rs11833579, on chromosome 12p13 and within 11 kb of the NINJ2 gene were associated with stroke [Ikram MA et al. *N Engl J Med* 2009]. The International Stroke Genetics Consortium set out to validate these results in a meta-analysis that was conducted using a combined sample of 8637 cases and 8733 controls of European ancestry and one population-based genomewide cohort study of 278 ischemic strokes among 22,054 subjects. Investigators evaluated associations between the two SNPs and ischemic stroke, incident stroke, and stroke subtypes (according to Trial of ORG 10172 in Acute Stroke Treatment [TOAST] criteria). Similar analyses were performed in cases and controls of African-American, Pakistani, and Chinese ancestry.

This well-powered meta-analysis detected no association between rs12425791 or rs11833579 and ischemic stroke in the cohort of European ancestry (OR, 0.97; 95% CI, 0.91 to 1.04; p=0.41 and OR, 1.02; 95% CI, 0.95 to 1.10; p=0.55, respectively). Additionally, no association was found for atherothrombotic stroke, incident ischemic stroke, recurrent ischemic stroke, or any of the ischemic stroke subtypes with regard to either SNP, according to 2235 cases (p>0.10 for all stroke categories). The original meta-analysis reported significant heterogeneity (rs11833579: heterogeneity p=0.073, I2=56.1%; rs12425791: p=0.15, I2=42.1%). However, no significant heterogeneity was observed in the current meta-analysis by the consortium (heterogeneity p>0.20; I2<20%).

Based on these results, members of the International Stroke Genetics Consortium concluded that these SNPs were not associated with increased risk for ischemic stroke.

Results from the Penumbra Pivotal Stroke Trial Substudy

While the Penumbra Pivotal Stroke Trial demonstrated a recanalization rate of 81.6%, the rate of good clinical outcome, defined as a modified Rankin Scale (mRS) score ≤2, was relatively low (25%) [The Penumbra Pivotal Stroke Investigators. *Stroke* 2009]. Mayank Goyal, MD, University of Calgary, Calgary, Alberta, Canada, presented a subanalysis from the Penumbra Pivotal Stroke Trial.

The aim of this substudy was to evaluate whether a good initial noncontrast computed tomography (NCCT), defined as >7 according to the ASPECTS scoring system, and short time to recanalization predicted good clinical outcome in patients with acute ischemic stroke who were undergoing endovascular procedures. The substudy included 85 of the original 125 Penumbra trial participants (median age 64.1 years), stratified by blinded NCCT reading at presentation. Patients were grouped according to NCCT ASPECTS score of >7 or ≤7 (median ASPECTS score at baseline was 6). ASPECTS scores were categorized as good (8 to 10; observed in 36.5% of patients), intermediate (5 to 7), and poor (0 to 4). The primary outcome was mRS ≤2 at 3 months.

Medical comorbidities at baseline included hypertension (n=83), diabetes (n=23), and atrial fibrillation (n=34). Occlusions were located in the internal carotid artery in 22.4% of patients (19.3% had ASPECTS scores >7 vs 24.1% ≤7), in the M1 main coronary artery in 63.5% of patients (61.3% had ASPECTS scores >7 vs 64.8% ≤7), and in the M2 main carotid artery in 14.1% of patients (19.3% had ASPECTS scores >7 vs 11.1% ≤7) at baseline.

TIMI scores of 2 to 3 were noted in 81.2% of patients. Of the patients with ASPECTS scores >7, 83.9% had TIMI 2 to 3 recanalization compared with 79.6% with ASPECTS scores ≤7 (p= 0.8). At 3 months, mRS 0 to 2 was observed in 27.1% of patients, 50% in the ASPECTS scores >7 group, and 15% in the ASPECTS scores ≤ 7 group (Table 1). When broken down by ASPECTS categories of good, intermediate, and poor, good clinical outcome was significantly greater in the >7 group compared with the ≤7 group (RR 3.3; 95% CI, 1.6 to 6.8; Table 1), and no patient with an ASPECTS score ≤4 (poor scan, n=28) had good clinical outcome. Additionally, good clinical outcome was significantly higher in the early recanalizer (≤300 minutes) group compared with the combined late recanalizer (>300 minutes) or nonrecanalizer (TIMI 0 to 1) group (RR 2.3; 95% CI, 1.2 to 4.4). No patient without recanalization (TIMI 0 to 1; n=16) did well.

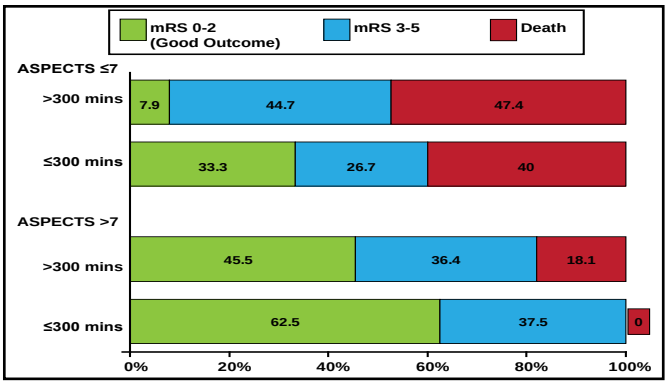
Table 1. Clinical Outcomes Stratified by Baseline CT ASPECTS Score.

	Total (n=85)	ASPECTS >7 (n=31)	ASPECTS ≤7 (n=54)	p value
TIMI (2 to 3)	81.2%	83.9%	79.6%	0.8
Median Onset to Recanalization (time in minutes)	365.5	390	359	0.6
mRS (0 to 2) at 90 days	27.1%	50%	15%	0.001

Reproduced with permission from M. Goyal, MD.

After adjusting for baseline stroke severity, there was evidence of an ASPECTS score and onset-to-recanalization time interaction. The direction of interaction was such that among patients with ASPECTS scores >7, the relative effect of onset-to-recanalization time (≤300 minutes or >300 minutes) in predicting outcome was small. Among patients with ASPECTS scores ≤7, only those with an onset-to-recanalization time ≤ 300 minutes had some chance of achieving a functional outcome (Figure 1).

Figure 1: Clinical Outcome (mRS at 3 months) in Two Groups, ASPECTS Scores >7 and ≤7, Stratified By Onset-to-Recanalization Time <300 Minutes and ≥300 Minutes.



Reproduced with permission from M. Goyal, MD.

Dr. Goyal concluded that faster recanalization and proper patient selection that is based on initial NCCT contribute to the achievement of good clinical outcomes in patients with acute ischemic stroke who undergo endovascular procedures.

Home Rehabilitation for Stroke Using Virtual Reality Gaming Technology (Wii) May Be a Useful Rehabilitation Strategy

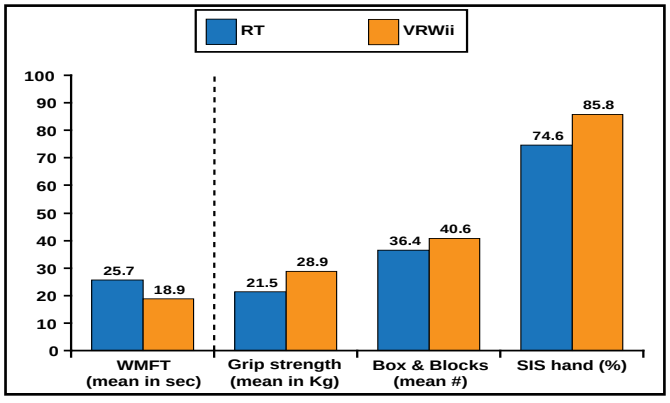
Increased intensity of rehabilitation is associated with better motor recovery in stroke patients [Kwakkel G et al. *Stroke* 1997]. However, the effectiveness of interactive virtual reality gaming (such as that found with the Nintendo Wii system) for stroke rehabilitation remains unclear. Gustavo Saposnik, MD, St. Michael's Hospital, Toronto, Ontario, Canada, presented results from the randomized, single-blinded, Effectiveness of Virtual Reality Exercises in Stroke Rehabilitation (EVREST; NCT00692523) study, which investigated this issue.

Twenty-two patients (mean age=61 years) who received standard rehabilitation within 2 months after a mild to moderate stroke (defined as arm deficit of ≥4 on the Chedocke-McMaster scale) were randomized to receive either virtual reality therapy using the Wii system (VRWii; n=11) or recreational therapy (RT; n=11), such as playing cards or Jenga, for eight 60-minute sessions over a 2-week period. Comorbidities included hypertension, dyslipidemia, diabetes mellitus, and atrial fibrillation. Functional status at the time of randomization for the VRWii group included a mean Canadian Neurological Scale of 8.5 (vs 9.7 in the RT group), median Chedocke-McMaster score of 4.0 (vs 4.5 for RT), and a median Barthel Index of 65 (for both groups). A modified Rankin Scale (mRS) of 3 to 4 was noted in 81% of VRWii patients and 63% of RT patients at baseline. The mean time from stroke onset to randomization was 24 days, and baseline characteristics were similar in both groups. Patients in both groups were instructed to use their affected arm predominantly. The primary outcomes were the total time receiving the intervention (assessing feasibility) and the proportion of patients who were experiencing intervention-related adverse events during the study period (assessing safety). The secondary outcome was efficacy, as determined by Wolf Motor Function Test (WMFT), Box and Block Test (BBT), and the Stroke Impact Scale (SIS), performed at a follow-up visit 4 weeks postintervention.

No serious adverse events were observed. Dizziness/nausea was noted in one patient in the RT group but none in the VRWii group. Fatigue, determined as Borg scale >13, was observed in 3 patients in the VRWii group versus 2 for RT. Four patients in the RT group reported any symptom during any session versus 6 in the VRWii group.

Eighty percent of patients in the RT group completed all 8 sessions versus 90% of patients in the VRWii group. The mean total session time was 364 minutes and 388 minutes for VRWii and RT, respectively. The mean individual session time was 46.5 minutes and 56.2 minutes for VRWii and RT, respectively. Patients in the VRWii group did significantly better on the WMFT postintervention after adjustment for age, baseline functional status, and stroke severity compared with the RT group. The VRWii group also demonstrated improvement in grip strength, BBT, and SIS at 4 weeks (Figure 1).

Figure 1. Unadjusted Secondary Outcomes (Efficacy).



Reproduced with permission from G. Saposnik, MD.

VRWii may be a useful strategy for home rehabilitation that is focused on promoting motor function after stroke. This innovative interactive approach appears to be safe, feasible, and potentially effective in enhancing motor function after an acute stroke, concluded Dr. Saposnik.