

# ECT, rTMS, chronobiology

## ECT

electro-shock treatment, being the most effective therapy in psychiatry (71-94% efficacy in MDD):

- *MA*: ECT provokes an **epileptic paroxysm** via electric stimulation (over several day-long intervals) **stimulating dopaminergic transmission, GABA and  $\beta$ -endorphins**. The procedure is done under anesthesia (propofol anesthetic + succinylcholine for myorelaxation) and pre-treatment with an anticholinergic (e.g. atropine) to prevent cardiac bradyarrhythmias or aspiration is recommended. Treatment is continued till the patient achieves maximum therapeutic response (**>20s EEG seizure!**)

- *Indications*: **depression** (pharmacoresistant, psychotic depression or MDD in ), **manic schizoaffective disorder, symptomatic psychosis, schizophrenia** (catatonic or with psychomotor agitation), **lethal catatonia** (**bilateral** approach), **NMS** (from severe EPS);

- *CIs*: **intracranial HT**, CNS tumour/aneurysm, CNS post-hemorrhage, demyelination, retinal detachment, pheochromocytoma, anesthesiological hazards (concomitant infection), post-infarction;

- *AEs*: confusion, memory loss (rare & disappearing after  $\approx$  3m); - *Procedure* (takes  $\approx$  20 minutes): treatment of MDD usually takes  $\approx$  6-8 sessions, whereas mania and schizophrenia take  $\approx$  8-12 sessions; **Tonic phase** (during shock delivery)  $\rightarrow$  **clonic phase** (immediately after shock);

## rTMS (repetitive transcranial magnetic stimulation)

**Non-invasive** technique used to excite neurons in the brain as **weak electric currents are induced in the neurons by rapidly changing magnetic fields**:

- *Indication*: **major depression** (coils in dorsolateral prefrontal cortex) + **tinnitus** + NMS; - *CI*: history of **epilepsy, intracranial HT**, usage of drugs  $\downarrow$  seizure threshold, history of stroke or a pathological EEG;

- *AEs*: induction of epileptic paroxysm, headache during application, temporary  $\uparrow$  seizure threshold; **Vagus nerve stimulation**: invasive method, used mainly for **resistant epilepsy** (after ECT has failed);

- *AEs*: alteration of voice, coughing, throat pain, hoarseness,  $\downarrow$  HR, obstructive sleep apnea (reversible); **DBS**  $\rightarrow$  only used for **resistant OCD** (also for intention tremor and PD);

## Chronobiology

A branch of biology concerned with cyclical physiological phenomena:

- *Biological timing system*: central (**suprachiasmatic nuclei**) and peripheral clocks (every organ/cell);
- Zeitgebers (Synchronising agents): reset and stabilise central/peripheral clocks: **light/dark cycle** (blue light is the major one  $\rightarrow$  **melatonin** from pineal gland), social cues, mealtimes, exercise, ...
- Experiences in mice with clock mutations (polygenetic) manifest  $\uparrow$  similar behavior to human mania! • Daily and seasonal cycles affect many aspects of mental illness:
  - **Depression** is linked to diurnal mood variation, early morning awakening, longer-term periodicities (manic-depressive cycles) or seasonally linked episodes; **Sleep deprivation** may reveal  $\uparrow$  effective!
  - **Seasonal affective disorder**: may be treated with phototherapy