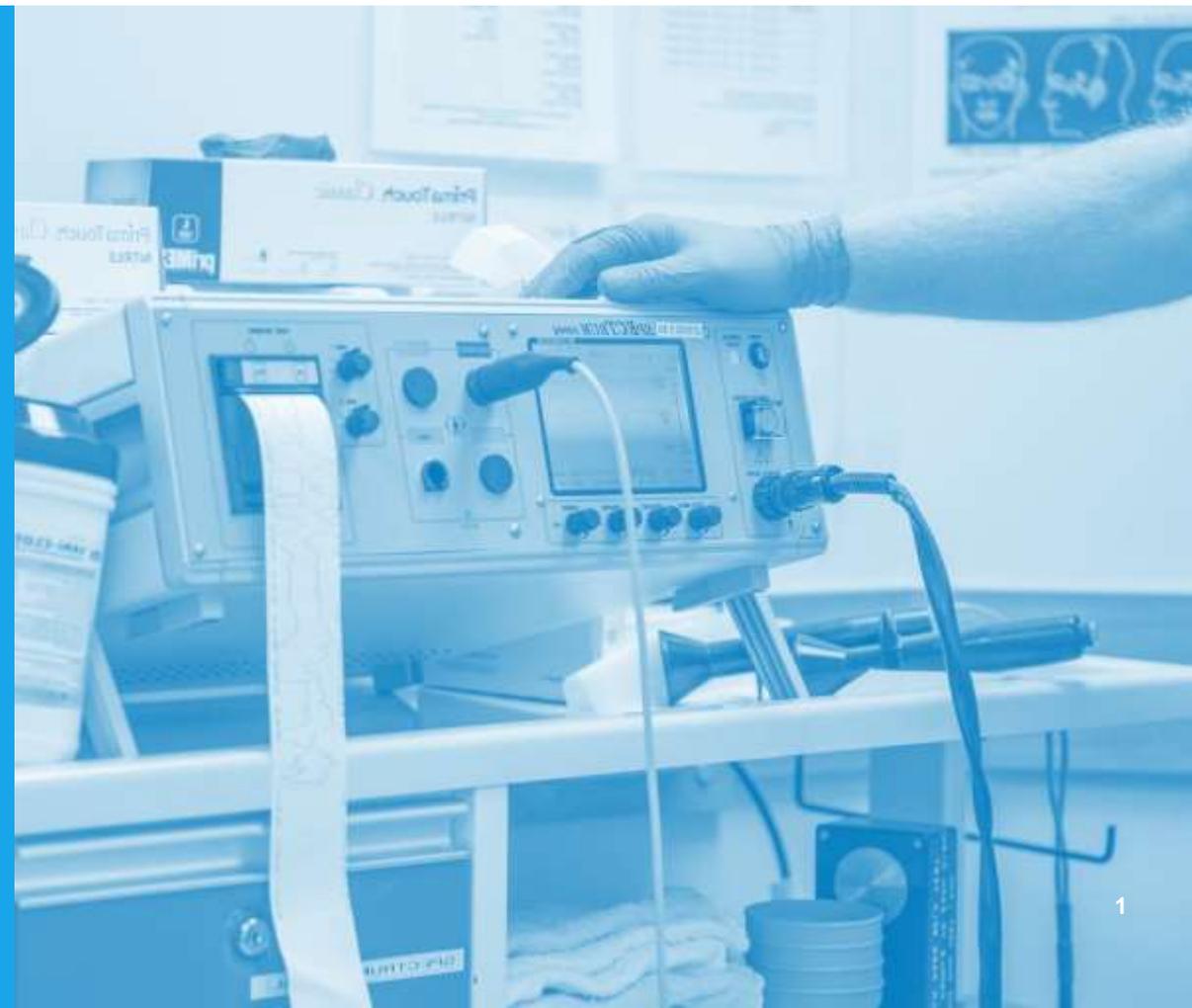


Risk of dementia after ECT

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NACT May 2023



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ECT and dementia



- Temporary memory loss is a common side effect of ECT
- However, discussions on the potential long-term adverse cognitive outcomes are ongoing

Australian study

- 87 patients (mean age 69y)
- ECT for depression
- Followed for 5 years
- 14% diagnosed with dementia
- Subsample (>75 years)
 - 36% diagnosed with dementia
 - 11% in the background population

Brodsky H, J Affect. Dis, 2000

Swedish study

- 49 patients (mean age 60y)
- ECT for depression
- Followed for 10 years
- 34% diagnosed with dementia

Berggran A, J Affect. Dis, 2016

ECT and risk of dementia in patients with affective disorders: a cohort study

Articles

  **Electroconvulsive therapy and risk of dementia in patients with affective disorders: a cohort study**

Marete Osler, Morten Pieter Rosing, Gunhild Tidemann Christensen, Per Krogh Andersen, Martin Balslev Jørgensen

Summary
Background Electroconvulsive therapy (ECT) is the most effective treatment for severe episodes of mood disorders. Temporary memory loss is a common side-effect, but ongoing discussions exist regarding potential long-term adverse cognitive outcomes. Only a few studies have examined the frequency of dementia in patients after ECT. The aim of this study was to examine the association between ECT and risk of subsequent dementia in patients with a first-time hospital diagnosis of affective disorder.

Methods We did a cohort study of patients aged 10 years and older in Denmark with a first-time hospital contact for an affective disorder from Jan 1, 2005, through Dec 31, 2015, identified in the Danish National Patient Registry with ICD-10 codes F30.0 to F39.9. From the registry we retrieved information on all ECTs registered for patients and followed up patients for incidental dementia (defined by hospital discharge diagnoses or acetylcholinesterase inhibitor use) until Oct 31, 2016. We examined the association between ECT and dementia using Cox regression analyses with multiple adjustments and propensity-score matching on sociodemographic and clinical variables.

Findings Of 168 015 patients included in the study, 5901 (3.5%) patients had at least one ECT. During the median follow-up of 4.9 years (IQR 2.4–7.8) and 872 874 person years, the number of patients who developed dementia was 111 (0.1%) of 99 045 patients aged 10–49 years, 965 (2.7%) of 35 945 aged 50–69 years, and 4128 (12.5%) of 33 025 aged 70–108 years. 217 (3.6%) of the 5901 patients treated with ECT developed dementia, whereas of 162 114 patients not treated with ECT 4987 (3.1%) developed dementia. The corresponding incidences were 70.4 cases per 10 000 person-years (95% CI 61.6–80.5) and 59.2 per 10 000 person-years (57.6–60.8). In patients younger than 50 years and 50–69 years, ECT was not associated with a risk of dementia compared with age-matched patients who were not given ECT (age-adjusted hazard ratio [HR] 1.51, 95% CI 0.67–3.46, p=0.32; and 1.15, 0.91–1.47, p=0.22, respectively). In patients aged 70 years and older, ECT was associated with a decreased rate of dementia (0.68, 95% CI 0.58–0.80; p<0.0001), but in the propensity-score matched sample the HR was attenuated (0.77, 0.59–1.00; p=0.062). 31 754 patients (17.6%) died during follow-up (mortality rate per 1000 person-years 35.7, 95% CI 35.3–36.2) and supplementary analyses suggested that the risk of dementia, taking the competing mortality risk into account, was not significantly associated with ECT (subdistribution HR 0.98, 95% CI 0.76–1.26; p=0.24).

Lancet Psychiatry 2018;
5: 348–56
Published Online
March 6, 2018
[http://dx.doi.org/10.1016/S2215-0366\(18\)30056-7](http://dx.doi.org/10.1016/S2215-0366(18)30056-7)
See Comment page 294
[http://dx.doi.org/10.1016/S2215-0366\(18\)30054-3](http://dx.doi.org/10.1016/S2215-0366(18)30054-3)
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Osler M, Rosing MP, Christensen GT, Andersen PK, Jørgensen MB.

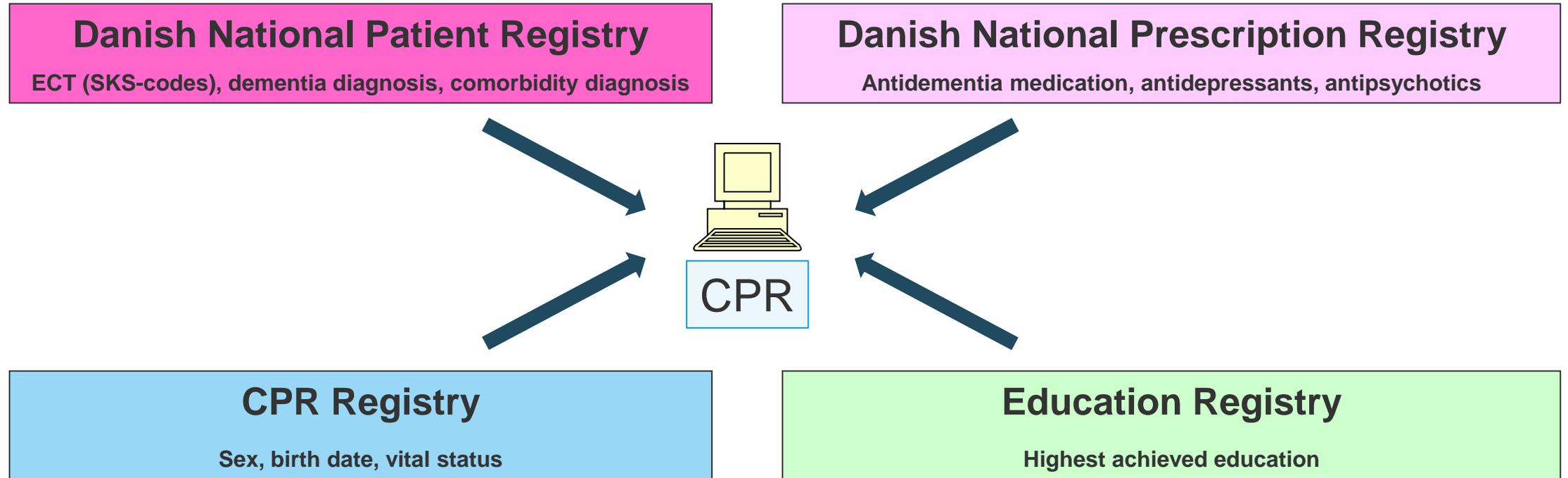
Lancet Psychiatry 2018;5:348-56.

The Danish National Patient Registry



- 1870: Danish Twin Registry
- 1925: Danish Registry of Central Paresis
- 1937: Registry of Tuberculosis
- 1943: Danish Cancer Registry; Registry of Causes of Death
- 1949: Danish Multiple Sclerosis Registry; Military Conscription Registry
- 1968: Danish Civil Registration System; Cytogenetic Register
- 1969: Central Psychiatric Registry
- 1970: Income Statistics Register; Suicide registry
- 1973: Medical Birth Registry; Register of Legally Induced Abortions
- 1974: Student Register
- 1976: Danish Breast Cancer Cooperative Group Database; Employment Classification Module
- 1977: Danish National Patient Registry**
- 1979: Central Register of Labour Market Statistics; Aarhus Sarcoma Registry
- 1980: Integrated Database for Labour Market Research; Fertility Database
- 1981: Population's Education Register; Building and Housing Register
- 1982: Danish Pacemaker and ICD Registry
- 1983: Danish Register of Congenital Malformations
- 1985: Danish Registry of Childhood Cancer; Melanoma Database
- 1989: Regional Prescription Databases; Register for Suicide Attempts; National Vascular Registry
- 1990: Nephrology Registry; National Health Service Register; Laboratory Database
- 1994: Danish Colorectal Cancer Database; In Vitro Fertilisation Register
- 1995: Danish National Prescription Database; Hip Arthroplasty Registry
- 1996: Danish Multiple Sclerosis Treatment Registry
- 1997: Danish Transfusion Database; Pathology Database; Knee Arthroplasty Registry
- 1999: Western Denmark Heart Registry
- 2000: Danish Heart Registry; Acute Leukemia Registry; Rheumatology Database; Lung Cancer; Bladder Cancer Database
- 2002: Danish Database for Hepatitis B and C
- 2003: Danish Stroke Registry; Heart Failure Registry; Schizophrenia Database; Lymphoma Database
- 2004: Danish Database of Reimbursed Prescriptions; Hysterectomy Database; Anesthesia Database; Geriatric Database
- 2005: Danish Cruciate Ligament Registry; Gynecological Cancer Database; Myelomatosis Database
- 2006: Danish National Diabetes Registry; Shoulder Alloplasty Registry; Pancreatic Cancer Database
- 2007: Danish Intensive Care Database; GP Database; Non-Melanoma Skin Cancer Database; COPD Database
- 2008: Danish Cervical Cancer and Mammography Screening Databases; Fetal Medical Database
- 2009: Danish Sarcoma Database; Children's Cancer Database; Neuro-Oncology Database
- 2010: Danish Prostate Cancer Database; Renal Cancer Database; Sleep Apnea Database; Organ Donation Database
- 2011: Danish Penile Cancer Database; Depression Database; ADHD Database; Ocular Oncology Database
- 2013: Danish Testicular Cancer Database; Heart Rehabilitation Database; Liver and Bile Duct Cancer Database
- 2014: Danish Colorectal Cancer Screening Database

Register data





ECT and risk of dementia in patients with affective disorders: a cohort study



Osler et al.

168,015 patients with
incident affective disorder
between 2005-2015



5,901 (3.5%) patients
treated with ECT

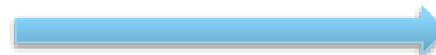


162,144 (96.5%) patients
not treated with ECT



217 (3.7%) dementia
outcomes

Follow-up: 5 years



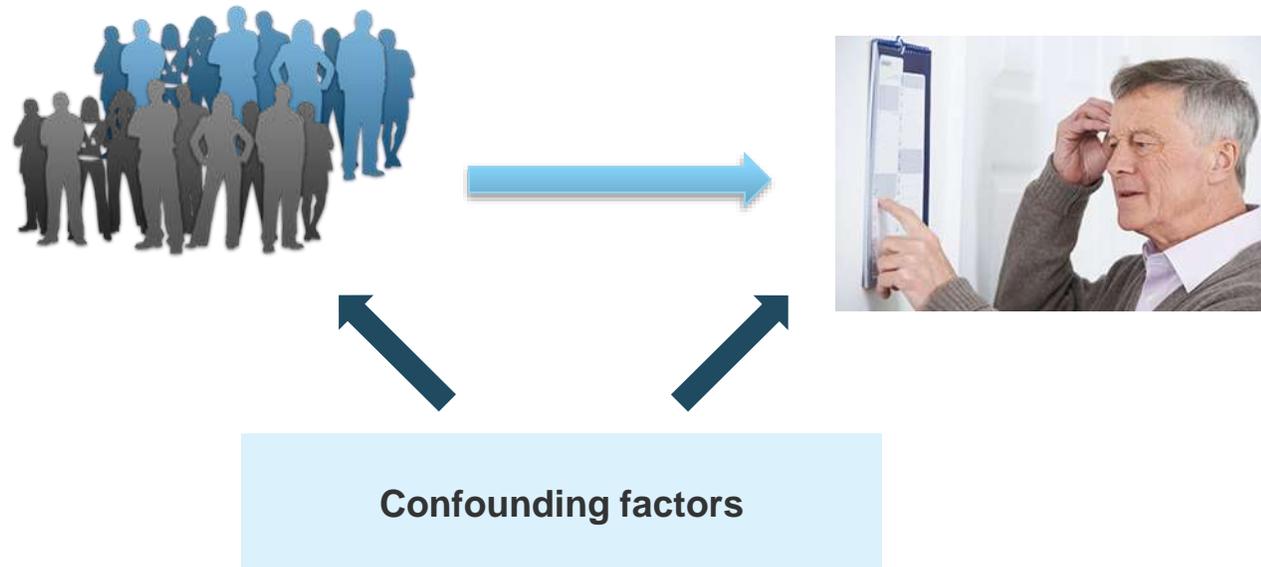
4,987 (3.1%) dementia
outcomes





Confounding

Lack of comparability between patients treated with ECT and patients not treated with ECT on factors that are associated with their risk of dementia



Osler et al.

Accounted for by:

- Multiple adjustment
- Propensity score matching

Baseline characteristics in %



Osler et al.

	Original sample		PS matched sample	
	No ECT	ECT	No ECT	ECT
Total	162 114	5901	5901	5901
Women	62.1	59.8	59.5	59.8
Mean age	46.9	52.7	52.6	52.7
High educated	13.9	20.6	20.9	20.6
Comorbid schizophrenia	2.3	4.6	4.3	4.6
Comorbid alcohol and mixed substance abuse	9.4	7.2	6.8	7.2
Previous stroke	7.1	4.2	3.9	4.3
TCA the year before inclusion	4.7	8.9	8.2	8.9
Other antidepressants the year before inclusion	61.5	73.7	73.7	73.6
Lithium the year before inclusion	0.6	1.9	1.7	1.9
Typical antipsychotics the year before inclusion	7.1	12.1	11.9	12.1
Atypical antipsychotics the year before inclusion	1.5	3.2	4.6	4.2
Other antipsychotics the year before inclusion	2.5	5.3	4.9	5.3

Results



Osler et al.

	Dementia outcomes	Multiple adjusted* HR (95%CI)	Propensity Score matched (95%CI)
Age 10-49			
No ECT	105	1	1
ECT 	6	1.42 (0.60-3.35)	2.36 (0.46-11.41)
Age 50-69			
No ECT	890	1	1
ECT 	75	1.28 (0.97-1.64)	1.45 (0.97-2.13)
Age 70-108			
No ECT	3992	1	1
ECT 	136	0.62 (0.52-0.76)	0.77 (0.59-1.00)

*Adjusted for sex, educational level, subdiagnosis, comorbidities, and co-medication at baseline





Supplementary analyses

Information bias

Can the results be explained because ECT may influence how likely doctors are to give a diagnosis of dementia?

➔ When data was reanalysed with lag period of 2 years, results were similar to the main results.

Competing risk of death

Can the results be explained because early death would prevent dementia from occurring and ECT have been related to mortality ?

➔ When data were analysed using competing risk regression results were relative similar to the main results.



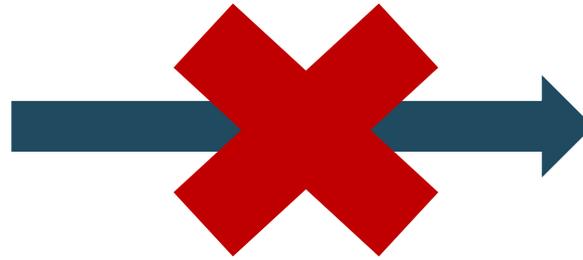
Osler et al.



Conclusion



Osler et al.



ECT was **not associated** with risk of incident dementia in patients with affective disorder after correcting for the effect of patient selection and competing mortality



ECT and risk of Dementia in Taiwan



Chu et al.

frontiers
in Psychiatry

ORIGINAL RESEARCH
published: 07 September 2018
doi: 10.3389/fpsyg.2018.00007

Check for updates

Electroconvulsive Therapy and Risk of Dementia – A Nationwide Cohort Study in Taiwan

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OPEN ACCESS

Edited by: Xavier Noya, Free University of Brussels, Belgium

Reviewed by: Serge Brand, Universität Basel, Switzerland; Xiaowei Han, China-Japan Friendship Hospital

Background: Electroconvulsive therapy (ECT) is an effective treatment for schizophrenia, bipolar disorder, and major depressive disorder, and a temporary memory loss may occur after ECT. However, the association between ECT in patients with schizophrenia, bipolar disorder, and major depressive disorder, and the risk of dementia is yet to be examined.

Objective: This study aimed to clarify as to whether ECT is associated with the risk of dementia after ECT in patients with schizophrenia, bipolar disorder, and major depressive disorder.

Chu C, Chien W, Chung C, Chao P, Chang H, Kao Y, Chou Y, Tzeng N.

Front in Psychiatry 2018;9:367

Methods

92,295 patients with bipolar disorder,
depression or schizophrenia
in year 2000



Matched 1:3 by:
• Sex
• Age
• Index date



994 (1.1%) patients
treated with ECT



2,982 patients
not treated with ECT



45 (4,5%) dementia outcomes

Follow-up: 10 years



149 (5,0%) dementia outcomes



Chu et al.



Results



Chu et al.

	Dementia outcomes	Multiple adjusted HR (95%CI)
No EC 	149	1 [reference]
ECT	45	0.77 (0.58-1.29)

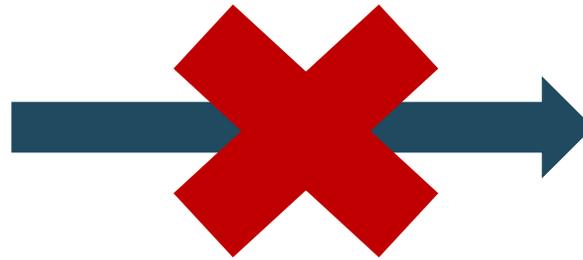
*Adjusted for sex, age, comorbidity, urbanization, level of insurance



Conclusion



Chu et al.



The study supports that ECT is **not associated** with risk of dementia in patients with bipolar disorder, depression or schizophrenia.

Dementia after ECT for affective disorder: ECTs in Risskov



Hjerrild et al.

ORIGINAL STUDY

Long-Term Risk of Developing Dementia After Electroconvulsive Therapy for Affective Disorders

Simon Hjerrild, MD, PhD,* Johnny Kahlert, MSc, PhD,† Poul-Erik Buchholtz, MD,*
Raben Rosenberg, MD, DMSc,‡ and Poul Videbech, MD, DMSc§

Objectives: Severe depression is associated with an increased risk of developing dementia, however, whether treatment with electroconvulsive therapy (ECT) modify this risk remains unknown.

Methods: In this matched cohort study, 1089 consecutive in-patients with affective disorders, receiving ECT during the period 1982 to 2000, were matched with 3013 in-patients with affective disorders not treated with ECT (non-ECT), and 108,867 individuals randomly selected from the background population. The comparison cohorts were matched on sex, age, and the non-ECT cohort was further matched according to diagnoses and admission period and hospital. Dementia diagnoses were retrieved from the national patient health registry. Analyses were adjusted for disease severity, somatic, and psychiatric comorbidities.

Results: The cumulative incidence of dementia was 13.45% (10.75–16.46%) in the ECT cohort after 34 years of follow-up, 10.53% (8.5–12.81%) in the non-ECT cohort, and 8.43% (8.17–8.7%) in the background cohort. Using the ECT cohort as reference and age as the underlying time scale, the adjusted hazard ratio of developing dementia was 0.73 (0.52–1.04) in the non-ECT cohort and 0.61 (0.49–0.76) in the background cohort. The stratified analysis based on age at index (<65 years; 65–80 years; >80 years) found no age-related difference in the risk of developing dementia between the ECT cohort and non-ECT cohort.

Conclusions: The ECT treatment of affective disorders was not associated with an increased long-term risk of developing dementia compared with in-patients with affective disorders not treated with ECT.

Key Words: depressive disorder, bipolar disorder, dementia, electroconvulsive therapy, epidemiologic studies

(J ECT 2021;37: 250–255)

Electroconvulsive treatment (ECT) is an effective treatment against major depression.¹ The procedure is safe, and ECT-related mortality is extremely low.^{2,3} However, some

administered neuropsychological tests and processing speed, working memory, anterograde memory, and some aspects of executive function improved beyond baseline levels,⁴ but a recent study have shown that the cognitive effects of ECT can persist up to 6 months.⁵ No accumulation of cognitive impairment was observed in a study of patients undergoing maintenance ECT.⁶

Nevertheless, some patients report long-lasting or even permanent impairments in autobiographical memory,¹⁰ that is, difficulties in retrieving memories of personal events or facts acquired before commencing ECT. The precise nature of ECT-associated autobiographical impairments and how they should be assessed and measured remain debated.^{11–13} Autobiographical memory impairments can accentuate ECT-related anxiety through negative reports on ECT in social and lay media and lead to public concern over ECT potentially causing “brain damage.”¹⁴ A recent review of magnetic resonance imaging studies was unable to report any detrimental effect of ECT on brain structure,¹⁴ and the findings are substantiated by several animal studies.¹⁵ Kranaster et al¹⁶ showed no increase in serum levels of proteins associated with structural brain damage after ECT. The same research group found increased mobilization of Aβ_{1–42} levels in cerebrospinal fluid after efficacious ECT of depression, pointing toward a potential protective effect of ECT against dementia in patients with depression.¹⁷ It remains unfeasible to fully differentiate between the mid-term and long-term adverse effects of ECT on cognitive function posttreatment from the cognitive impairment associated with depression.¹⁸ This is further complicated by depression per se, which increase the risk of dementia 2-fold.^{19,20} Two previous epidemiological studies have examined the risk of developing dementia in patients that received ECT. First, a Danish large cohort study of 168,015 patients diagnosed with affective disorders from 2005 to 2015 of whom 5901 had at least one ECT. During a me-

Hjerrild S, Kahlert J, Buchholtz P, Rosenberg R, Videbech P.

J ECT 2021,37:250-4.

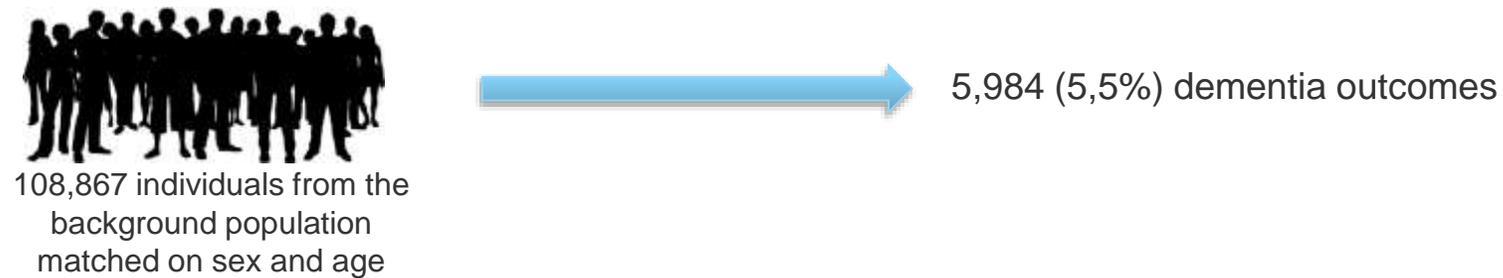
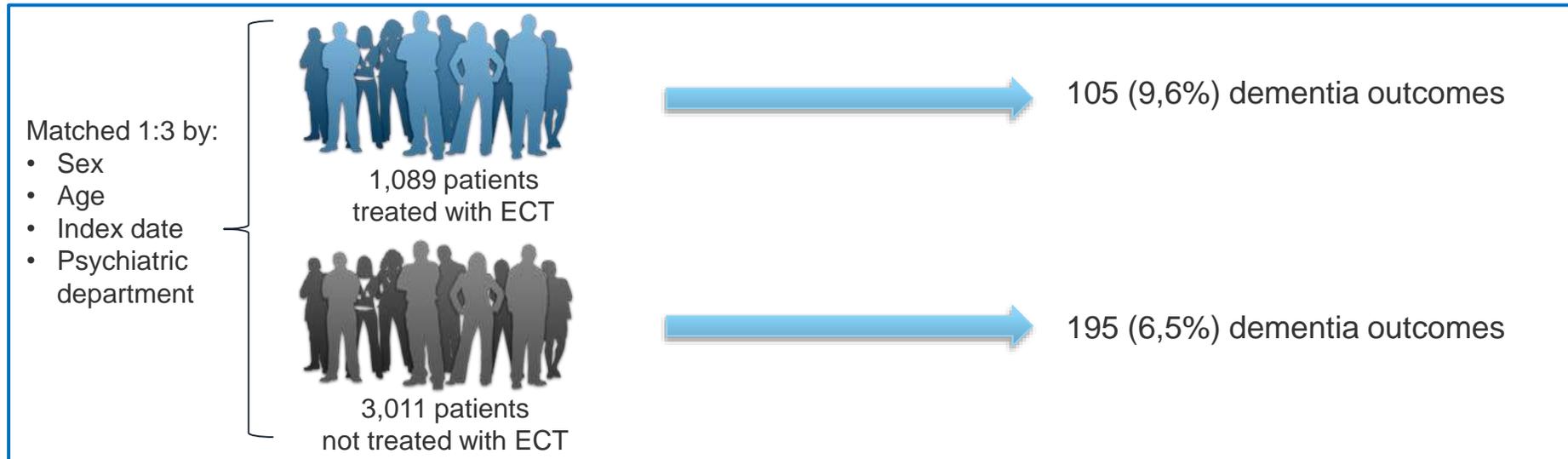


Methods

Patients with affective disorder 1982-2000



Follow-up: 16 years



Results

		Dementia outcomes	Multiple adjusted* HR (95%CI)
All ages			
No ECT		195	1
ECT		105	1.36 (0.96-1.92)
Age <65			
No ECT		<i>Not reported</i>	1
ECT		<i>Not reported</i>	1.69 (0.96-3.00)
Age 65-80			
No ECT		<i>Not reported</i>	1
ECT		<i>Not reported</i>	1.07 (0.68-1.69)
Age >80			
No ECT		<i>Not reported</i>	1
ECT		<i>Not reported</i>	3.44 (0.92-12.51)

*Adjusted for sex, educational level, subdiagnosis, comorbidities, and co-medication at baseline



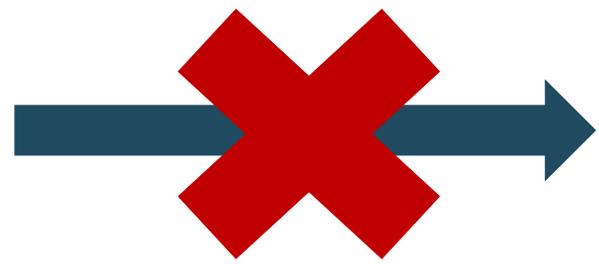
Hjerrild et al.



Conclusion

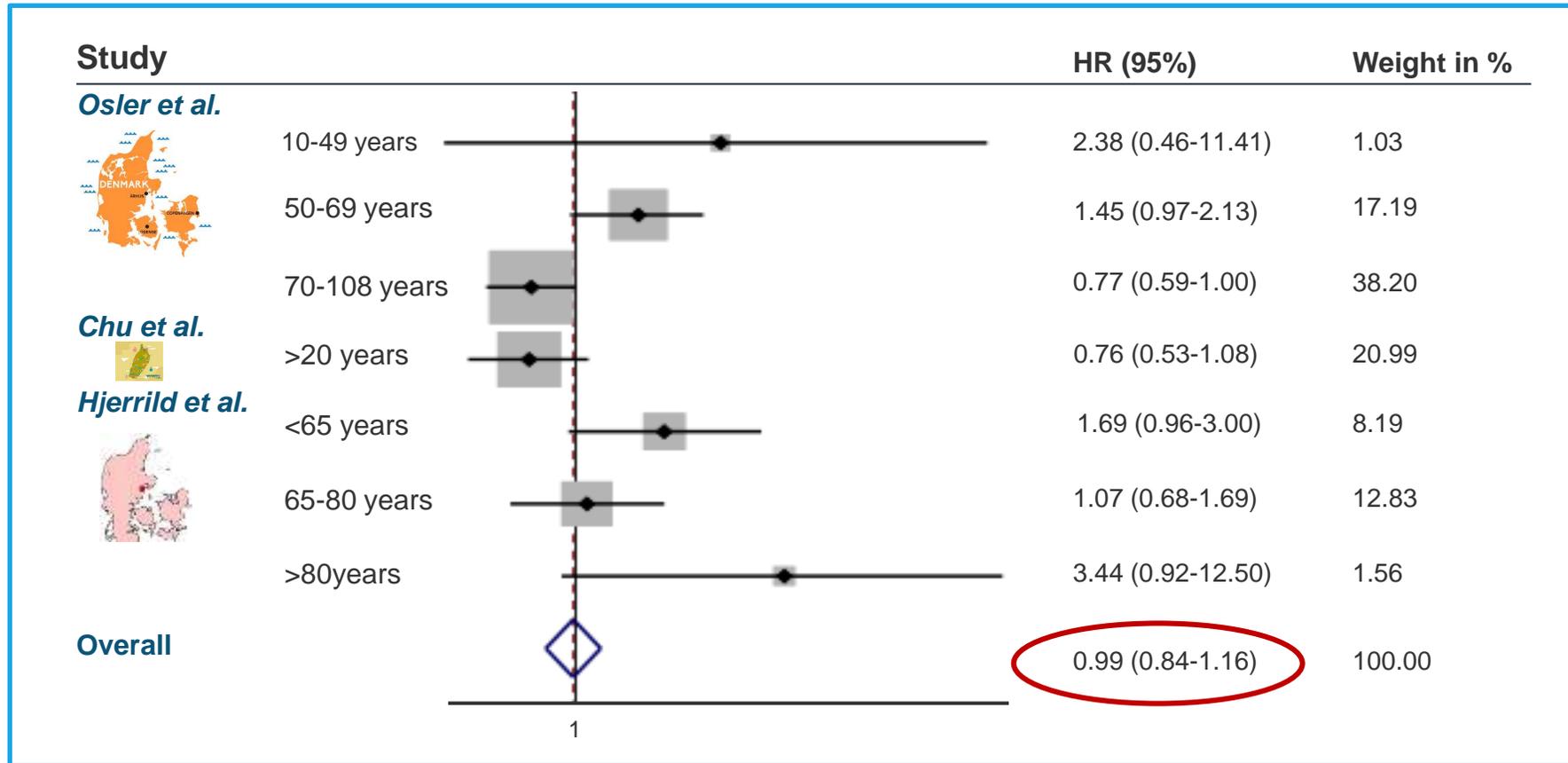


Hjerrild et al.



ECT treatment was **not associated** with long-term risk of developing dementia in patients with affective disorders.

A meta-analysis



Back to the beginning...



- Temporary memory loss is a common side effect of ECT
- However, discussions on the potential long-term adverse cognitive outcomes are ongoing

Australian study



- 87 patients (mean age 69y)
- ECT for depression
- Followed for 5 years
- 14% diagnosed with dementia
- Subsample (>75 years):
 - 36% diagnosed with dementia
 - 11% in the background population

Brodsky H, J Affect. Dis, 2000

Swedish study

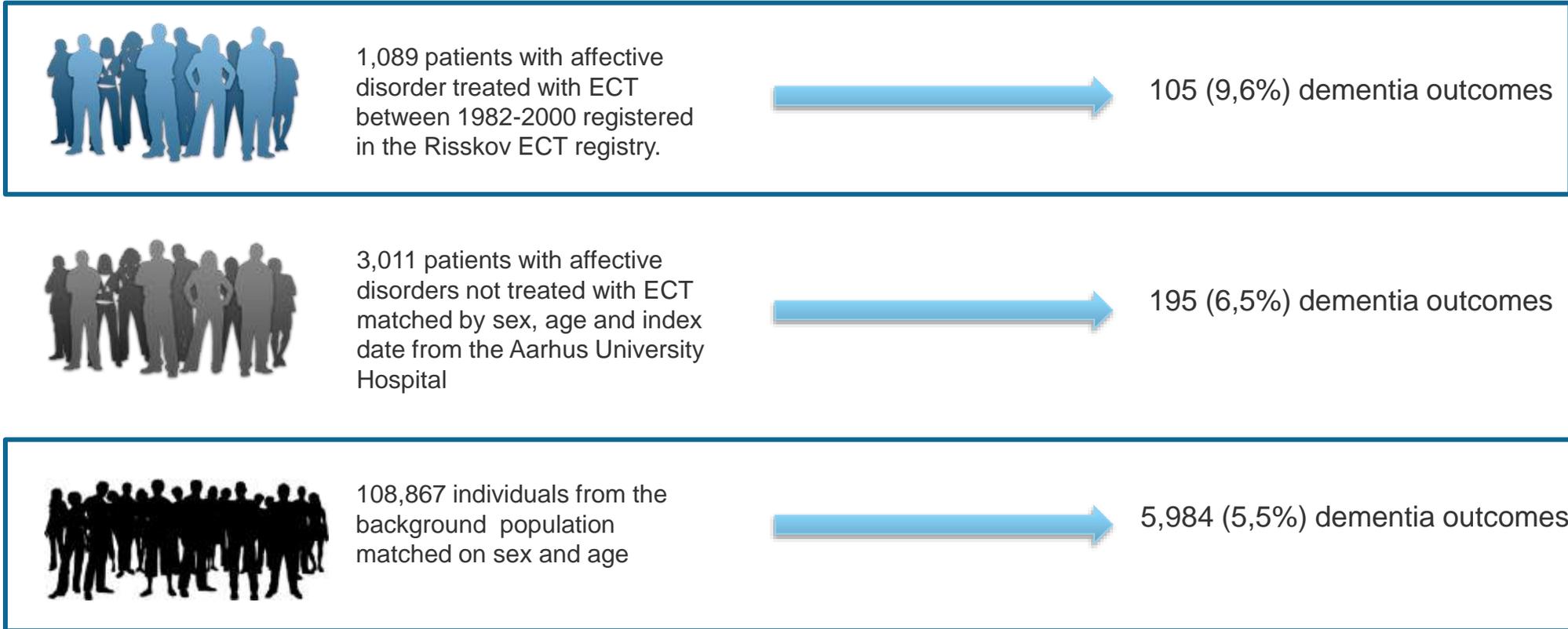
- 49 patients (mean age 60y)
- ECT for depression
- Followed for 10 years
- 34% diagnosed with dementia

