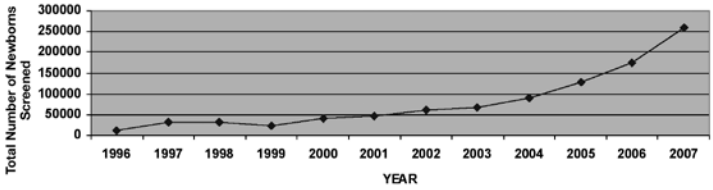

Figure 6. Number of newborns screened at the NSC-NIH from 1996-2007.

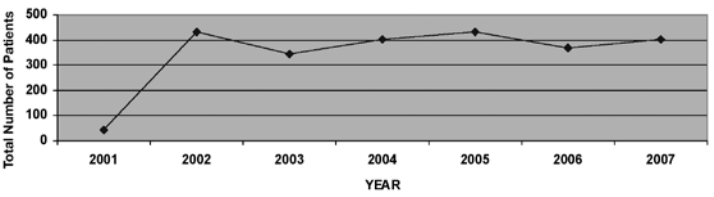

Figure 7. Number of patients referred for biochemical testing from 2001-2007.

newborn screening. The law provided the infrastructure for the implementation on a national scale, inclusion of newborn screening in the insurance benefit package of the newborn, provision for infrastructure building in all health regions, including personnel and training, and provision for sufficient laboratory facilities to ensure quality testing at low cost for families. Since the implementation of the law, the advocacy and policy component of newborn screening was transferred to the Newborn Screening Reference Center (NSRC), which is also housed at the NIH. Figure 6 shows the number of newborns referred to the NSC-NIH for screening from 1996-2007.

Molecular Genetics. The Molecular Genetics Unit provides a vital component to the University's research, educational and civic missions. It studies the genetic causes of childhood disorders going from the clinic to the DNA sequence. Interdisciplinary researches are done in collaboration with both local and international academic clinicians and scientists with specialist groups studying the genetics of monogenic and complex genetic conditions in the Filipino population. Using molecular genetic techniques, new diagnostic tools are applied for conditions seen in our clinics to understand how these genes cause disease. Since 2000, the following molecular projects were handled by the unit: alpha-1-antitrypsin, glucose-6-phosphate dehydrogenase deficiency (G6PD), congenital adrenal hyperplasia (CAH), achondroplasia, maple syrup urine disease (MSUD), Duchene Muscular Dystrophy/ Becker's Muscular Dystrophy (DMB/BMD), subacute sclerosing panencephalitis (SSPE), α- and β- thalassemia, Phenylketonuria (PKU), methyl malonic aciduria (MMA), diabetes (DM), hypertension, acute lymphocytic leukemia (ALL), cancer genetics (specifically oral, breast and colorectal cancers), and the PAN-SNP study.

Biochemical Genetics. The Biochemical Genetics Unit

offers expert diagnostic testing and provides physician-assisted consultative services to clinicians in order to promote adequate diagnosis and management of inherited metabolic disorders. The array of biochemical tests includes urine metabolic screen by high voltage electrophoresis, quantitative amino acid analysis by high performance liquid chromatography and organic acid analysis by gas chromatography-mass spectrometry. Figure 7 shows the number of patients referred for biochemical testing from 2001-2007.

Study Groups and Registries. The Institute is home to the following study groups: Philippine Cancer Genetics Study Group, the Philippine Oral Cleft Study Group and the Philippine Birth Defects Surveillance Group. The IHG supervises the conduct of the following registries – the Philippine Birth Defects Registry; the Philippine Oral Cleft Registry and the PGH Birth Defects Registry.

Training. Together with the Department of Pediatrics of the PGH, a two-year fellowship program in Clinical Genetics is offered. It is designed to provide broad clinical exposure to areas of clinical genetics, dysmorphology, biochemical genetics, cytogenetics, molecular genetics, and neonatal screening programs. Since the fellowship training has started, it already produced 3 geneticists now practicing in the different regions of the country (1 in Cebu, 1 in Davao, 1 in Manila). In response to the DOH goal of providing genetic services, the IHG together with the Department of Pediatrics, will offer a masters degree in genetic counseling starting schoolyear 2010-2011.

Advocacy Programs. In cooperation with the government agencies and other health organizations, the Institute participates actively in tri-media campaign for the better understanding of genetic disorders and the proper referral of patients with genetic conditions. The Institute also assists families in setting up family support groups for rare genetic conditions. The IHG participates in continuing education activities and medical missions of the Down Syndrome Association of the Philippines, Inc. (since 1994) and the Philippine Society of Orphan Disorders, Inc. (since 1996), the Maple Syrup Urine Disease (MSUD) Parent Support Group (since 2006) and the Cornelia de Lange Parent Support Group (since 2006).

National Issues. Demand for genetic services have increased throughout the Philippines. One major obstacle to improving genetic services lies in the provision of basic genetic healthcare services in every region. While it would be preferable to have at least one geneticist and one genetic counselor in each region, this is currently not possible. There are very few geneticists, with clinical practices available only in Manila, Cebu and Davao. In response to this critical lack of specialists, the Department of Health and the Newborn Screening Reference Center offer scholarships for fellowships in clinical genetics for pediatricians committed to practice clinical genetics in regions without services.

The IHG works very closely with the Department of Health and Department of Interior and Local Government in the implementation of the newborn screening program. As a result of the Newborn Screening Act of 2004 (Republic Act 9288), a new office was created – the Newborn Screening Reference Center (NSRC) as another institute of the National Institutes of Health. All policy oriented tasks of the newborn screening program were transferred from IHG to NSRC. NSRC provides technical assistance to the DOH-NIH network in seeking to attain the ultimate goal of screening Filipino newborns for common life-threatening heritable disorders. NSRC provides information and resources in the area of newborn screening to benefit health professionals, the public health community, consumers and government officials.[4]

International Cooperations. The IHG is recognized as one of the leading genetics centers in Asia. The Newborn Screening Unit receives foreign laboratory and program coordinators for short term (1 to 2 months) training, and the Clinical Genetics Unit accepts foreign physicians for short term observerships at the Philippine General Hospital. IHG faculty members also have key roles in the Asia Pacific Society of Human Genetics and the International Society for Neonatal Screening. The IHG, together with Asia Pacific Society of Human Genetics, will be organizing the following workshops for both local and regional participants in 2009-2010: bioinformatics; genetic epidemiology and statistical analysis for population studies; newborn screening; and, dysmorphology and metabolic workshops. The IHG also hosted the 2001 4th Regional Meeting of the International Society for Neonatal screening and the 2008 Asia Pacific Society of Human Genetics Conference and HUGO-Pacific Conference.

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