FULL LUKE ARM PROSTHETIC

FOLLOWING A HIGH TRANSHUMERAL AMPUTATION

A Case Study

Client:
LC

Accident:
09 March 2014

Injury:

Left arm trapped in conveyor and surgically amputated at the scene.

- LC was working as an operative at S, a recycling plant in Bootle, Merseyside on a part-time basis whilst seeking employment as a bricklayer.

- It was his first job following college.

- Part of his job involved cleaning the conveyor and the premises generally.

- He was following the example of more established colleagues.

- He was wiping the side of the conveyor casing with his left hand when a finger tip of the too large elasticated gloves with which he was supplied caught an in-running nip which was unguarded.

- His arm was pulled into the conveyor up to the shoulder.

- LC was trapped for some 3 hours until a decision was made by the emergency medical team from Aintree Hospital to amputate on site.

- LC was then flown by helicopter to hospital.

- The arm was retrieved but was badly de-gloved around the elbow and it was not possible to re-attach it.

- S went into liquidation shortly after the accident.
- S's employers' liability insurers – Gable Insurance AG – are now also in liquidation.

- Gable denied liability suggesting that LC had removed the guard himself and deliberately placed his hand inside the conveyor mechanism!

- Proceedings were issued. Upon service, Gable sought to avoid the policy on the grounds of material non-disclosure by S.

- Gable refused to fund any rehabilitation under the Rehabilitation Code.

- Upon further investigation, it transpired that LC was working at the recycling plant as an agency worker. He was introduced by that agency to umbrella company A.

- LC had thus not been employed by S but by Company A.

- His employment had been transferred to a linked umbrella company some 3 weeks prior to the accident.

- That company, R, was then brought into the proceedings as a Third Defendant.

- Gable AG was admitted to the proceedings as a Second Defendant.

- R adopted Gable's defence.

- Further R went on to say that as it had no control over the premises or the work done there, it owed no duty of care to LC to provide him with a safe place and safe system of work.

- R too refused to apply the Rehabilitation Code. Thus between the accident date in March 2016 and the receipt of the first interim payment in October 2016, LC had no rehabilitation.

- LC thus had no choice but to proceed to trial on liability only.

- The trial took 5 days in September 2016 and judgment was given on 30 September 2016 as against the First and Third Defendants on a joint and several basis.

- R was found to owe a personal duty of care to LC as his employer. Thus when that duty was delegated to and breached by S, R remained in law liable for that breach of duty.

- As between the Defendants, the First Defendant was to meet 75% of the damages and the Third Defendant was to meet 25% of the damages.

- Whilst LC won, the trial judge found that he was 10% to blame.

- That finding was based upon LC's concession under cross examination at trial when he had acknowledged, according to the trial judge:

"*albeit with the application of hindsight and common sense the risk arising from moving his hand close to the machinery*".

- LC appealed that finding of contributory negligence.

- The Court of Appeal reversed the finding of contributory negligence on 1 December 2017.

- Thus LC has judgment for 100% of damages.

- An initial interim payment of £250,000 was ordered on 30 September 2016 and paid by R, as was a payment on account of costs at £240,000.

- That payment allowed sufficient funds to begin a programme of care and case management.

- A request for a further interim payment of £750K was made in December 2016.

- This was to purchase suitable accommodation and prosthetics.

- R in a one line e-mail stated that any further interim payment application would take at least half a day of Court time and refused to make any further interim payment.

- Following a contested hearing on 24 March 2017, the Court ordered a further payment of £645K.

- R has made 2 further interim payments totalling £550K voluntarily.

- LC has moved to a rented bungalow and has purchased a second bungalow which is in the throes of adaptation which is due to be completed next month.

- In the second half of 2017, LC has learned to drive and has acquired an adapted vehicle.

- Initially in March 2017 it was envisaged that LC would have osseointegration.

- That was to have been under the care of A/Professor Al Muderis.

