

# Transfer of Knowledge in the early History of Paediatric Cardiology: Gerald R. Graham MD (London)

## Background

**Project of the German Society of Paediatric Cardiology (DGPK):**  
 Documentation of the European history of paediatric cardiology since 1950 interviewing its honorary members. The biographical interviews with Gerald Graham MD (\*1918), former Head of Department of Clin. Physiology and Measurement of Great Ormond Street Hospital for Children (GOSH) in London (UK) took place in October 2009 and 2011.



Gerald Graham at the AEPC-Conference, London (May 2013) photo: J. Meyer-Lenz

## Aim

**1. A pioneer contributes to the early history of paediatric cardiology (1950-1990)** in Germany and sheds some lights on the transfer of knowledge from USA – United Kingdom (UK) – Germany (especially W-Germany). Gerald Graham, born in Germany, emigrated to the USA in 1940 via London (1937-1940). He received his medical education and his training in physiology at the universities of Chicago (Illinois) and Cleveland (Ohio). His most eminent academic teachers were Louis Katz and Carl Wiggers, outstanding researchers in the field of physiology and cardiology. Since 1954, Gerald Graham, MD, has been living in London. Since that time he has contributed to the great success of paediatric cardiology of GOSH: it reached a prominent position in paediatric cardiology and open-heart surgery in the UK and in Europe by the 1970s.

**2. The role of Gerald Graham and GOSH in the development of paediatric cardiology in Europe, especially in Germany**

- From 1960 to 1983/4 Gerald Graham - and GOSH - played a significant role in the establishment of the field of paediatric cardiology (P. C.) in clinical medicine in European countries.
- Particularly P.C. in Germany was decisively influenced by the important incentives going out from GOSH and Gerald Graham. That way W-Germany P.C. was able to achieve the standards that apply throughout the USA and UK in the early 1950s.
- One of the most effective means of transfer of knowledge: to spend an exchange period in GOSH as "invited guest".
- Another factor who contributed to promote the new discipline: the newly founded professional associations of P.C at national (DGPK 1969/1974) and European level (AEPC 1963). They created platforms for the exchange of knowledge, for further training and effective networking.\*\*\*\*\*

## Method

Content Analyses of the Interviews and historical contextualisation

- Biographical Aspects
- Dynamics of development
- The impact on the development of P.C. in W-Germany

### I. Gerald R. Graham Biographical Sketch Germany – UK – United States

1918	Gerald Graham was born in 1918 in Berlin into a Jewish secular family
1937	Emigration to the UK (London)
1940	Emigration with his parents from London to the USA
1943/50	Studies of physiology and medicine. His teachers – outstanding researchers in both fields – are <b>Louis Katz</b> and <b>Carl Wiggers</b> (Michael-Reeve-Hospital / Un. of Chicago / Western Reserve University School of Medicine / Cleveland).
1950/51	Internship / MD / appointments in hospitals, medical schools in Chicago: cardiology / physiology.
1952/53	<b>Northwestern Un. Medical School Chicago (Appointment as Associate Professor)</b> In cooperation with paediatric cardiac surgeons he sets up a Heart-Station with a cath-lab; G. G. begins performing first cardiac catheterisations in children with congenital heart disorder (CHD); Because of his training as a physiologist he has a high degree of expert knowledge in the field of bypass technology (HLM / Gibbon / de Bakey / Kay-Cross) and hypothermia.
1950s	The 1950s were a time of radical transformation in the field of cardiac surgery <b>Open Heart-Surgery</b> (centres: Minneapolis – Cleveland et al.) enables long-term correction of CHD and takes over the leading role until the beginning of interventional catheterisation (e.g. 1966/67; Rashkind)
1940s	The <b>techniques of cardiac catheterisation</b> (radiology / angiography) are established in the USA. Pioneers: A. Courmand / D. Richards / <b>R. Bing</b> (in children - Johns Hopkins Hospital Baltimore) in P. C. ***

### II GOSH 1954-1970: The upswing of the „Cardiac Unit“ and the dynamics of transfer of knowledge

1954	Gerald Graham sets up the cath-lab and the modern possibilities in the field of diagnostics and post-operative care (cardiac catheterisation) and contributes to build up the <b>Thoracic Unit of GOSH</b> , assembling all specialists around the diagnostics and therapy of cardiovascular diseases in children. (Initiator(s) and manager(s): <b>Richard Bonham Carter / David Waterston</b> ). Together with the engineer Alan Knight he develops between 1960 and 1962 a correctly functioning <b>HLM</b> (de Bakey-pump, Kay-Cross-oxygenator, rotating discs, innovative module concept). <b>Open-Heart-Surgery at GOSH</b> becomes increasingly successful. Corrections of complex heart diseases in children of any age (e.g. Fallot, TGA) are possible.
1960s	Gerald Graham's activities are devoted to disseminate the level of knowledge and experience in Europe. Great importance was attached to (West)-Germany. He is a <b>co-founder of AEPC and DGPK</b> . The annual meetings are pivotal events, forum of discussion and exchange of knowledge at a national, European and Anglo-American level. The number of university paediatric clinics and centres in W-Germany increases; in 1989 there are about 26, in unified Germany about 33 in 2001.
1979	As a <b>member of the editorial board of „Pediatric Cardiology“</b> (1979) Gerald Graham contributes to further internationalization of research and communication of P. C. From 1962 to 1983 <b>not less than 16 young</b> – among them additional further leading German – <b>paediatric cardiologists</b> take part (as "invited guests") in a training at GOSH (Thoracic Unit / Cardiac Block: Department of Clinical Physiology)).

### 1. GOSH: Cardiac Surgery and Late Survival % 1955-1975 (extracts)\*

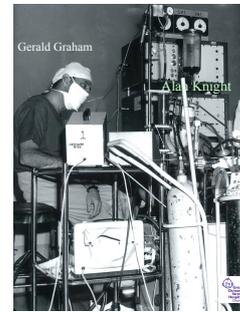
Category	n	5-year	10-year	15 year
<b>All patients</b>	599	76.4	67.0	59.6
Concordant TGA:				
<b>All Mustards</b>	73	81.2	-	-
Blalock Hanlon	41	59.5	48.6	36.4
<b>Coarctation of Aorta</b>				
<b>All patients</b>	123	84.3	84.3	84.3
<b>Tetralogy of Fallot</b>				
<b>All shunts</b>	79	73.7	59.0	56.1
VSD	74	80.7	70.6	70.6
Banding of PA				
Primary Closure	32	96.6	-	-

### 2. GOSH – Differentiation in Subunits: Cardiac Paediatric Surgery / Physiology / Cath-Lab \*\*

	Paediatric cardiac surgeons (Consultants)	Operationen (Bypass-Technology)	Dep. of Physiology (Dep. of (Cln.) Physiology (since 1960))	
1950-1960	D. J. Waterston	Closed-Heart; Hypothermic Blalock-Taussig-Shunt PDA / ASD VSD; Valvulotomy Waterston-Anastomose	Catherisation Fluoroscopy Angiography G. Graham	(since 1958) Development HLM G. Graham
1960-1970	D. Waterston E. Aberdeen (since 63/64)	Open-Heart- (HLM); Mustard TGA (palliative)	Diagnosics: Radiology-Angiography Interventions Rashkind (BAS since 1966/67)	Cardiac Technology (HLM) Funktional Diagnostics (Lung-Volume etc.)
1970-1980	D. Waterston Aberdeen / J. Stark	Fallot TGA (s.a)	Interventions:	s.a.
1980-1990	J. Stark / M de Leval M. Elliott V. Wong	Membran Oxygenators Fontan Left ventricular hypoplasia	Interventions J. Deanfield (since 1983/84)	since 1983/84: Echocardiography Sullivan / Phil Rees



GOSH Department of Physiology: Alan Knight (l) and Gerald Graham (r). HLM photo: Courtesy of Kate Bull



During Cardiac Surgery about 1966: Gerald Graham and Alan Knight controlling the HLM. photo: Courtesy of Gerald Graham



