Interview with David Gow (GD1/150/1)

Summary:

David Gow began to work at the Bioengineering Centre at the Princess Margaret Rose Hospital (PMR) as a Research Associate in 1981, and became a licensed bioengineer for the Lothian Health Board in 1984. He is best known for inventing the Edinburgh Modular Arm System (EMAS), the world's first myoelectrically controlled arm with a powered shoulder, elbow, wrist and fingers in 1998; and inventing the i-Limb, the first ever artificial hand with independently powered digits, in 2007. He stepped down as Director from Touch Bionics in 2009 and retired from his role as Director of the Southeastern Mobility and Rehabilitation Technology (SMART) Centre at Astley Ainslie Hospital in 2015.

David Gow talks about the trajectory of his career and the projects which he either led or in which he was involved. He discusses the history of bioengineering in Edinburgh, including the work of Professor David Simpson, and occupational therapist Helen Scott. In particular, David talks about his work to develop the Edinburgh Modular Arm System (EMAS) and the i-Limb.

This interview was conducted by Louise Williams (LW), LHSA Archivist.

Detailed timings:

0:14 – DG introduces himself. Briefly discusses his early life and how he came to work at the Bioengineering Centre at the Princess Margaret Rose Hospital (PMR). Mentions that he became Director of Rehabilitation Engineering Services (RES), the Bioengineering Centre, and later Southeastern Mobility and Rehabilitation Technology (SMART).

2:40 – DG describes his time studying Mechanical Engineering at the University of Edinburgh (UoE).

3:31 – DG discusses when he first became interested in bioengineering.

4:20 – DG talks about why he decided not to pursue medicine.

4:53 – DG describes what the environment at the Bioengineering Centre was like when he first began his career. Explains how the prostheses in Edinburgh were provided, and mentions that few patients at the time had powered prostheses.

6:16 – DG describes the trial of the Swedish Hand which took place in the artificial limb centres of Edinburgh, Manchester and Oxford. DG states that this encouraged him to work in arm prostheses because he seen the Swedish Hand on the TV programme "Tomorrow's World" which featured an interview with Dr Sorbye, the inventor of the hand.

7:13 – DG discusses the results of the Swedish Hand trials and explains how the hand operated. Mentions that the Swedish Hand trials only took place because of parents lobbying for the prosthesis to come to the UK.

8:51 – DG outlines how the gripping point in the Swedish Hand worked.

9:31 – DG discusses the level of child patients that the PMR had. Outlines the story of patients who were going to be fitted but was found to be unsuitable.

10:34 – DG explains the medical contribution made by Professor David Simpson (DS) and the trip that he took to Germany to discuss constructing prostheses for children who had been affected by thalidomide.

13:03 – DG discusses international connections with prostheses industries in countries like Canada and Sweden, saying that they were very important in bioengineering work. Explains why DS made gas powered prostheses instead of myoelectric prostheses. Also discusses DS' role in providing prostheses for children.

14:55 – DG explains what extended physiological proprioception (EPP) is, and how DS used this concept that he created to improve the way that he constructed prostheses.

16:23 – DG mentions that DS predominantly provided prostheses to young children.

18:02 – DG describes how DS' artificial arms went from three functions to five functions after his child patients grew older.[1]

18:56 – DG discusses if DS' gas powered prostheses would be heavy. Also talks about how heavy his developments in electrically powered prostheses were.

19:57 – DG explains how the gas cylinders in the gas powered prostheses would be changed and how often they had to be replaced.

22:43 – DG talks about whether staff members at the Bioengineering Centre worked with the child patients.

23:40 – DG discusses the patient experience when at the Self Care Unit[2] of the Bioengineering Centre.

25:05 –LW and DG discuss the involvement of Occupational Therapists in the Bioengineering Centre, particularly Helen Scott (HS).[3] DG describes how HS taught the children to do daily activities both with and without a prosthesis.

26:55 – DG states that he did not work with DS because he had already left the Bioengineering Centre before he started to work there. Talks about the period when the Bioengineering Centre had no Director until Hamish Law (HL) was appointed.

28:29 – DG discusses how the direction of the Bioengineering Centre was often uncertain due to budget cuts. Mentions how DG began working there after HL received a research grant from the Scottish Home and Health Department (SHHD). Discusses HL's role within UoE.

29:22 – DG describes the working environment he had when he first started working at the Bioengineering Centre.

30:49 – DG discusses the artificial hand project that he worked on when he first started working at the Bioengineering Centre. Explains how the project he was working on was unsuccessful.

