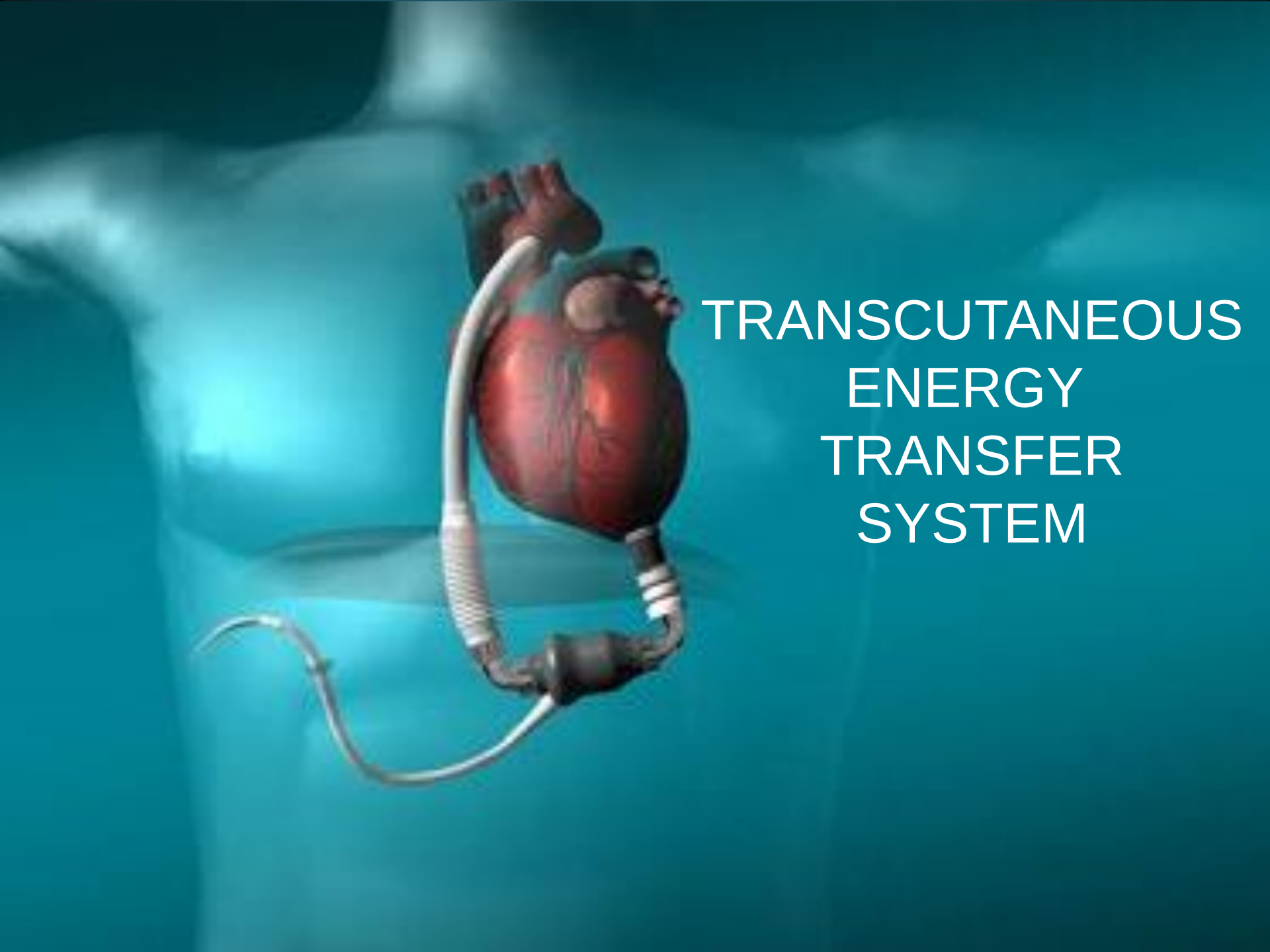
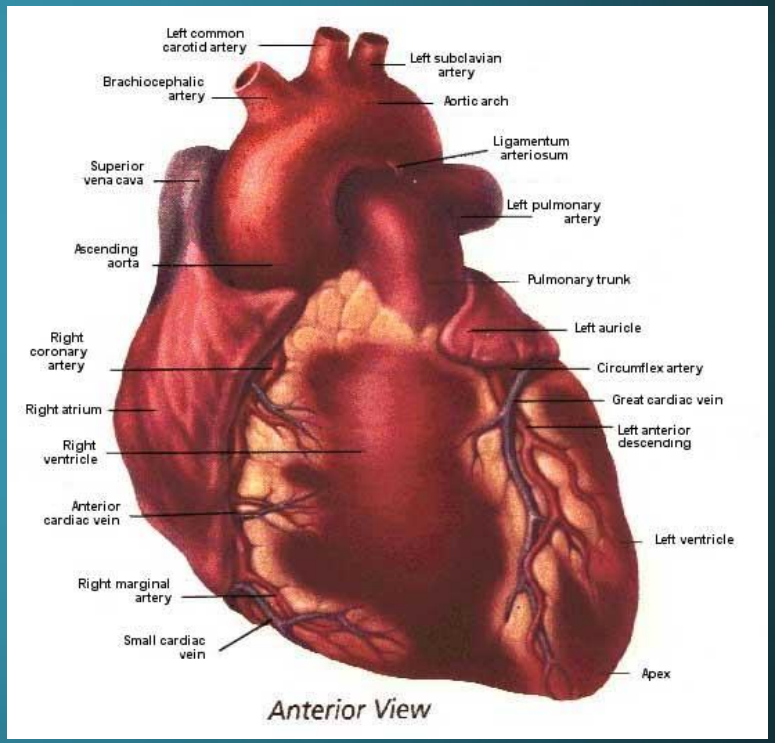

