IVS promotes brain plasticity

IVS | Intensive Visual Simulation A unique technology dedicated to motor planning and central control of movement

Output Dessintey

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Our mission

Dessintey develops and markets intensive rehabilitation technologies to accelerate recovery and ensure greater patient quality of life.

Our mission is to assist patients throughout their healing and rehabilitation journey.

Our technological solutions aim at increasing, diversifying, and personalizing their daily practice program from the moment they join the rehabilitation center until they return at home.

Dessintey relies on the latest scientific evidence in neuroscience and on its close contact with therapists and doctors to offer simple and efficient technologies.

The co-founders,

Nicolas FOURNIER, Davy LUNEAU, Pr. Pascal GIRAUX.

Motor control principles

Action planning is quickly altered in patients



For many Stroke or CRPS patients, **Action planning** is altered or non-existent. They lose awareness of their own body, but also the memory of **motor functions**.

Without representation of movement, *i.e.* without this essential stage of action planning, the movement cannot be effective and accurate. "The problem is not the repetition of movement but the ability to plan what to do. It's not a problem of muscle power, it's a problem of control of the body."



Dr. Franco MOLTENI Clinical Director - Villa Beretta Rehabilitation Center, Italy

IVS Intensive Visual Simulation

A unique technology dedicated to motor planning and central control of movement

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IVS technology combines approaches with high level of clinical evidence on motor recovery and pain treatment.

Neurorehab

	Motor functions	Activities & Participation
Assessments	FMA, Motricity index	ARAT, WMFT, FIM, MBI, AHA
Action Observation - AO	+++	+++
Motor Imagery - MI	++	+++
Mirror Therapy - MT	++	+++

Visual Simulation Training (VST) efficacy in Lower Limb recovery

	Neurorehab			Pain	Othopaedics
	Motor functions	Activities & Participation	Others	Amputation, Plexus, CRPS	Surgery, Fracture, Immobilization
Assessments	Strength, ROM, FMA, EMG, Brunnstrom Stage	10WT, TUG, F8WT, BBS, FIM, RMI, Temporo- spastial analysis	-	VAS, McGill, ROM	Strength, ROM, Gait speed, Balance
Action Observation - AO	+++	+++	NA	++	++
Motor Imagery - MI	++	++	NA	++	++
Mirror Therapy - MT	++	+++	NA	+++	++

+++ Efficacy proven in review and meta-analysis (moderate effect)

++ Efficacy proven in review and meta-analysis (low effect)

Efficacy proven in various RCT +

NA Lack of data collection

References:



Visual Simulation Training (VST) efficacy in Upper Limb recovery Pain Othopaedics Amputation, Surgery, Fracture, Others Plexus, CRPS Immobilization Star cancellation, Line VAS. ROM Strength, ROM Bissection, Bergego ++

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NA

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VST Efficacy in Upper Limb recovery | AO: Wang 2015; Borges 2018; Buchignani 2019; Herranz-Gomez 2020; Ryan 2021 | MI: Kho 2014; Guerra 2017; Yap 2019; Barclay 2020; Herranz-Gomez 2020; Suso-Martí 2020 | MT: Pandian 2014; Thieme 2018; Zhang 2018; Gandhi 2020; Pérez-Cruzado 2016.

VST Efficacy in Lower Limb recovery | AO: Buchignani 2019; Ryan 2021; Sanchez Silverio 2021 | MI: Garcia Carrasco 2016; Yap 2019; Suso-Martí 2020; Cuenca-Martinez 2021; Zhao 2022 | MT: Broderick 2018; Thieme 2018; Louie 2018; Li 2018; Cuenca-Martinez 2021; Xie HM 2021; Zhang 2022.

"Seeing a movement is almost like doing it."







Upper or Lower Limb movement observation with IVS automatically induces a cortical sensorimotor activation.

Reinstating coherence between what the patient intends to do and the sensations he perceives prompts relearning.

The technological platform

Personalized therapy programs

Showcasing more than 15 years of research, IVS integrates a smart therapy-based algorithm assistance to make the therapists' day-to-day work easier.

Based on the evaluation performed by the therapist, IVS offers a variety of exercise sequences.

It recognizes the best suited movements to the patient's impairments.

IVS manages the planning of sessions and patient's overall program.

An "augmented assistant" facilitates the preparation of the session

A patient-centric solution developed with clinicians



Evaluations



Movement library

Progress & activity reports









Guided session Algorithm-based therapy



Presentation

IVS Intensive Visual Simulation

Positive visual feedback promotes relearning



Rehabilitation Objectives

IVS relies on brain plasticity principles.

Integrating IVS among the therapeutic pathway stimulates the central control of movement and bolster patients' abilities in action planning.





IVS3 for Upper Limbs

Vision plays an essential role in the early stages of reconstructing body image and motor control. With an intense immersion, IVS allows the patient to reintegrate a healthy functional limb and to focus on the representation of movement.

IVS4 for Lower Limbs

Adapted to wheelchairs, IVS4 allows patients to work seated to learn basic movements and more complex coordinations then in a standing position it is more focused on a functional approach to balance and walking.



Complementarity

IVS is used in addition to other conventional therapies and technologies



- Robot-assisted therapy
- FES
- Muscle strengthening
- Task-oriented therapy
- CIMT

- FES
- Robot assisted therapy Exoskeleton
- Trunk reinforcement & balance therapy
- Active and passive mobilization
- Standing & muscle strengthening

In my daily life Vicious circle of failure A cascade effect

1 · Lack of Movement I can't move due to the injury I don't want to move to avoid pain

5 • Non-Use Body exclusion and compensation 5 bis • Pain In some cases. increase and installation of chronic pain

4 · Body Ownership Decrease in body ownership

3 · Motor Command Loss in movement representation and action planning

2 • Brain Activations

The brain area dedicated

to motor command is less

and less active

with IVS

1 • I see and I can feel the movement It improves my motivation and participation

5 • Motor learning I reduce the mismatch

between motor intention and the visual feedback 5 bis • Pain Movement or even movement perception can reduce pain



4 · Body Ownership I can see my body in movement and integrate the affected side in my body image

Positive feedback of movement

Pain CRPS, PLP, burnt...

Neuro Stroke, TBI, SCI, MS...

Orthopedics Trauma, immobilization...

During "Intensive Visual Simulation" training Restoring coherence between movement intention & vision A virtuous circle



2 • Brain Activations

Even if I don't move, my brain is automatically activated through Action Observation

3 • Motor Command I can imagine my body moving and promote in the same time the motor command

IVS - Intensive Visual Simulation

IVS Indications



- Stroke
- Brain injury
- Multiple sclerosis
- CRPS
- Amputation
- Cerebral palsy
- SCI
- Immobilization
- Plexus injury
- Trauma

Large inclusion criteria

- Flaccid limbs
- Spasticity
- Hemineglect
- Apraxia
- Body image disorders
- Bimanual impairments

- Aphasia
- Cognitive disorders
- Attention deficits
- Learning disabilities
- Pain
- Allodynia...



Why is IVS a unique & patented technology?

- Intense immersion to reintegrate a healthy functional limb
- (both for Upper & Lower Limbs)
- Neurological lateralized stimulation 3
- 4 or cognitive disorders
- 5
- 6
- 7 Ultra-easy to handle: 30 sec. to start a session
- 8 Complementary to conventional approach and robotic devices

2 High level of clinical evidence on VST approaches

Early start of therapy, accessible to flaccid patients

"Enhanced assistant" with diversified exercises

Intensive therapy with few exclusion criteria



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