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[1] The prostheses with three functions had elbow flexion, wrist rotation, and control of a hand/hook. The prostheses with five functions had the same 3 functions along with shoulder elevation and shoulder rotation.
[2] The Self Care Unit was built at the Princess Margaret Rose Hospital in 1966. It was designed to be accommodation for children with upper limb deficiencies to stay with their mothers while they undertook intensive training to learn how to use their prosthesis.
[3] LHSA holds many of Helen Scott's patient albums (confidential patient data throughout).

34:57 – DG talks about patients being fitted with prostheses.

35:29 – DG explains the work of prosthetists in Scotland.

37:11 - Mentions that the NHS would contract prothetists out to Steepers or Kellies, the private companies involved in prostheses manufacture. Mentions the monopoly that these companies had over the market until the Bioengineering Centre began to work with other European companies after Kellies went out of business.

38:45 – DG outlines how prothetists in Scotland shifted from solely private companies to solely working for the NHS. Mentions that prosthetists still work for private companies in England.

41:21 – DG discusses the influence that Strathclyde University had on the prosthetics industry.[4]

43:21 – DG explains that the private prostheses companies make everything about a prosthesis, such as motors and cosmetic covering. Explains that this is difficult for patients as they may not be receiving the best device for their needs.

44:53 – DG points out the irony that he wanted to make a prosthesis for the NHS which was inexpensive and unaffiliated with a private company, yet he created the i-Limb as part of Touch Bionics.

45:13 – DG discusses how he was involved with private companies from the beginning of this career. Mentions that private companies conducted their own prosthesis research privately.

47:00 – DG describes his involvement working with charities, particularly REACH, a children's charity for those with upper limb deficiencies. Mentions that there were also private donations from individuals. These parties often donated money to a specific project.

48:58 – DG discusses how there was a lack of prostheses facilities available for children. Expresses a desire to fit child patients with partial hands and a powered knuckle. Describes trying to move the prosthesis componentry so that artificial limbs could be scaled down and used for children.

50:31 – DG talks about not being able to pursue his research post at the Bioengineering Centre because his PhD research was unsuccessful and HL had left his post. DG instead received other grants to continue working there until he became an official Bioengineer in 1984.

52:17 – DG describes his experience working at the SMART Centre. States that it was a challenging environment to work in because he was managing healthcare professionals out with the bioengineering field. Briefly mentions that he has visited hospitals in other countries.

53:54 – DG discusses how the Bioengineering Centre was the last department to still operate at the Princess Margaret Rose Hospital until it closed in 2002. Describes reluctantly moving to the Eastern General Hospital (EG) shortly after this. Talks about how the location at EG was only temporary, making it challenging to decide a layout for the new premises. States that it then closed in 2007 and Bioengineering Service was moved to SMART at the Astley Ainslie Hospital (AA).

[4] This is due to the fact that The University of Strathclyde has the only Prosthetics and Orthotics course in Scotland.

57:36 – LW mentions that at the time of interview, there was an exhibition at UoE Main Library about the 70th Anniversary of the NHS which displayed information relating to a "bionic arm". [5] Mentions the publicity surrounding the arm when it was fitted to Campbell Aird (CA).

59:40 – DG discusses how the Royal Infirmary of Edinburgh (RIE) managed the Bioengineering Centre and decided to shut down the PMR. Decision to keep developing projects despite uncertainty about the Centre's position in the NHS. DG mentions that in 1993, he had developed the PRODIGITS device which he then patented.

1:01:56 – DG talks about when CA first came to the Bioengineering Centre. Discusses the team of staff involved in constructing the EMAS.

1:03:19 – DG explains how his electrical arm system worked. Mentions that he was inspired by gas powered prostheses. Talks about how he also made two gas-powered arm prostheses which he fitted to a patient that had been affected by thalidomide.

1:04:36 – DG describes the difficulties in fitting arm prostheses to patients like CA that are missing one arm, not two. Discusses the first time that CA was fitted with an electrical arm in 1993.

1:05:22 – DG discusses that the Bioengineering Centre ran out of funding to continue developing the electrical arm project. Talks about his decision to create the EMAS in 12 weeks, and the subsequent press conference where CA was fitted with the EMAS in 1998.

1:07:05 – DG describes the media attention surrounding CA and the EMAS. Mentions that this publicity motivated funding for the EMAS to be patented.

1:07:53 – DG discusses the progression from the EMAS to the i-Limb hand.

1:08:28 – DG talks about how the grip of the artificial hand on the EMAS was different to other prostheses on the market because it had a rotating thumb.

1:09:43 – DG talks about whether the rotating thumb was his invention.

1:11:23 – DG describes how the EMAS impacted CA's life and how often he wore it.

1:12:38 – DG discusses the importance of CA's device having a shoulder.

1:13:48 – DG discusses CA's experience engaging with the media.