TRANSCUTANEOUS
ENERGY
TRANSFER
SYSTEM

MISSION STATEMENT

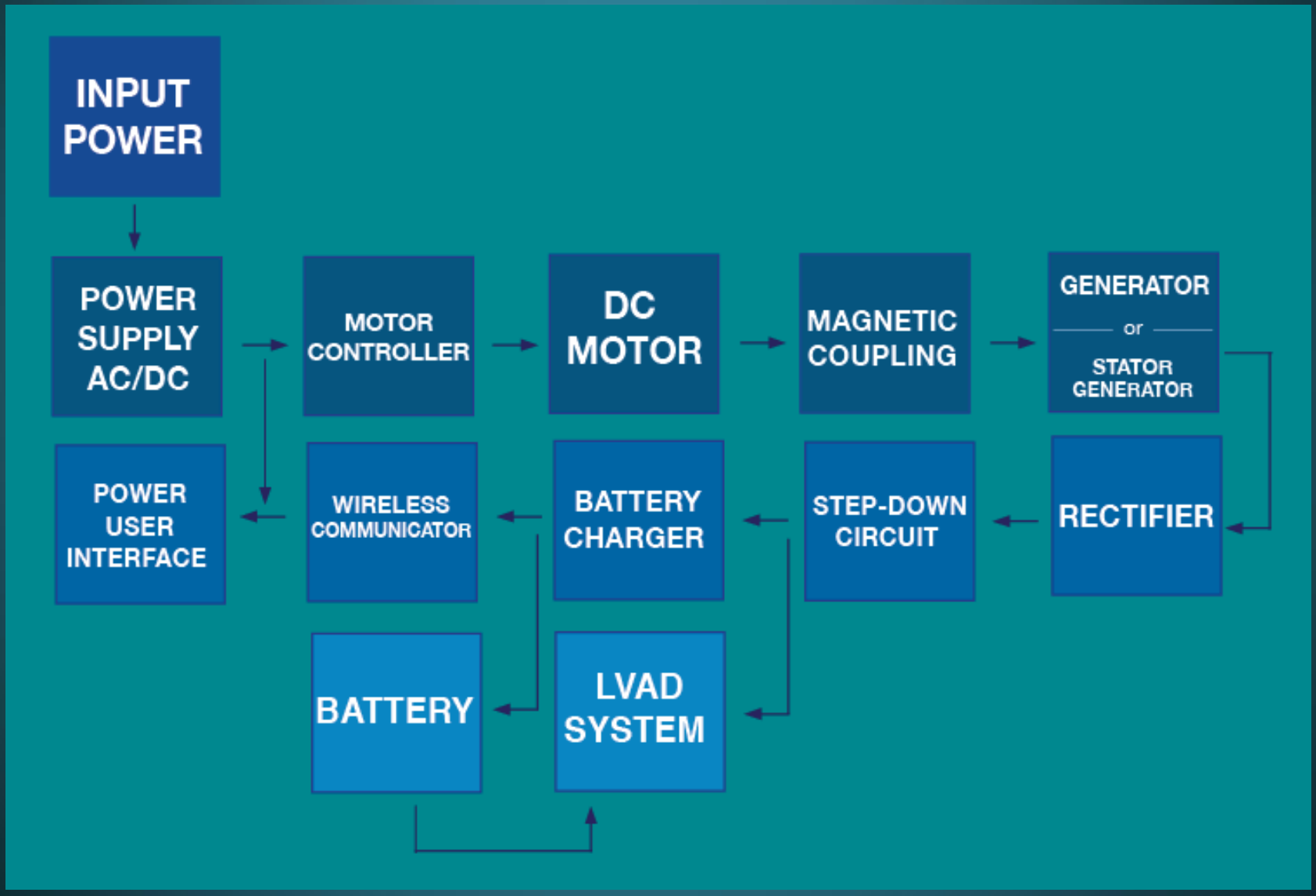
TETS TEAM P13021

To design and produce a commercially viable Transcutaneous Energy Transfer system with the ability to power a left ventricular assist device (LVAD). This TETS device will use a magnetic coupling to enhance the patients quality of life while operating in a safe, efficient, reliable and user friendly manner.



Source: http://www.nuclearcardiologyseminars.net/images/anterior.jpg

SYSTEM PROPOSAL



Meeting Specifications

#	Import.	Location (Inside/Outside)	Spec Description	Metric	Units	Actual Value	Acceptable Value	Ideal Value
EM1	9	Inside	Output Power	Power	Watts	16	10	50
EM2	9	Inside	Voltage Output	Voltage	Volts	21v	21v	21v
EM3	9	Inside	Product Life	Time	Years	~4 years	7	> 10
EM4	9	Inside	Waterproof	IEC60529	Ingress Protection	Untested	IP67	IP68