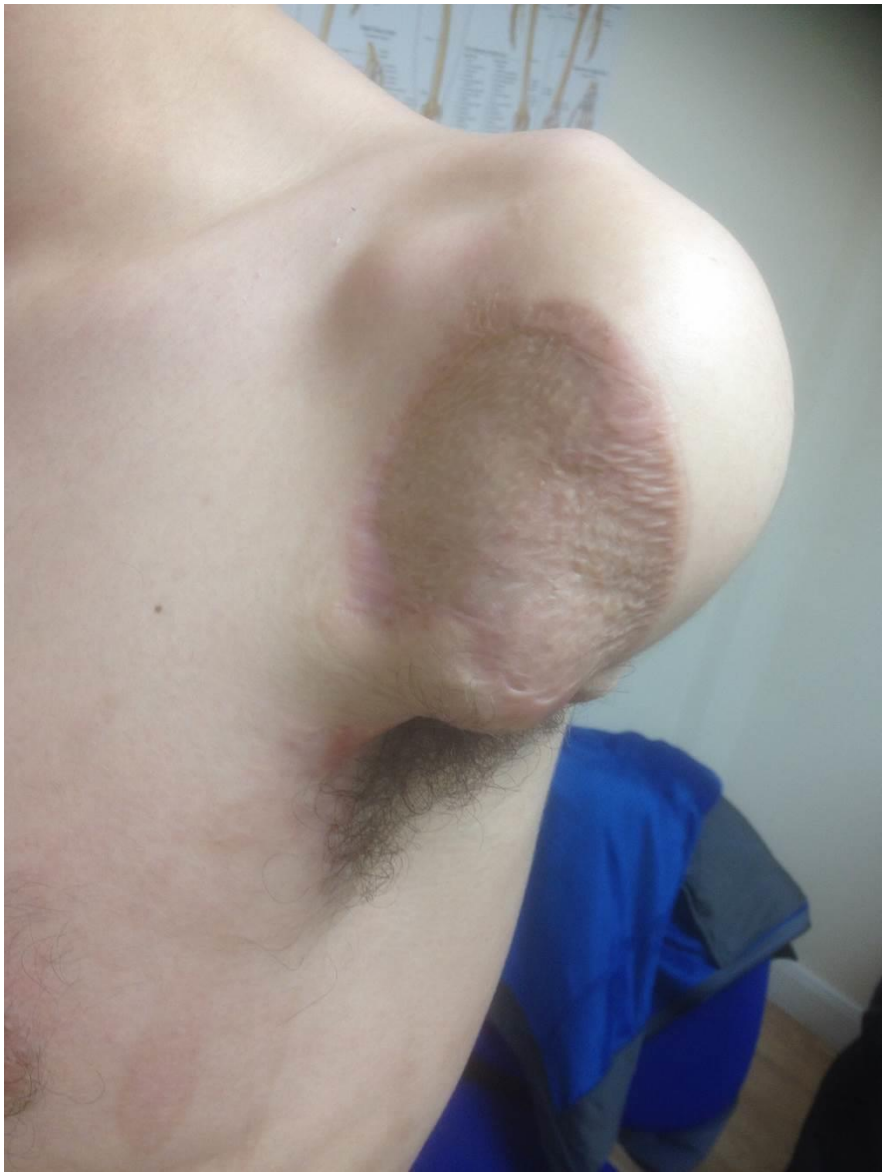
- LC and I had attended a conference with 3 of the 4 surgeons worldwide then conducting such surgery.

- This was in London in March 2017.
- Osseointegration was to have been combined with targeted muscle reinnervation…

