

Martin Elliott, 37th Gresham Professor of Physic



1983 Toby Rickard-Elliott is born: film editor, lover of history and London, one of the good guys MARTIN, LESLEY AND BECAN ELLIOTT



Toby Rickard-Elliott 1983 -2009







The Heart; an Introduction

I treat congenital disorders of the heart and lungs

what could possibly be

elevant about this?



Through synergy with infectious diseases undernutrition

35% of child deaths



Deaths per 1,000 births





mortality of surgery for congenital heart disease

Mortality (%) **O**



0 1950 1970 1980 1960







the heart is special to people

"Man naturally has a great curiosity about the nature of his inside."

RK French (Wellcome Unit for the History of Medicine)1978









Gilgamesh, King of Uruk in Mesopotamia ≈ 2600BC



"I touched his heart, but it does not beat at all"

van Tellingen, C.Neth Heart J 2009;17:130-5





the heart

starts working within days of conception works ceaselessly beats 100k/day, 40m/year 3 billion in average lifespan supplies distribution network of 97,000 km of vessels and most of the time you don't notice it's there





the heart is special to people

soul emotion love strength

not just torm and function



the heart is special to people





16thC BC, Papyrus of Ani, The Book of the Dead described in Baig, MN et al Neurosurg Focus 23 (1):E3, 2007







the brain; not so special?



brain hooks









Xīn 心 Heart, mind

Heart, mind

disposition, feelings, sense of intention



various Sanskrit texts illustrate the importance of the heart in 'making moral judgements'

भागणेचायनमः॥ ७२म्॥ आग्नार्ग्रे दिने। पुरः रहितं। यज्ञस्य। देवं। आतिर्ज ॥होतरिंगरल्उधार्तमंग अग्निः प्रदेशिः कार्षि अनः उपः न्त्तिः उत्तगत्तः देवा न्राजा। रहा वसति । आग्निना एथिं। अन्तवत्र पार्षे एव । द्वि अद्व ग्रासं वीरपत्रनमंग अग्नेयंग्यू संग्ज्य युरंग विश्वतः परिग्म् भ आसिम सः रत्। देवेषु म छति।अमिनः। तिता। कविश्त्रेतुः। सत्यः। चित्रव्येवः २तमः॥देवः । देवे आ। गम् भिः। त्रा आयत्र जगाराष्ट्रपेन्तं अग्रि भइंग्यारिंगतकेरत्र तत्र समं आग रः॥उर्पत्वा अग्ते। द्वेअस्य। दीषां तरतः। भिया। वयंगनमः। भरतः। आगरमासा राजेते अखराणां गिर्णा का तस्य हादिवं भवर्थमानं स्व इमें भसः नः पिताः रिय स्तनवे, अमें मुख्यायनः भवा सर्वस्तानः स्तर्मे गर्भ गयार्गि आग्यारि

रवीतनगरमामांश अरं स्ताआतेषांभ्याक् खायगहर्ग भाषायार्ति उक्का मिः अरंते। त्यांभ्अष्ठभजग्रितारंः॥सुत्तःसीमाःभअत्ःभ्यदःभवदःभ वायार्गतभत्तर्भभ्रम्यन्ताःभना। जिमाति। साख्यमें अउक्तनां सामे पातये । रंद्रवाय्राति रमे खताः ॥ उपाप्रयः भा आभ्यतं॥इंदेवःभ्वांगउत्रांतिः कियायास्ति रंदरः ना चेनथः सुतानां गाजनीव सर्गिवांग्रनिधवस्ता तोग्आायातंग्डणे स्वत्य रा यायाइग्ले रंडः ज्यासुन्वः गआग्यातं उर्यातिः रकतं भस्तु रसाम्ध्या म्या म्या मित्र करे गुम्त रहेतं। वर्तणंग्चा भित्रार्दसंगध्ययंग्धतानां । सार्थता । अतनगमित्रावरुणे। अत्ताव चोर अत्मर्याग अनुं रहतं आ राषिरति भू वीर्ति नः भित्रावरणा नु विज्ञाती उरुक्षया रक्षं र्यातेरनि अपसंग ७ ॥ अभ्यता यज्ये १: र्यः

> 15-12thC BC, RigVeda described in Baig, MN et al Neurosurg Focus 23 (1):E3, 2007





Empedoctle's. Empedoctle's.

the heart is the most important organ in the body, and the seat of the soul

Empedocles 5thC BC





Philolaus 5thC BC

nous (mind) \approx brain psyche (soul) \approx heart $(growth) \approx umbilicus$



the heart is the seat of wisdom

the heart is mentioned over 420 times in the Bible



"Your true nature lies in the internal spirit....We call it the 'heart'...Not to the lump of flesh which is found in the left side of the chest; it has no special merit and is possessed also by beast, the dead and can be seen by the external eye....The true nature of the heart is not of this world...the external flesh is a vehicle, and all the limbs and organs of the body are its soldiers...the heart is the monarch of the entire body."

Al-Ghazzali A: Alchemy of Happiness. Crook JR, trans. Chicago: Great Books of the Islamic World, 2005, pp 13-14, pp 958



not soul, not spirit, not emotion

the heart is a pump

the centre of our circulation

'astonishment was replaced by reasoning and interfering'



van Tellingen, C.Neth Heart J 2009;17:130-5



http://wellcomelibrary.org/player/b16677948#?asi=0&ai=0





the heart of the matter

the *correct* circulation began to be understood around the time of **Thomas Gresham** in the 16thC



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1544-





Harvey 1578 - 1657





FRANCOFFRETT Sumptibus GVILIELMI FITZERL ANNO M. DC. IXFIIL

flow, valves & pulse







my predecessors did not always get it right



1597

Matthew 6winne



1607

Peter Mounsell



1615

1620

Thomas Winston in 1620, Matthew Gwinne became commissioner for tobacco; *'unscrupulous Government officials* controlling the licensed traffic in tobacco'





Sumptibus GVILIELMI FITZERI.

1628

"Thomas Winston made no original discoveries, and showed no acquaintance with Harvey's work on the circulation" Virginia Company of London

> ¥ 1606-1624

Wesley Frank Craven



the miracle of life

www.pregnancychat.com



superior vena cava

inferior vena cava

right atrium 3-7 mmHg

right ventricle 25/0-4 mmHg

pulmonary artery





how does this amazing organ develop?



andrew cook



matt king

jacob read

and a state of the state of the

knowing your left from your right



the primitive node

Vogan & Tabin Nature 1999


The Scale of Things



40w 20w 14w

Change in size

Sequential Segmental Analysis



- Analyse the heart in 3 segments
- Limited number of patterns within each segment
- Limited number of ways segments can connect
- Any number of associated lesions









Analysis/Description of Congenital Heart Disease



Richard and Stella van Praagh



American system





International **Paediatric &** Congenital Cardiac Code www.IPCCC.net





Bob Anderson

Anton Becker + others



European system





Thousands of Diagnoses, Thousands of Terms

1

there is so much to put right





















what can go wrong

superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle

abnormal or persistent communications





atrial septal defect ASD





atrial septal defect ASD







atrial septal defect ASD







Ultrasonography



Dr Carl Helmuth Hertz, 1953 working with Dr Inger Edler



cardiac echocardiography, 1965

























atrial septal defect ASD











atrial septal defect ASD





abnormal or persistent communications



R

ventricular septal defect (VSD)











superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle

superior vena cava

right atrium

inferior vena cava

univentricular heart absent right ventricle

pulmonary artery













small (hypoplastic) right ventricle

6





superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle

superior vena cava

right atrium

inferior vena cava

pulmonary artery



left atrium

univentricular heart absent left ventricle

superior vena cava

right atrium

inferior vena cava

pulmonary artery



left atrium

hypoplastic left heart syndrome (HLHS)







Cincinnati Children's

small (hypoplastic) left ventricle

superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle

superior vena cava

right atrium

inferior vena cava



pulmonary artery

pulmonary veins

anomalous pulmonary vein connection (partial)





superior vena cava

inferior vena cava

pulmonary artery pulmonary veins

anomalous pulmonary vein connection (total)



superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle



transposition of the great arteries (TGA)

pulmonary veins

left atrium

left ventricle

pulmonary artery



we all perceive things differently

cardiologist and surgeon see different anatomy



pre-op echo



intra-op morphology

3-D has helped, and will help more

















the ability to correct the many things that can go wrong parallels the length of my life

surgery for congenital heart disease

let Gresham history = 12 hours

just one and a half hours of Gresham time



Wednesday 19th November 2014

Heart Surgery for Congenital Heart Defects - Science or Art?





the HEART of the matter





rolling credits to come



The Heart of the Matter

an introduction to the series

- why congenital heart disease?
- how the heart develops
- what can go wrong with it
- how diagnosis has changed


the heart is special to humans

The living body is warm, it breathes and it moves with an innate motion and in reaction to structural changes. Thus *life* must be hot, mobile, associated with breath. It was natural to try and identify a locus for this in the living body.







the heart is special the heart is complex the heart can be malformed malformations affect physiology we can now make accurate diagnoses.

Anno-domini 1519-1579



Global Causes of Child Deaths, 2010

Ot

Through synergy with infectious diseases undernutrition causes 35% of child deaths

14%







the heart is special the heart is complex the heart can be malforned malformations affect physiology we can now make very accurate diagnoses





the heart of the matter Martin Elliott

Gresham Professor of Physic Professor of Cardiothoracic Surgery at UCL co-Medical Director at The Great Ormond Street Hospital for Children Consultant Cardiothoracic Surgeon at The Great Ormond Street Hospital for Children



the heart of the matter



the heart: an introduction

Moind's Fourth Postulate

The degree of certainty in one's level of competence is inversely proportional to the actual level.

missing or small components

superior vena cava

right

inferior vena cava



pulmonary artery

abnormal connections

superior vena cava

right atrium

inferior vena cava



pulmonary artery



left atrium

left ventricle

aorta

abnormal connections



right atrium

right ventricle

pulmonary artery



inferior vena cava

aorta