

HIGH-INTENSITY GAIT TRAINING WITH VIRTUAL REALITY FOR CEREBELLAR AND PONTINE STROKE RECOVERY: A CASE SERIES

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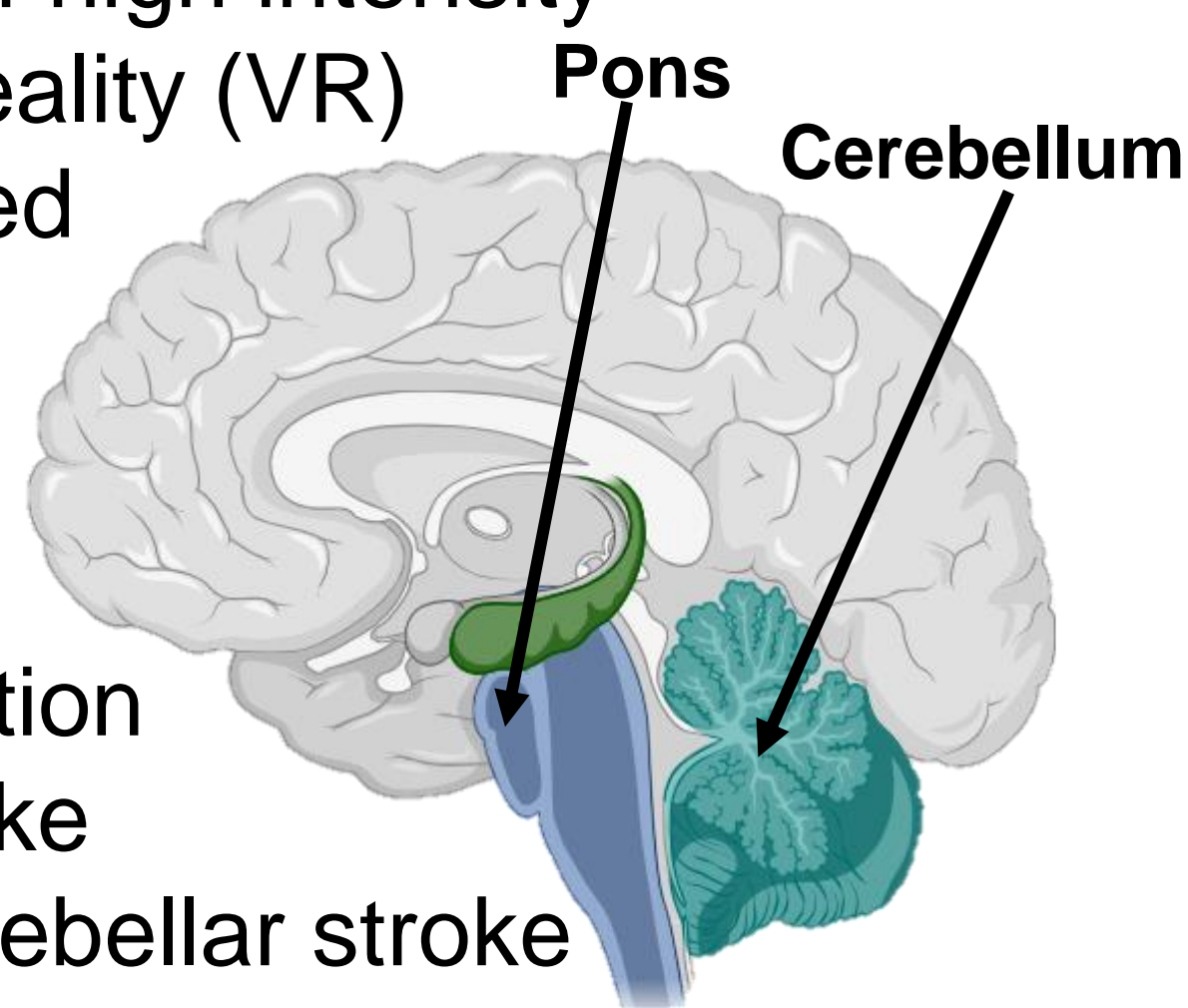
Background / Case