1:14:25 – LW and DG mention CA's career as an hotelier in Moffat, Scotland. DG discusses that CA lived in Glasgow when he first visited the Bioengineering Centre and wore his first arm for two years. Describes how a newspaper contacted him after CA informed them about the bionic arm project at the PMR, motivating him to say that it would be constructed in 12 weeks.

1:16:53 – DG explains what the term "bionic" means and discusses its use in the media.

1:17:30 – DG describes his own experience interacting with the press.

1:18:13 – DG mentions that he archived some of his own video material.

1:18:50 – DG states that many people are interested in the EMAS and the i-Limb hand because they are controlled by the human body.

[5] This is the Edinburgh Modular Arm System (EMAS).

1:19:48 – DG discusses how he continued to work in the NHS even after forming Touch Bionics and describes how Touch EMAS was initially formed and funded.[6] Mentions that he stepped down as Director of Touch Bionics in 2009.

1:22:03 – DG states that he believes that most of his goals were met because of founding Touch Bionics. Mentions that it is now owned by another company.[7]

1:22:29 – DG mentions his process in making the first electrical prosthesis project that he worked on.

1:23:54 – DG discusses the Bioengineering Centre's involvement in developing silicone cosmetic coverings. Outlines the process for making these coverings.

1:25:34 – DG mentions his collaboration making an electrically powered hand with REACH. Talks about how he was inspired to incorporate a worm and wheel mechanism into his prosthesis after riding his wife's exercise bike, which he then used to create his PRODIGITS device. Explains that this then helped to create the i-Limb hand.

1:29:58 - DG explains how the fingers in the i-Limb hand are operated. Discusses how he made the i-Limb hand compatible with electrodes from other prostheses companies to make it available internationally. Explains why the i-Limb hand was the first product in Touch Bionics to go to market.

1:31:31 – DG discusses how Touch Bionics constructed their prostheses designs before they had facilities. Explains why the company chose to have their premises in Livingston. Estimates how many employees were working at Touch Bionics at the time of interview.

1:33:55 – DG talks about how some patients choose not to wear cosmetic gloves on their prosthesis, giving them a "bionic" appearance.

1:34:42 – DG describes the demand for the i-Limb hand on the NHS. Mentions the fact that Touch Bionics received press attention and awards for their product.

1:36:22 – LW and DG discuss the i-Limb hand being the first of its kind. DG describes how many patients fitted with the i-Limb hand stressed importance on having fingers.

1:37:16 - DG discusses how patients fitted with the i-Limb hand shake hands with others, a practice not normally done by prosthesis users. LW and DG discuss how people may not consider how those wearing prostheses may engage in interaction in this way.

1:38:37 – DG describes how some prosthesis users use the i-Limb hand as a tool. Talks about how patients have thanked him for the impact the i-Limb has on their lives.

1:39:34 – DG discusses how products take much longer to be available on the NHS than through a private company. States that at the time of interview, the i-Limb was available through NHS Scotland but not NHS England, and used more widely in the United States of America (USA).

1:40:34 – DG talks about his interactions with patients, mentioning that some patients that he worked with at the start of his career have since been fitted with the i-Limb hand.

[6] TouchEMAS was the name of David Gow's company when he created it in 2002. It was rebranded to Touch Bionics in 2003.

[7] Since 2016, Touch Bionics is owned by Icelandic company Ossur.

1:42:24 – LW and DG talk about how patients sometimes use different prostheses for different purposes. DG explains that this is particularly common in sportspeople and models who use prostheses.

1:44:44 – DG discusses the psychological affect that a cosmetic prosthesis can have. Mentions a time where he met a patient who wanted an amputation so that they could have a full cosmetic arm to look more realistic.

1:45:43 – DG describes how involved he is with Touch Bionics.

1:46:13 – DG discusses when he retired from the NHS in 2015. Mentions that he was awarded a CBE in June 2014. States that he returned back to Touch Bionics very briefly to sell the company.

1:47:38 – DG talks about how he desires to preserve the history of the EMAS and the i-Limb.

1:48:22 – DG discusses what he hopes for the future of the bioengineering industry. Mentions that war is often the root cause for advancements in prostheses. Desires bioengineering to be a subject of academic debate.

1:50:48 – DG describes his involvement working with ex-military amputees during his time at the SMART Centre at Astley Ainslie.

1:51:49 – DG states that the i-Limb hand would not exist if not for trials of the hand conducted at American military hospitals.

1:52:19 – DG describes how British military amputees are supported.

Duration (h:mm:ss): 1:53:51

Format: .WAV file

Date of interview: 14/06/2018

Date span of content: 1963-2018

Known links to other records: