

## Functional Recovery Patterns from 7 Day to 2 Year after the First Strokes in Korea: The KOSCO study

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### Objective

There is no definite consensus to when the recovery of stroke function is stagnant, although it is some reports that the activities of daily living and the motor function are 6 months. The purpose of this study was to analyze the functional recovery patterns from 7 days to 2 year after stroke onset and the time point to reach the plateau of each function for the total, ischemic and hemorrhagic stroke.

### Materials and Methods

This study was an interim analysis of the Korean Stroke Cohort for Functioning and Rehabilitation (KOSCO) designed as 10 years long-term follow-up study of stroke patients. All patients who admitted to the representative hospitals in 9 distinct areas of Korea with their acute first-ever stroke (from August 2012 to May 2015) were recruited. Both ischemic and hemorrhagic strokes were included but transient ischemic attacks were excluded. Out of 8,010 patients who agreed with participation, 4,909 patients completed face-to-face assessments at 2 year after stroke onset. Functional assessments included Korean modified Barthel Index (K-MBI), Korean Mini-Mental State Examination (K-MMSE), Fugl-Meyer Assessment (FMA), Functional Ambulatory Category (FAC), the American Speech-Language-Hearing Association National Outcome Measurement System Swallowing Scale (ASHA-NOMS), and Short Korean Version of Frenchay Aphasia Screening Test (Short K-FAST). We demonstrated the each functional recovery pattern for total, ischemic and hemorrhagic stroke data separately and also for subsets grouped by their baseline stroke severities.

### Results

Among 4,909 patients, 79.7% of patients suffered from ischemic and 20.3% hemorrhagic stroke, respectively. Their mean age was 63.8 years and the ratio of male to female was 1.45. Table 1 shows the distribution of the clinical characteristics by stroke type. The multi-facet functional recovery patterns in first-ever stroke patients were different according to the baseline stroke severity. RMANOVA showed a significant interaction effect between time and baseline stroke severity) in K-MBI, FMA, K-MMSE, FAC, ASHA-NOMS, Short K-FAST ( $P < 0.05$ ). K-MBI reached to the plateau at 18 months after ischemic stroke onset in the mild group; however, K-MBI reached to the plateau at 12 months after ischemic stroke onset in the moderate and severe group.

## Conclusion

The results of this study demonstrated that functional recovery should be expected after the first 6 months in the first-ever stroke patients. In addition, the present study showed that there were different recovery patterns according to functional domain and severity at acute phase in stroke patient

## Acknowledgment

This study was supported by the Research Program funded by the Korea Centers for Disease Control and Prevention (2016E-33003-02)

Variables	Total stroke patients (n=4,909)	Ischemic stroke patients (n=3,913)	Hemorrhagic stroke patients (n=996)
	Mean±SD or percentage	Mean±SD or percentage	Mean±SD or percentage
Age, years	63.3±12.8	64.8±12.3	57.7±13.0
Sex, male	59.2%	61.8%	49.0%
Body mass index	23.8±3.3	23.9±3.3	23.4±3.3
Smoking, current	27.2%	28.4%	22.7%
Alcohol, current	40.1%	39.8%	41.3%
Education, years	9.9±4.8	9.7±4.8	10.7±4.6
Medical history			
Hypertension, Yes	53.7%	56.0%	44.2%
Diabetes mellitus, Yes	20.9%	24.2%	10.2%
Coronary heart disease, Yes	5.8%	6.7%	2.9%
Atrial fibrillation, Yes	7.1%	8.7%	1.6%
Hyperlipidemia, Yes	9.3%	11.2%	4.6%
CCAS	5.1±1.7	5.2±1.7	4.7±1.6
Premorbid mRS, score	0.7±1.3	0.6±1.2	0.8±1.6
NIHSS at 7 day	4.0±6.2	3.3±5.1	6.8±8.9
Functional assessments at 7 day			
Fugl-Meyer Assessment	79.2±32.1	82.5±29.2	66.4±38.9
K-MMSE	22.3±8.3	23.2±7.5	18.6±10.2
Functional Ambulatory Category	2.9±1.9	3.2±1.8	1.8±2.0
AHSA-NOMS	6.0±1.9	6.2±1.7	5.1±2.4
Short K-FAST	13.7±6.0	14.3±5.5	11.5±7.3
Neurological aggravation, Yes	3.5%	4.0%	1.7%
Complication during hospitalization			
Thromboembolic disease, Yes	1.4%	1.4%	1.3%
Pneumonia, Yes	2.4%	1.7%	5.2%
Ventilatory insufficiency, Yes	0.6%	0.4%	1.4%
Urinary tract infection, Yes	2.4%	1.8%	4.5%
Number of complications (0-4)			
Duration of hospitalization, days	18.5±24.1	14.5±20.0	34.4±31.4
Intensive inpatient rehabilitation, Yes	20.9%	17.8%	33.1%

**Table 1. Distribution of general and clinical patient characteristics**