EM5	3	Inside	Thin	Thickness	Meters	0.0354 (1.397 in)	0.0254 (1 in)	< 0.0254 (1 in)
EM6	3	Outside	Product Life	Time	Years	~10 years	1	5
EM7	3	Outside	Thin	Thickness	Meters	0.0421 (1.66 in)	0.0508	< 0.0508
EM8	3	Outside	Water-tight	IEC60529	Ingress Protection	Untested	IP43	IP43
EM9	3	Outside	Time to Start operation	Time	Seconds	14 sec	60	5
EM10	9	Both	Reliable	% reliability	%	<95%	95%	99%
EM11	9	Both	Minimal Heat Generation	Heat Generation	Flux mW/cm^2	53mW/cm^2	40	< 40
EM12	9	Both	Electrical Insulation	Leakage Current	Amps	Leakage = 0 Amps		0
EM13	3	Both	Lightweight	Mass	Kilograms	I= 0.39 | E = 0.44	0.45	< 0.45
EM14	3	Both	Small	Diameter	Meters	I =0.0823 (3.240 in) E=0.0980 (3.857 in)	0.0762 (3 in)	< 0.0762
EM15	3	Both	Contact Pressure	Axial Pressure on Skin	Pascals	689 pascals	3500	<3500
EM16	3	Both	Transfer Gap	Case to case Distance	Millimeters	13	10	20
EM17	3	Internal	Battery Life Powering LVAD	Time	Hours	5	8	12

9 = must have, 3 = nice to have, 1 = preference only

TEST PLAN

Output Power (From generator/stator)

- Tools: Multimeter (or Oscilloscope), Load
- Independant: gap, load
- Dependant: Amperage out, Voltage (Level)

Time to start operation

- Tools: Stopwatch
- Dependant: Time to start

TEST PLAN

Flux:

- Dependant: *ΔTemp*
- Confounding: Ambient temp

Product life & Reliability: FMEA

Waterproof: Not Performed

Dimensions: Calipers

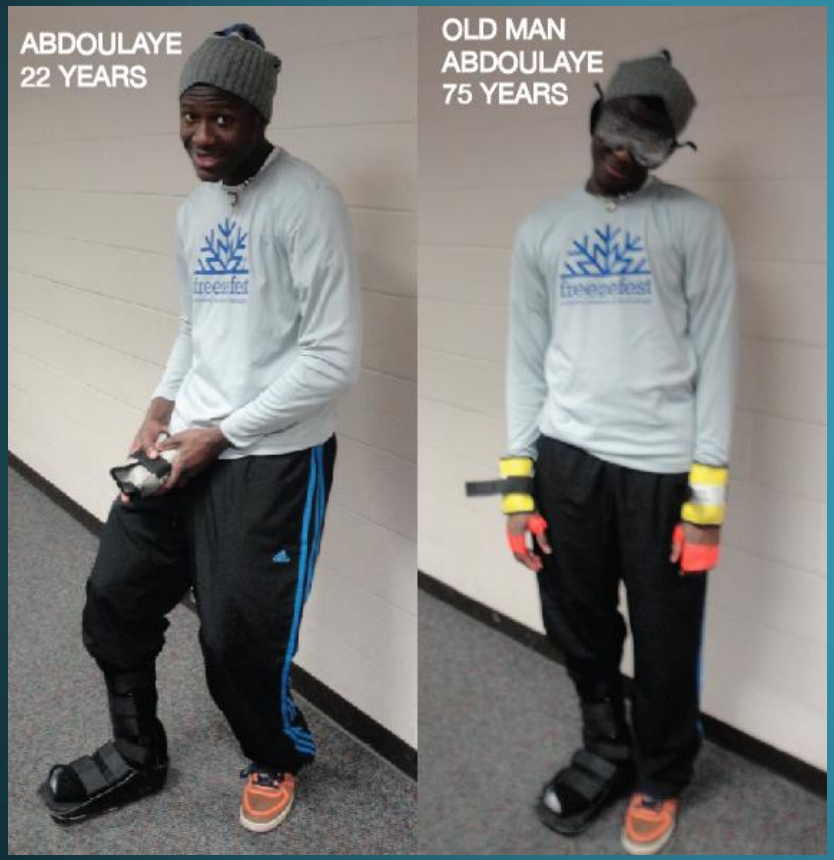
Weight: Scale

Contact Pressure: Test rig for last years device. (vary with gap)

Improvements

- Useful Power output
- Charging an Internal Battery
- Wireless Communication from implant to UI
- User Interface
- User Experience research/considerations
- Robustness of Design
- Ease of Use

Empathy Research



Future Work

- New Battery Tech
- Medical Grade Materials
- Greater Investment in Motor/Generator
- Heat dissipation design/ more efficient components.
- CNC Manufacturing Processes
- Battery unit to control external motor
- Decrease overall size and mass

Thank You!

- Dr. Steven Day
- Ed Hanzlik
- Dr. Coley Duncan
- Dr. Todd Massey
- Dr. Chris Hoople
- Joe Tartakoff
- Jeff Lonneville