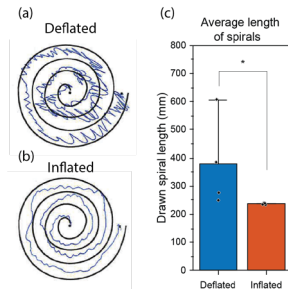


With a prevalence of approx. 5.6% of the population over 65 years of age, essential tremor and Parkinson disease are the widest spread motion disorders. Neither essential tremor nor Parkinson disease can be cured. Beside standard treatment with medication also alternatives based on mechanical damping using orthosis are investigated. Within a PhD at Empa demonstrators for a passive and a semi-active system were developed.

Tremor suppression with textile orthosis



Tremor suppression



Essential tremor and Parkinson disease occurs mainly on the upper extremities, more precisely affecting the hands and lower arm. Neither essential tremor nor Parkinson disease can be cured and patients are looking for unobtrusive, easy to use alternatives for standard treatments with medication. Mechanical damping systems integrated in orthosis adapted to the body are investigated. Miniaturization of electronic components combined with state of the art textile structures can be used to develop wearable, highly flexible tremor suppression orthosis.

At Empa demonstrators for a passive and a semi-active system were developed. Inflation of an air-filled structure in the passive system stabilizes the wrist resulting

in a selective stiffening of the joint and tremor reduction. In a pilot study at Kantonal Hospital of St.Gallen (KSSG) tremor could be reduced up to 80% depending on the assessed movement sequence. The picture to the left shows one example of drawing a spiral with and without the passive glove. The improvement regarding stability of movement is clearly visible and also statistically evident.

The semi-active demonstrator includes an active brake and gyroscope to assess and reduce tremor without affecting voluntary movement. An intelligent algorithm for movement analysis combined with an active element for controlled intervention allows differentiation between involuntary tremor and voluntary movement.

Both solutions will be further developed and validated in clinical trials. The solutions will be improved regarding use cases and optimized depending on the target group.

