

### What is missing for physicians to prescribe a BCI?

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# WHAT IS MISSING FOR PHYSICIANS TO PRESCRIBE A BCI?

## Introduction

Since the early development of BCI, clinical applications are presented as a major objective. However, despite notable progress, they struggle to enter the clinical routine. Besides technological limits, we notice that most BCI studies involve healthy subjects, and when applied to patients, they are mainly proof-of-concept studies. Recent « replace » or « restore » BCI studies showed noticeable changes in terms of design, to optimize clinical translation. We will highlight some of these pragmatic turns. We will also compare these new strategies with general clinical guidelines and practices to emphasize what is still missing to allow a rehabilitation physician to prescribe a BCI.

## What is missing ?

Institutional frame, allowing financial support by health insurance, based on realistic cost-benefit studies

A clear list of selected BCI products

Benchmarking of usablity for each kind



Clinical Neuroengineering Center 121 Brain street, Al City

ame:	Date :
hone:	
dress:	DOB:
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Prescription :

1 EEG-BCI, Model BESTBCITM 1 cap, X electrodes, X gel tubes

Prescription period : 6 months

Medical indication :

Late stage of Amyotrophic Lateral Sclerosis, lost of communication, no residual possibility to use other AAC Clinical expert centers, gathering multidisciplinary expertise

BCI database including demographic data (age, gender, profession, ...) and their impact on performance

Validation in ecological settings : home use, social use

Customer service

Longitudinal data

5

U.



Pels, Clinical Neurophysiology, 2019

e.g: *Vansteensel, NEJM, 2016 ;* Nuyujukian et al., PLOS ONE, 2018

## **Conclusion & Perspectives**

A clinician who would like to prescribe a BCI nowadays would face uncertainty at several levels, from the choice of the most adapted BCI for a given patient, to the effects that she/he could expect. For now, the field is not mature enough to ensure optimal BCI prescription. However, methodological changes that would favor the translation, such as user centered designs and longitudinal studies are spreading rapidly. On the other hand, the dominant engineering culture of the development of BCI is still perceptible in the lack of detailed clinical description of the patients, and in the lack of precise comparison with state of the art assistive devices or rehabilitation strategies. These steps are mandatory to realize realistic cost-benefit studies that are missing to allow the refunding of BCI solutions by health insurance. Finally, a strong "pragmatic" ethical frame would be required and should encompass all these aspects.



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