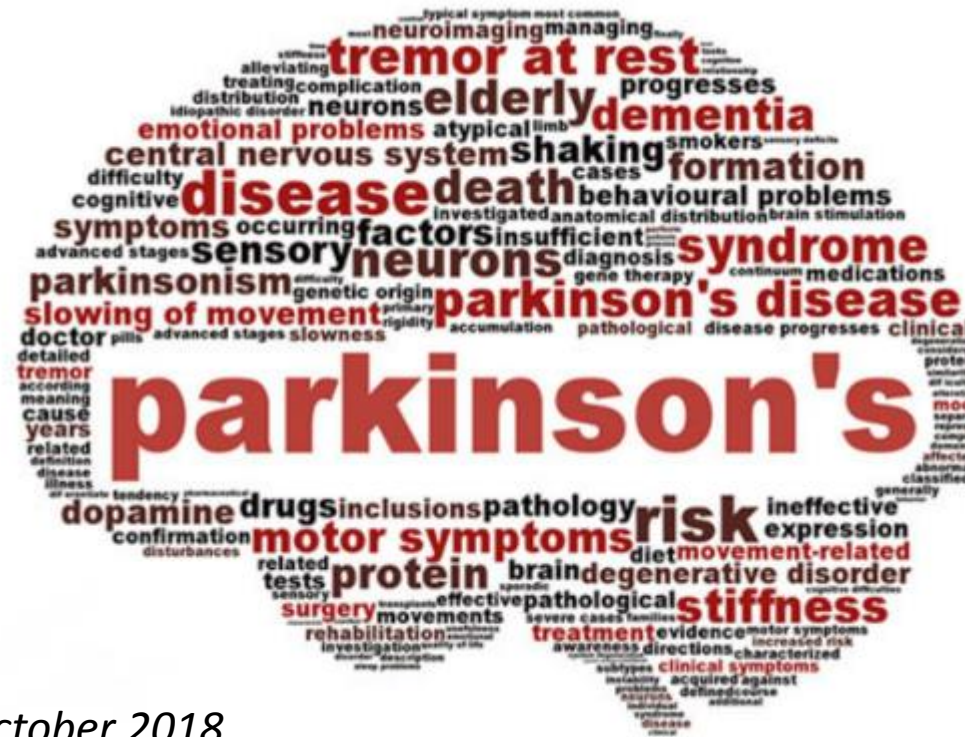


Parkinson's monitoring solution

A Fitbit for Parkinson's ?

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KURANOS

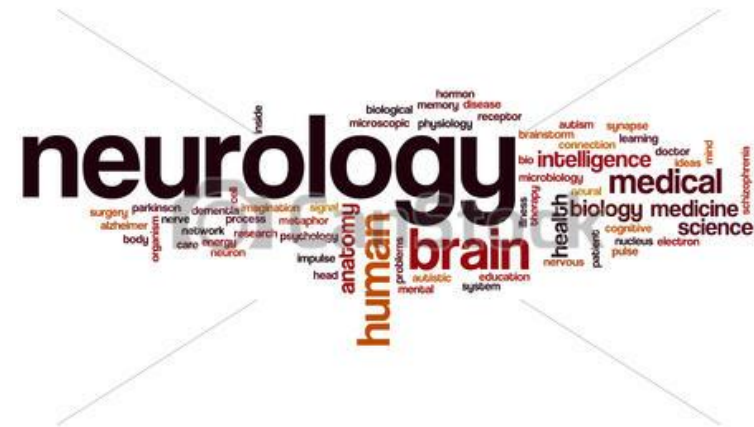
About Parkinson's

- Parkinson's disease is the second most common neurodegenerative disease (only Alzheimer's is bigger).
- About 1 million patients in the US, slightly more in the EU (5-10 million world wide).
- Predominantly a disease for older people - ~1 % of people over 65 has the disease.
- Younger persons can also get it – called Early Onset Parkinson's.
- There is no cure – medicine only to treat symptoms!
- Most common symptoms are:
 - Tremors
 - Rigidity
 - Slowness of movement (bradykinesia)
 - Postural instability
 - Sleeping problems
 - Constipation
- The cause of PD is a lack of Dopamine in parts of the brain due to the death of dopamine producing neurons in the Substantia Negra in the Basal Ganglia.
- Not possible for dopamine to cross the blood-brain barrier – most common medicine is Levodopa that converts to dopamine after entering the brain.

Motivation

“When I started in neurology 25 years ago, I started by measuring and characterizing Parkinson’s tremors – what makes you think you can do it better now?”

Pierre Burkhard – Head of neurology department at HUG



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Key Issue: no effective monitoring

Lack of data on the patients, their symptoms and their responses to treatments.

The only data available are coming from:

- Neurologists visits of 30 min every 6 months → not effective
- Few clinical centers in Europe where trials are performed → not efficient – only very few patients
- Existing competitive motion tracking wearable devices or mobile apps → not effective, bulky and outdated devices, only available in determined centers or areas

What is available now?



What would we like to make ?

Hardware:

- Long battery lifetime – makes it possible to measure almost 24/7
- Very sensitive sensor package – sensors are much, much better now than 25 years ago!
- Simple design – preferably an esthetically pleasing design that patients would like to wear
- E-ink screen to alert the patient to when to take their prescription pills or do the exercises
- Buzzer to alert the patient to take pills or do exercise or battery low!
- Two buttons – one green and one red makes it possible to delay pill taking or exercises if moment is not good or accept them now

More technical design choices

- Battery should last 14-21 days between charging
- All electronics must have low power consumption.
- This rules out Wi-Fi and Bluetooth
- Data downloaded from watch during charging
- Slow download because of low power consumption memory
- Download will probably take about 2 hours (5 GB) – but recharging will also take a few hours so this is probably okay
- Sensor package measuring at 26 Hz 14 bit in tests

Now we have the data – then what?

- To encourage as many patients as possible to use the device, they have to have direct benefit from the measurements themselves
- This means that we have to make two databases – one with the individual datasets where the patient or attending neurologist can log in to see a rough analysis of the patients data – has the tremors become less or more since changing to a new drug? How much exercise does the patient do? How does the patient sleep?
- This should help the neurologist (and patient) to decide on the best drugs to use and thus a better quality of life for the patient and with more targeted drugs, the health insurance company may also save money!
- Hopefully this will mean that the patient can purchase the device and get reimbursed from the health insurance company.

A question of money!

- We expect the watch can be made to a retail price of 50-100 euros.
- Comparison:
- When I started getting drugs for Parkinson's the main drug (and most expensive one as well) was Azilect.
- Starting price for a months worth of Azilect in France: 98 euros
- At the same time I checked the price in the US: 360 dollars
- Since then the price has fallen in Europe – price now: 65 euros
- Meanwhile price has gone up in the US: 640 dollars
- If a device costing 50-100 euros can save the health insurance some drug expenses by better targeting the drugs, this should be a no-brainer!

The big pay-off!

- Beyond the patient database we would of course like to make a big anonymized database and use Machine Learning to try to find new and unseen connections in the data that could be of use to all Parkinson's patients and perhaps even help point the way to better progression markers for Parkinson's And perhaps even a cure!!
- 5-10 million Parkinson's patients worldwide.
- Expected to increase as population ages.
- Maybe 100,000 patients wearing our watch ??????????



The next steps?

- We would like to build 20-40 prototype watches for testing the whole chain, including the database and other software.
- This would most likely take about 1 year.
- After that we should be ready to go big scale!
- We need funding now to build the prototypes and to get the software as near to fully optimized as possible.



Thank You

“Improving healthcare through technological innovation and Big Data”

