BIOCHEMICAL GENETIC DIAGNOSTIC SERVICES IN THE NETHERLANDS

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HISTORY

- The University Departments of Pediatrics had their own laboratories in the 1960's and developed chromatographic analyses.
- Well-known pioneers were Wadman (Utrecht) and Hommes (Groningen).
- They were actively supported by metabolic pediatricians such as Fernandes, Tegelaers, van Sprang, and Van Gelderen.
- Mass spectrometry in the metabolic lab was introduced in Utrecht as early as 1973.

POLITICAL DECISIONS

- In 1977 the National Health Council was asked to make recommendations for a nationwide service of clinical genetic activities.
- The NHC committee on this suject was headed by dr. Hans Galjaard, professor of Human Genetics at the Rotterdam Medical School.

Professor Galgaard (left) is trying to convince world political leaders of the importance of setting up diagnostic biochemical genetic laboratories

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- Genetic services were to be executed by so-called Foundations for Clinical Genetics which were fully independent of the University hospital which supplied the housing.

GENETIC SERVICES IN THE NETHERLANDS

COUNSELING		
BIOCHEMICAL GENETICS	BASIC SCREENING	ENZYME TESTS
CYTOGENET-ICS	POSTNATAL	PRENATAL
MOLECULAR GENETICS	KNOWN MUTATIONS	SEQUENCING

Diagnostic Genetic Services can be performed legally only after obtaining a license from the Ministry of Health.

Currently these licenses are given exclusively to the University Hospitals.

Regional hospitals have the possibility to perform genetic services only in affiliation with a University hospital (sub-contracts)

QUANTITATIVE ASPECTS

- Netherlands population 16.5 million
- Annual births approx 200000
- Estimated number of complex genetic screening is 8000/year (4%)
- Extended newborn screening started 2007

DIAGNOSTIC CAPACITY IN THE NETHERLANDS

- Eight university laboratories are active in this field. Staffing ranges from 5-6 to 100 people per lab, also driven by research efforts.
- Five regional hospital laboratories provide biochemical genetic services in close collaboration with a university hospital lab.
- Neonatal screening is carried out by five state laboratories, some of these being part of hospital endocrinology labs.

EXTENDED NEWBORN SCREENING

AA	OA	FAO	Misc.
PKU	IVA	VLCAD	Biotinidase
MSUD	GA1	LCHAD	Galact
Met	MCC	MCAD	CHT
(Tyr)	HCS	(Carn)	AGS
	HMG		(CF)

Available test for the basic biochemical screening of inborn errors of metabolism

	Test	U	P	CSF		Test	U	P	CSF
1	Amino acids	X	X	X	12	Polyols	X		
2	Organic acids	X			13	Sialotransferrins		X	
3	Acylcarnitines	X	X		14	Sterols		X	
4	Purines pyrimidines (orotic acid)	X			15	Anions (thiosulfate)	X		
5	Oligosaccharides	X			16	Creatine-guanidine-acetate	X	X	X
6	Mucopolysaccharides	X			17	Neurotransmitters	X		X
7	Sialic acid	X			18	Pterins	X		X
8	Homocysteine		X		19	Methyltetrahydrofolate			X
9	Very long-chain fatty acids		X		20	Polyunsaturated fatty acids*		X	
10	Phytanic / pristanic acid		X		21	Sulfatides	X		
11	Bile acids / alcohol				22	Plasmalogens*			

DEVELOPMENT OF TECHNIQUES

1960	AAA					
1970	AAA	GC	HPLC			
1980	AAA	GC	HPLC	GC/MS		
1990	AAA	GC	HPLC	GC/MS	stable isotop	
2000	AAA	GC	HPLC	GC/MS	stable isotop	tandem MS

Intermediates of metabolism which can be analyzed by HPLC-MS/MS

Acylcarnitines
Amino acids
Homocysteine
Purines
Pyrimidines
Acylglycines
(organic acids)
(oligosccharides)
Sterols
Ceramides
Guanidinoacetate
Creatine
Very long-chain fatty acids
Bile acids
Polyols
Phospholipids
Catecholamines
N-acetylneuraminic acid
Sialotransferrins
Hemoglobins
Cholesterol sulfate
Sugar phosphate
Plasmalogens
Bile alcohols

ANNUAL TESTS IN THE NETHERLANDS

	1973	2000	TREND
BASIC BIOCHEM	1500	7500	STABLE
ENZYMES	500	2500	STABLE
DNA	-	15000	GROWTH
CHROMOS	3000	14000	
COUNSEL	<1000	8000	

THE OFFICIAL PROCEDURE

- Screening request from MD (clinical information)
- Lab asks authorization from insurance company
- Clinical biochemist/geneticist decides on extent of screening tests
- Report with conclusions and advice to MD
- Bill is sent directly to insurance company

THE PRACTICAL PROCEDURE

- Screening request from MD (clinical information)

- Clinical biochemist/geneticist decides on extent of screening tests
- Report with conclusions and advice to MD
- Bill together with authorization request is sent directly to insurance company

FINANCIAL ASPECTS

- Until 1996 payment per analysis
- Now: lump sum financing
- Basic biochemistry 550 euros
- Enzyme testing 800 euros
- DNA 600 euros

- Every patient is entitled to have a full genetic work-up once in a lifetime

FINANCIAL ASPECTS (2)

- A second genetic investigation will only be possible when new clinical information arises.
- All other follow-up testing (confirmatory tests or treatment monitoring) will be billed through the regular hospital system and may be charged to the referring hospital (AAA, GC, 40 euros)
- Every lab is free in making its prices for requests from abroad.

TRAINING IN BIOCHEMICAL GENETICS

- Two tracks are available, i.e.
- Clinical Chemistry Society offers a two-year-course after the regular four-year training
- Human Genetics Society has a four-year-course for PhD's in biochemistry
- Both tracks will give access to a registry as
- Clinical Chemist IEM or
- Clinical Biochemical Geneticist

NVKC

Certificate Certificaat

The Registration Committee of the Netherlands Society for Clinical Chemistry and Laboratory Medicine herewith certifies that the registration under number 440 of

De Registratie Commissie van de Nederlandse Vereniging voor Klinische Chemie en Laboratoriumgeneeskunde verklaart dat de inschrijving in het Register van Erkend Klinisch Chemici onder nummer 440 van

Dr. M. Duran **Dr. M. Duran**

born February 22 1946 in Rotterdam
has been prolonged as of January 01 2006
Registration includes qualification as a Clinical Chemist specialised in the field of Inherited Metabolic Diseases
This certificate is valid until January 01 2011
The previous certificate has herewith expired.

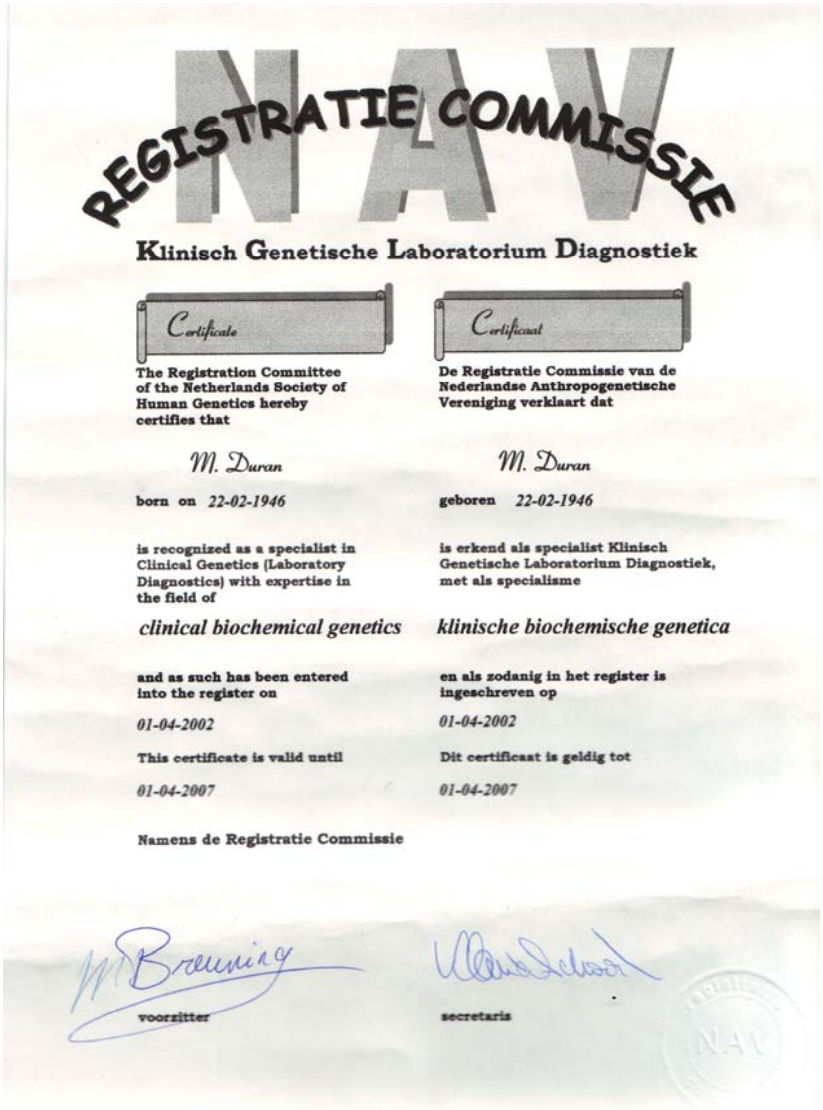
geboren op 22 februari 1946 te Rotterdam
met ingang van 01 januari 2006 is verlengd.
De inschrijving omvat tevens het aandachtsgebied Erfelijke Metabole Ziekten

Deze inschrijving is geldig tot 01 januari 2011
Hiermede is het voorgaande certificaat vervallen.

Utrecht, 26 januari 2006

President/Voorzitter *Secretary/Secretaris*

The registration lasts for five years and can only be re-issued after giving proof of continuing education



REGISTRATIE COMMISSIE

NAV

Klinisch Genetische Laboratorium Diagnostiek

Certificate

The Registration Committee of the Netherlands Society of Human Genetics hereby certifies that

M. Duran

born on 22-02-1946

is recognized as a specialist in Clinical Genetics (Laboratory Diagnostics) with expertise in the field of

clinical biochemical genetics

and as such has been entered into the register on

01-04-2002

This certificate is valid until

01-04-2007

Certificaat

De Registratie Commissie van de Nederlandse Anthropogenetische Vereniging verklaart dat

M. Duran

geboren 22-02-1946

is erkend als specialist Klinisch Genetische Laboratorium Diagnostiek, met als specialisme

klinische biochemische genetica

en als zodanig in het register is ingeschreven op

01-04-2002

Dit certificaat is geldig tot

01-04-2007

Namens de Registratie Commissie

voorzitter

secretaris

Training of specialists can only be obtained in certified labs which preferably have two registered specialists to act as teacher.

The teaching facilities of the Institute are scrutinized by two committees of the professional societies; teaching accreditation is given for five years.


Congres
STANFORD
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