In the Cath-Lab / GOSH 1975 photo: Helmut Singer



L. Two generations of HLM: 1962 and 2013 GOSH Mai 2013 photo: J. Meyer-Lenz

### 3. Transfer of knowledge 1962–1980 GOSH–Germany: Fellowships/ Cooperation/ Visiting guests (incomplete)

Department of Physiology	Standards of equipments (HLM, Elema Scholander Cineangiography) Diagnostics (Cardiac Catheterisation; Functional Diagnostics); Interventional Radiology and Cardiology (since 1966/67; Rashkind; BAS)			
„Fellows“ from Germany 1964-1984	Fellows / Registrars from western an eastern Germany. Total group: not less than 16 (Gerald Graham-Interview October 2009)			
Who took part? Year leading cardiologists of German heart-centres / units	Peter Brode St. Augustin 1974	Achim Lunkenheimer Nürnberg 1972 (?)	Hans Keller Eberbach	Heinrich Netz München
	Ursula Sauer München 1970-72	Achim Schmaltz Tübingen / Essen 1973	Klaus G. Schmidt Düsseldorf	Peter Schneider Leipzig 1979
	Helmut Singer Erlangen 1974/75	Irene Warnecke Berlin / Mannheim 1974/75	Carlo Kalfelz Bonn / Hannover 1966/67	Surgeons: Helmut Oelert (Hannover / Mainz) Andreas Urban St. Augustin
Transfer: Technologies Knowledge	New technologies in cardiac catheterisation „Mayo-Loop“; improvements in diagnostics (TGA); introduction of new procedures in cardiac surgery (e.g. Mustard); Integration of intensive care			
Career	The stay served as a "springboard" for their academic career (Senior-Consultant and Full-Professor).			
„soft skills“	Training of new forms of communication; cooperation in teams, respect of each other; regardless the hierarchies („British“ special learning culture) <b>Internationalisation</b> ; of exchange and research			
Contacts	<b>Individual Comments of former Fellows</b>			
Achim Schmaltz 1973 Sept.-Nov.	„The war-round once a week, a great event. Each question was respected by the senior consultants: It's a good question! The intellectually stimulating discussions provided the greatest benefit possible.“ (Achim Schmaltz: Interview 08-21-2013). learning effects: Mayo-Loop; intensive care unit for children;			
Irene Warnecke Berlin (Charlottenburg) 1974 /75	„With Gerald Graham and the team of GOSH I started my Habilitation-Project in 1975. He opened doors. I am thankful for his advices at all stages of my experimental work.“ (Irene Warnecke - Interview 08-08-2013) The results of her experimental studies for Closure of PDA (1984/85) was seen as an outstanding performance.***** and *****			



The war-round at GOSH 1975 with R. Bonham Carter (center). Behind: D. Waterston, G. Graham, J. Stark photo: Helmut Singer

## Conclusion:

1) Gerald Graham – who got an excellent formation in physiology and cardiology in the USA in the 1940s has played an important role in the transfer of knowledge in the field of P.C. since the 1950s in the UK.

1) He was significantly involved in the developing of nascent paediatric cardiology on the continent, especially in Germany, promoting the next generation of excellently-trained paediatric cardiologists benefiting from the learning culture and the high standard of knowledge of GOSH.

1) Publication of the interviews is planned

References: \* F J Macartney, J F Taylor, G R Graham, M de Leval, J Stark, The fate of Survivors of cardiac surgery in infancy. Circulation 1980; 62:80; \*\* data based on Gerald Graham MS 2012; \*\*\* Allan B Weiss, Heart to Heart. The 20th-Century Battle against Cardiac Disease. devises.Rugers University Press 2002, 24,57;  
 \*\*\*\* Warnecke I, Frank J, Hübler R, Lemm W, Bächer ES. Pediatr Cardiol. 1984 Apr-Jun;5(2):79-8. Transvenous double balloon occlusion of the persistent ductus arteriosus: an experimental study. \*\*\*\*\* Warnecke I, Bächer ES. Ann Thorac Surg. 1985 May;39(5):441-4. The experimental production of a persistent ductus arteriosus for testing catheter closure devices. \*\*\*\*\* B Beckert, S Bühler, R Lindner, Verläufe u. Motive von „Seitenwechselern“: Intersektorale Mobilität als Form des Wissenstransfers zwischen Forschung und Anwendung. In: R. Mayntz et al. (Ed.), Wissensproduktion und Wissenstransfer. Bielefeld 2008.