

# The F-Wave and H-Reflex Patterns with Increased Stimulus Intensity in Patients with Cerebrovascular Disease for the Neurological Evaluation of Affected Arm or Leg

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## Editorial

### What is F-wave?

The F-wave is a result of  $\alpha$ -motor neurons backfiring following an antidromic invasion of propagated impulses across the axon hillock [1]. Its occurrence reflects excitability changes in spinal motor neurons, as reported in patients with spasticity [2].

In our previous study, we investigated the nervous system of hemiplegic patients and evaluated the excitability of spinal neural function using F-wave data of patients with Cerebrovascular Disease (CVD) [3]. We also reported that persistence and F/M amplitude in patients with CVD were affected by the grade of muscle tonus, tendon reflex, or voluntary movement. Persistence reportedly depends on the number of neuromuscular units activated, whereas F/M amplitude ratio depends on their excitability [4]. Therefore, we concluded that F-wave measurement is an effective neurological test for evaluating muscle tonus and voluntary movement.

A characteristic of F-wave was that F-wave waveform was different at each supramaximal stimulation. However, we observed a waveform, similar to H-reflex, evoked at supramaximal stimulation in CVD patients with hyper tonus.

Characteristics of H-reflex and F-wave pattern with increased stimulus intensity [5].

The H-reflex and F-wave of the affected arm were examined with increased stimulus intensity during muscle relaxation in 31 patients with hemiplegic caused by CVD. The mean patient age was 56 years (range: 30–82 years).

Examination was performed in a supine and relaxed position. H-reflex and F-wave data with increased stimulus intensity following median nerve stimulation at the wrist were recorded at the opponence pollicis muscle on the affected arm of CVD patients. The H-reflex and F-wave patterns that occurred with increased stimulus intensity are divided into four types (types 1- 4).

In type 1, the F-wave appeared with increased stimulus intensity, but there was no H-reflex. In type 2, the H-reflex and F-wave both appeared with increased stimulus intensity, but the H-reflex disappeared first, followed by the F-wave. In type 3, the H-reflex and F-wave both appeared with increased stimulus intensity, but the F-wave appeared during the H-reflex. In type 4, only the H-reflex appeared with increased stimulus intensity; however, there was no F-wave.

The H-reflex and F-wave patterns with increased stimulus intensity in patients with markedly increased muscle tone and tendon reflex almost always demonstrated a type 4 pattern. Those with moderately increased signs in this parameter demonstrated type 2 or 3 patterns, whereas those with slightly increased signs demonstrated type 1 or 2 and those with normal or decreased signs demonstrated type 1.

The results indicated that the H-reflex, not the F-wave, with supramaximal stimulation appeared in patients with a relative increase in spinal neural excitability. Neurological signs of muscle tonus and tendon reflex affected the H-reflex and F-wave patterns.

Pattern characteristics of the H-reflex and F-wave were then used in neurological evaluation of CVD patients.

## References

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