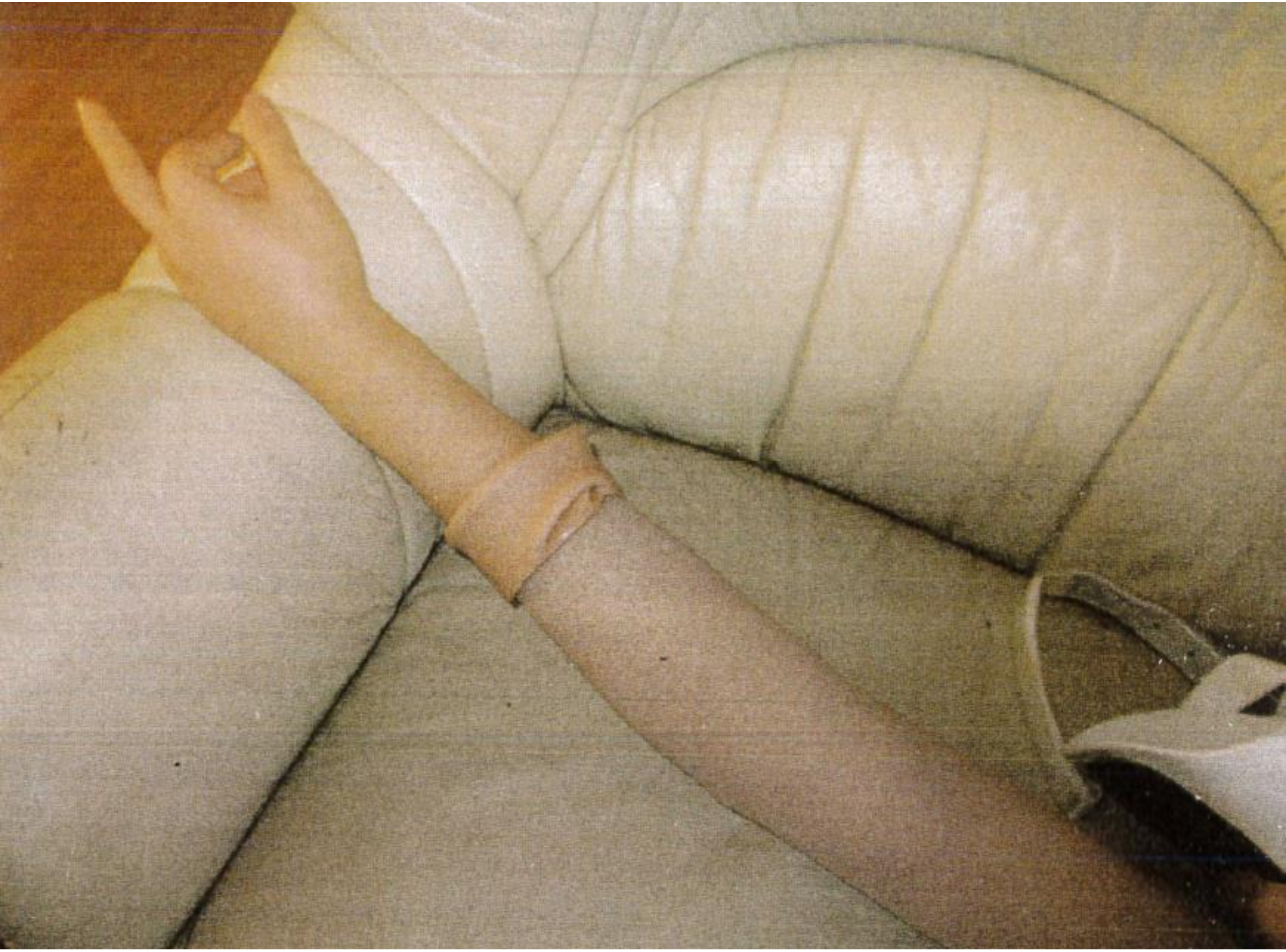
- … with a view to attaching and controlling a myo-electric prosthetic.

- The plan was to use a dynamic arm (elbow) and an i-Limb Ultra Revolution Hand.

- The next slide shows just how high the trans-humeral amputation was …



- As you can see from the next slide, LC wasn't terribly keen on the NHS supplied prosthetic …




Grandad

- However, in June 2017, we learned that the **LUKE** arm was now being offered on a commercial basis.

- **LUKE** is an acronym for **L**ife **U**nder **K**inetic **E**volution.

- The LUKE arm (with shoulder) has 10 powered joints.

- The LUKE arm offered LC superior functionality to any other upper limb prosthetic on the market.

- That functionality was immediate and avoided the need for surgery and extensive training and LC, who had been aware of the device, thus chose to pursue a LUKE arm.

- The LUKE arm was developed by DEKA Research & Development Corporation as part of the Defense Advanced Research Projects Agency's (DARPA) Revolutionizing Prosthetics program.

- It had additional funding from the United States Army Medical Research and Material Command through a contract with the Army Research Office.

- It is manufactured on behalf of Mobius Bionics. Due to the United States Food and Drug Administration [FDA] which licenses medical devices in the USA, the device can only be supplied by a registered prosthetist.

- Currently the device is FDA approved but not CE approved for export to Europe, so any purchase must be made in the USA.

- The LUKE can only be obtained from Next Step Bionics & Prosthetics in Manchester, New Hampshire.

- The LUKE arm must then be personally imported into the UK by the end user.

- LC went to the USA to trial the arm for a 3 day period in August 2017 and again in March 2018 to train with the LUKE arm for 2 weeks and to purchase one to bring back to the UK.

- The LUKE arm allows for:
  - Shoulder abduction and adduction;
  - Shoulder flexion and extension;

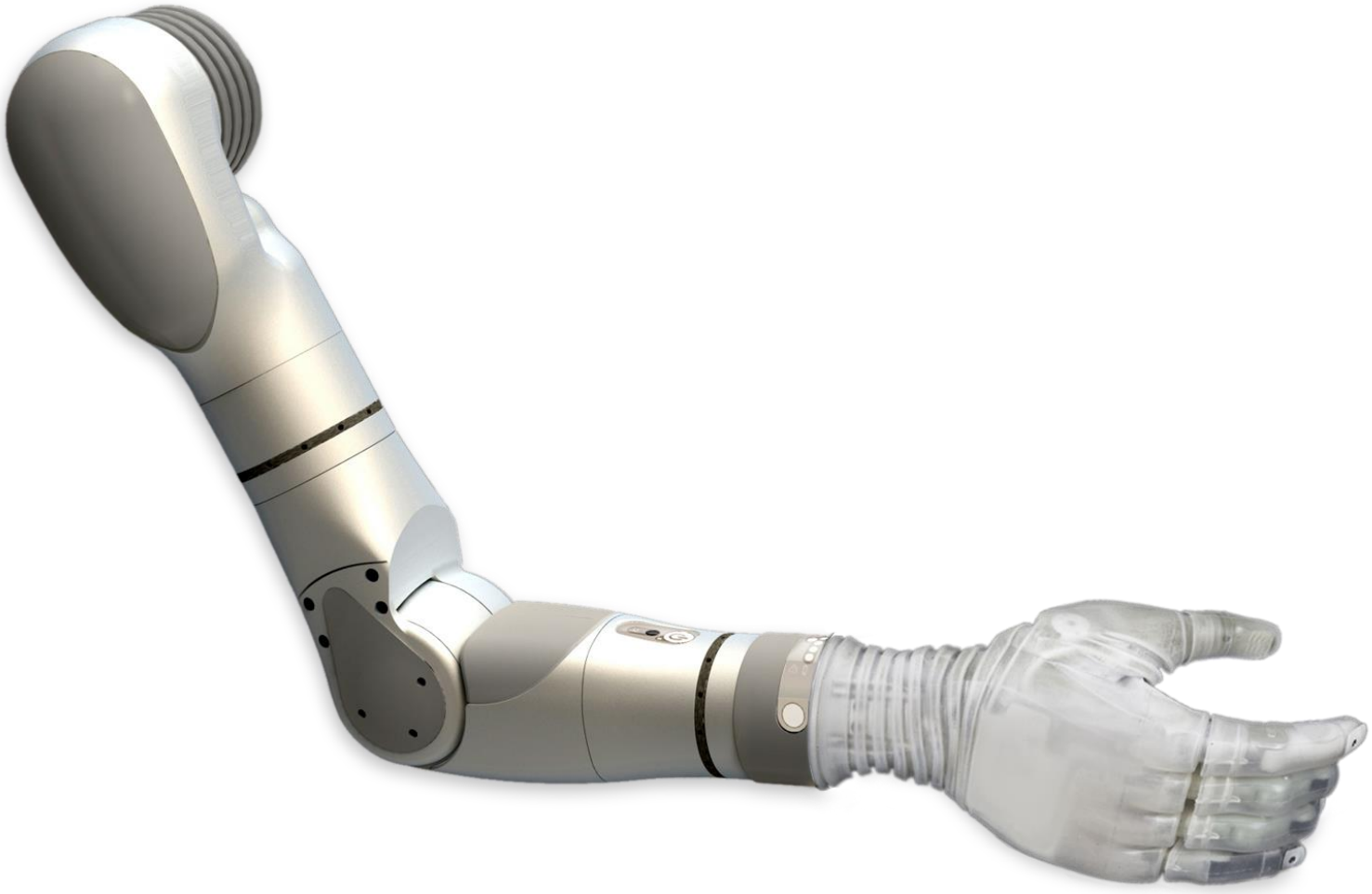
- Humeral rotation;
- Elbow flexion and extension;
- Wrist pronation and supination;