Background:

- Research supporting early therapeutic interventions in patients with acute posterior circulation stroke is limited
- The cerebellum controls balance, coordination, and gait¹
- The pons connects the cerebellum with the cerebral cortex helping to coordinate smooth, sequenced movements¹
- Damage to these areas impairs motor learning and disrupts regulation of coordinated movement¹
- Current research supports use of high intensity gait training (HIGT) and virtual reality (VR) within chronic stroke, but is limited within the acute phases

Case Description:

- Two patients receiving physical therapy in an inpatient rehabilitation facility (IRF) following acute stroke
 - Patient A: age 72, female, cerebellar stroke
 - Patient B: age 68, male, cerebellar & pontine stroke



Primary Aim

This case report investigates the effectiveness of HIGT with VR on postural stability, ambulation endurance, and gait speed in individuals recovering from acute cerebellar and/or pontine stroke

Methods

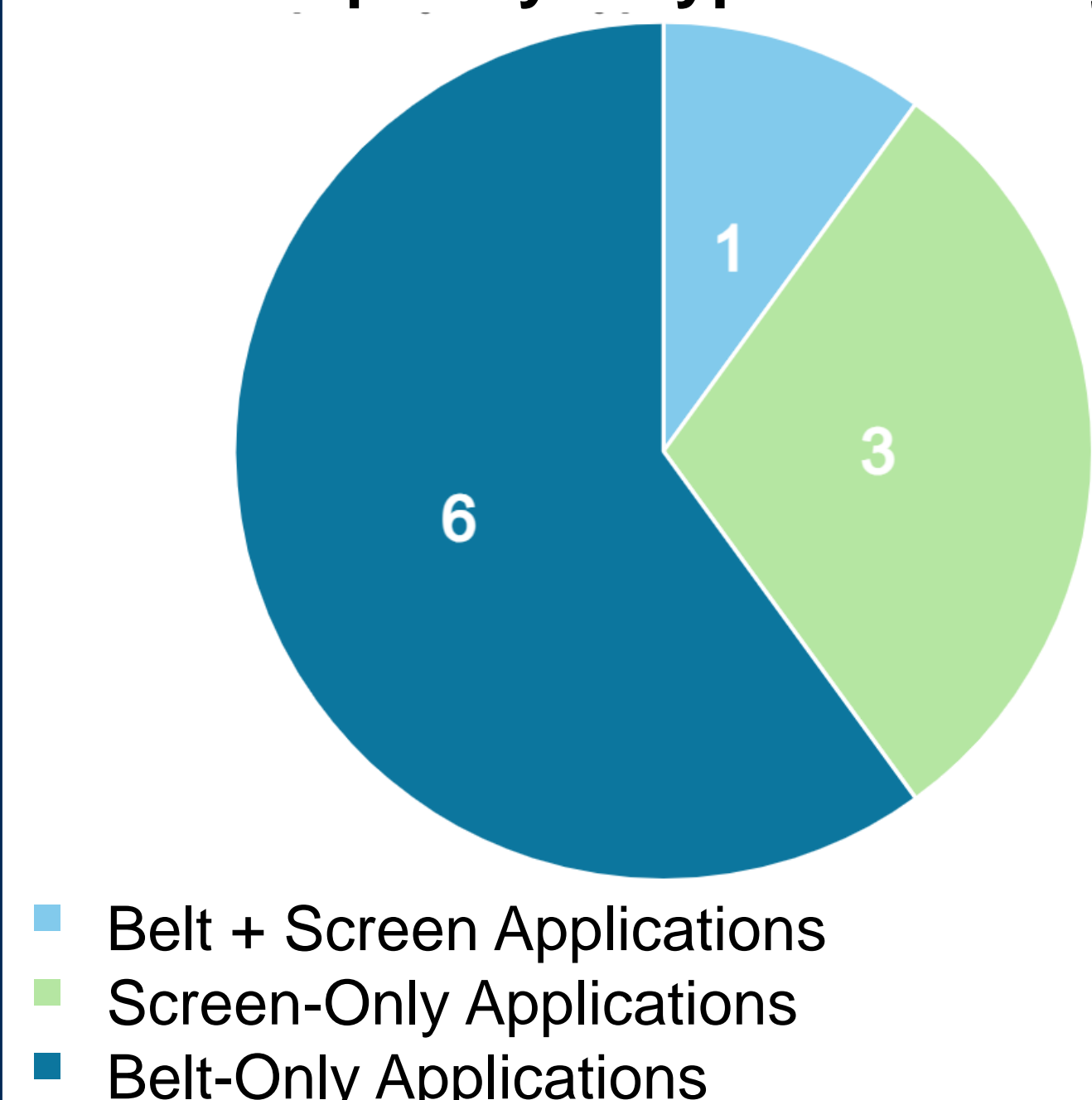
- HIGT with VR activities were performed on Motek C-Mill VR+ while wearing a fall mitigation harness
- The protocol was conducted for 5 consecutive days, 1 session per day, lasting ~40 minutes per session
- Goal was for the patient to achieve a rate of perceived exertion between 14-17 on the Borg scale^{2,3}
- Polar Beat heart rate monitor was used on patient's left forearm to monitor heart rate during each session
- 10MWT (10-meter walk test), 6MWT (6-minute walk test), and Berg Balance Score (Berg) were evaluated 1 day prior to protocol initiation and re-evaluated 1 day before discharge



Protocol

- Vitals were taken pre- and post-session
- Warm-up: 10 minutes on NuStep (seated aerobic stepper)
- Performed C-Mill activities that incorporated belt, front screen, and combined VR applications
- Rate of perceived exertion recorded after each activity
- If patients were not medically stable to participate in high intensity training, session was modified or eliminated (clinical judgment)

Frequency & Type of Activity



Results

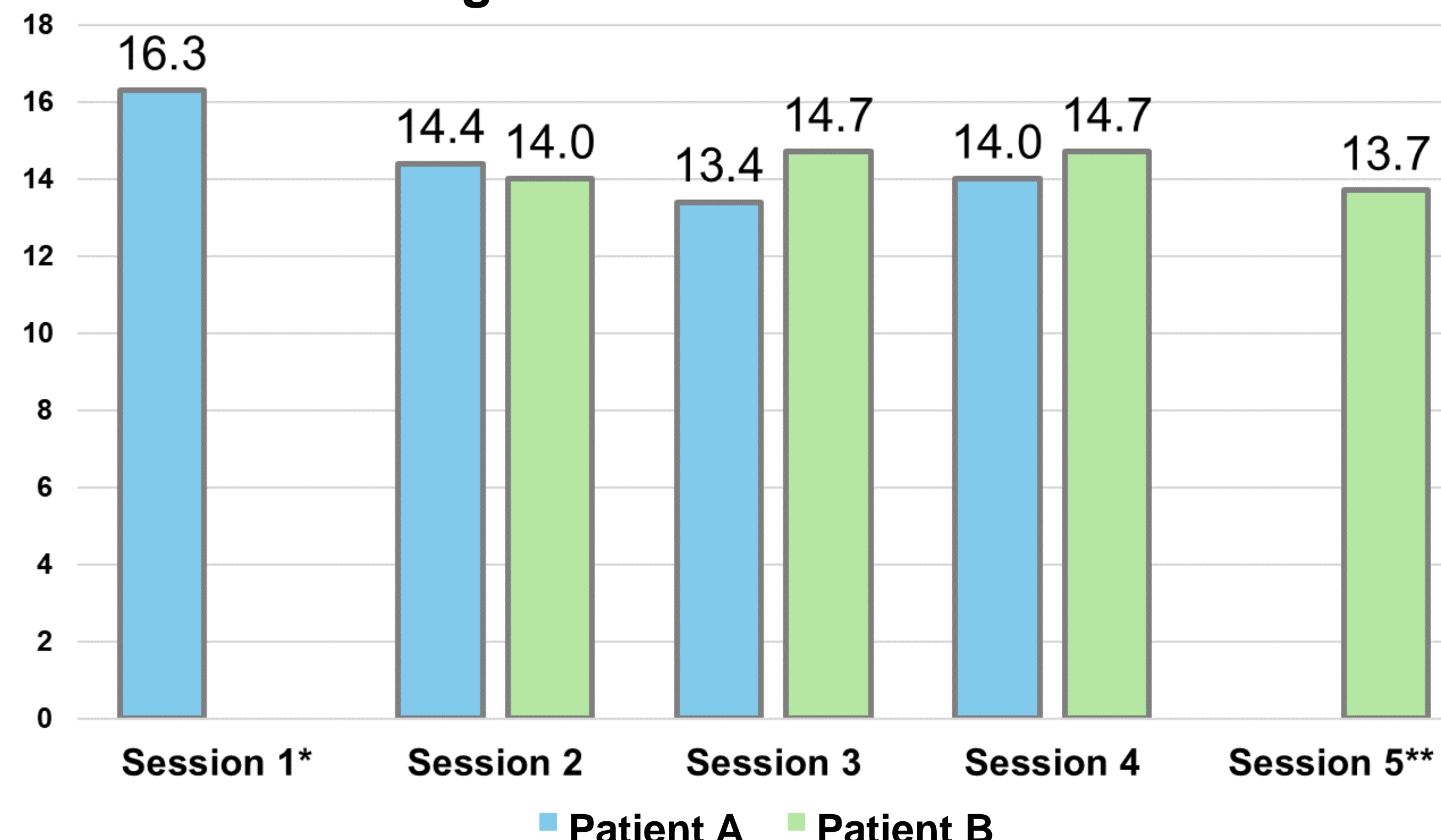
Patient A

	Pre-Test	Post-Test
Berg	34/56	38/56
6MWT	120 m	190 m
10MWT	0.50 m/s	0.72 m/s

Patient B

	Pre-Test	Post-Test
Berg	34/56	52/56
6MWT	137 m	274 m
10MWT	0.65 m/s	0.96 m/s

Average Rate of Perceived Exertion



* No data due to elevated blood pressure (not medically safe to participate)
 ** No data due to inability to leave room because of droplet precautions

Outcomes

- Both patients demonstrated improvement in all outcome measures from pre-test to post-test with most scores meeting the Minimal Clinically Important Difference (MCID)

	MCID	Patient A	Patient B
Berg	7	×	✓
6MWT	0.16 m/s	✓	✓
10MWT	71 m	✓	✓

- Both patients were discharged home after IRF stay
 - Patient A improved from a minimal assistance level to an intermittent supervision level
 - Patient B improved from a contact guard level to a modified independence level
- Rate of perceived exertion averaged 14.4, indicating HIGT was effective for each patient



Primary Takeaway

Findings from this case report demonstrate that utilizing HIGT with VR is a feasible and effective intervention within the IRF setting that can enhance individuals' likelihood of recovering from an acute cerebellar and/or pontine stroke

Discussion

- This is the first case utilizing the unique combination of HIGT + VR in patients with acute stroke as current published research only supports chronic stroke⁴
- Our protocol appeared to facilitate motor learning and neuroplastic changes toward recovery in our patients
- Using a C-Mill for HIGT with VR may serve as a powerful intervention tool
- However, barriers to this protocol include patient medical stability, staffing constraints, and access to resources
- Future studies should recruit larger cohorts, use longitudinal designs to evaluate long-term effects, and examine the impact of length of stay on outcomes



References