- Ulnar radiation and deviation;
- Index finger flexion and extension;
- Flexion and extension of the other 3 fingers together;

- Thumb abduction, adduction, flexion, extension and opposition.

CONFIGURATIONS

- There are 3 configurations available in 5 user sizes:
  - Shoulder
  - Humeral
  - Radial



There are 6 grips:

- **Power**
  - *for larger objects such as bottles, handles, etc.*

- **Chuck**
  - *three finger hold useful for gripping rounded objects such as door knobs, cups, tennis balls etc.*

- **Tool**
  - *A pistol grip that allows the user to hold and fire a gun by pulling the trigger or using a trigger to operate tools such as an electric drill.*

- **Fine Pinch Closed**
  - the thumb and index finger come together in opposition with the remaining fingers curled into the palm, when picking up a small item like a grape or pulling up a zip.

- **Fine Pinch Open**
  - As for the fine pinch closed, but the little, ring and middle fingers are open and extended.
- **Lateral pinch**
  - As when gripping a pen.

INPUT DEVICES

- There are up to 16 different input devices which can be used - LC uses inertial movement units (Mobius Bionics' own input devices exclusively created for use with the LUKE arm).

- LC uses additional switchgear to lift the arm over shoulder height.
- IMUs are attached to the shoes and detect the movement and tilt of the user's feet.
- Effectively like using a joystick.

- In fact at initial training on an arm on a stand, LC took the IMUs in his hand used them to move the training arm before putting the same on his shoes.

- That method has now been incorporated into training of new wearers.

- LC became adept at using the device fairly quickly.

- He can wear it to prepare food, to lift packets and utensils out of an overhead cupboard, to lift items (up to 10lbs in weight), to undertake two handed tasks.

- LC can open bottles, jars and packets without using his teeth.

- Previously he was reliant on his Mum who had to chop all ingredients, cut up his food and pre-prepare all snacks and drinks.

- He can engage in his hobby of fishing and can tie fishing knots using the LUKE arm to hold the line in place.

- LC is expected to be able to wear the LUKE arm for 4 – 6 hours per day for say 6 days per week. Wear will likely be in 2 tranches of 2 – 3 hours each.

- The full arm weighs about 5 kg.

- It has an internal battery and an external battery worn on the back.
- The internal battery will last for up to an hour. The external battery will last for up to 7 hours.
- It is attached by means of a socket.

- Available exclusively in the UK via Dorset Orthopaedics:

www.dorset-ortho.com

- More information available on website of Mobius Bionics:

www.mobiusbionics.com/luke-arm

Costs

Trial of LUKE arm including fabrication of a temporary socket	£25,300

Training for 2 weeks at Next Step	£20,000
Final balance for purchase of LUKE arm	£190,000
Fabrication of permanent socket	£8,600

The cost of flights, accommodation and subsistence are extra – say	£10,000
TOTAL	**£253,600**

- Device carries a 2 year guarantee. Replacement cycle of say 3 years.

Annual cost say:

£84,500

Lifetime multipliers at age 26 when device needs repurchasing:

- 0.75%	78.25	£6,612,125
0%	60.68	£5,127,460
+ 0.5%	51.91	£4,386,395
+ 1.0%	44.87	£3,791,515

Expensive, particularly if a second back up device is allowed.

END