Berggran A, J Affect. Dis, 2016





What about dementia in the background population?



Compared to dementia in the background population?

	Dementia cases	Crude Risk estimate	Adjusted* Risk estimates
Australia >75 years (1)			
 Background population	<i>Not described</i>	1	<i>n/a</i>
ECT 	10	3.27	<i>n/a</i>
Denmark all ages (2)			
 Background population	5984	1	1
ECT 	105	3.10 (2.56-5.71)	1.63 (1.31-2.05)

*Adjusted for sex, educational level, subdiagnosis, comorbidities, and co-medication at baseline



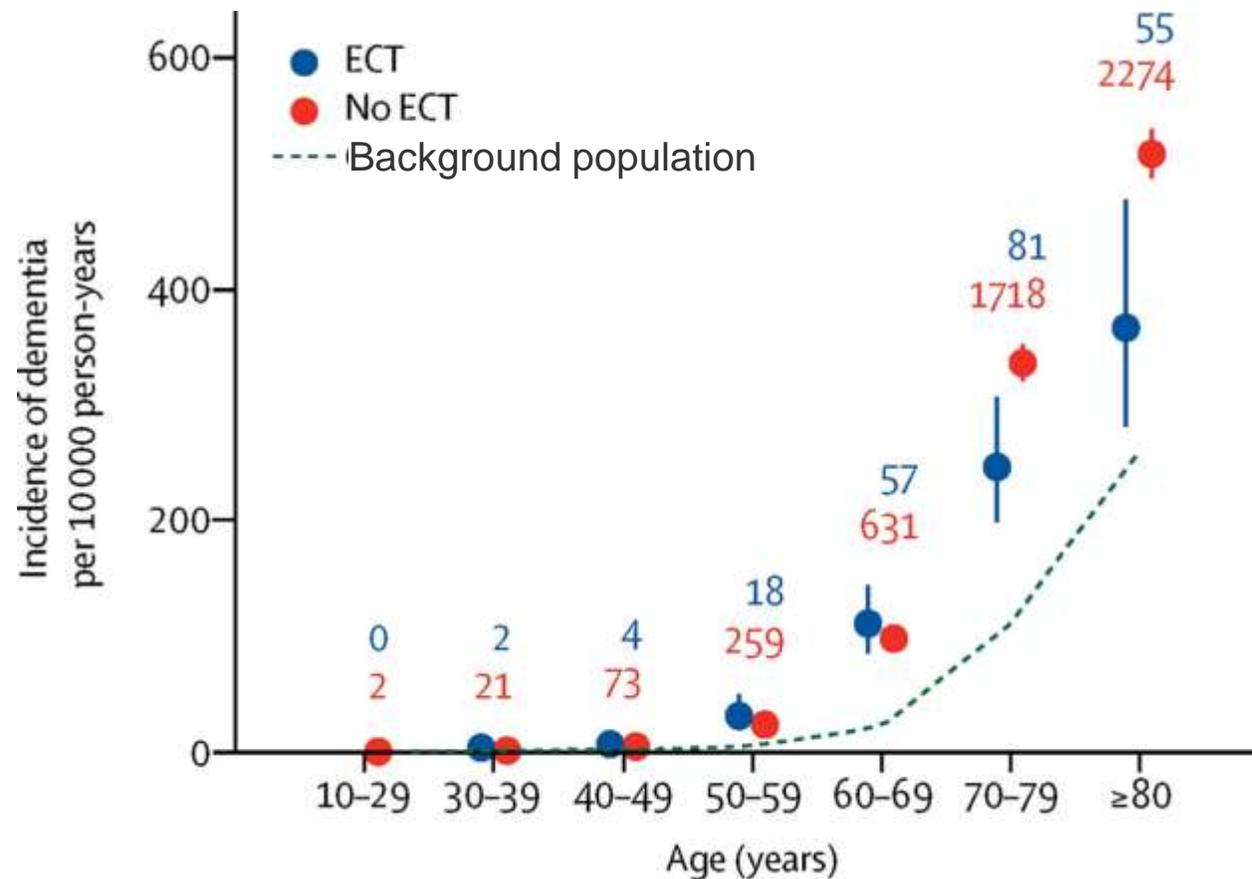
Danish patients with affective disorder (ECT and no-ECT) compared to the background population



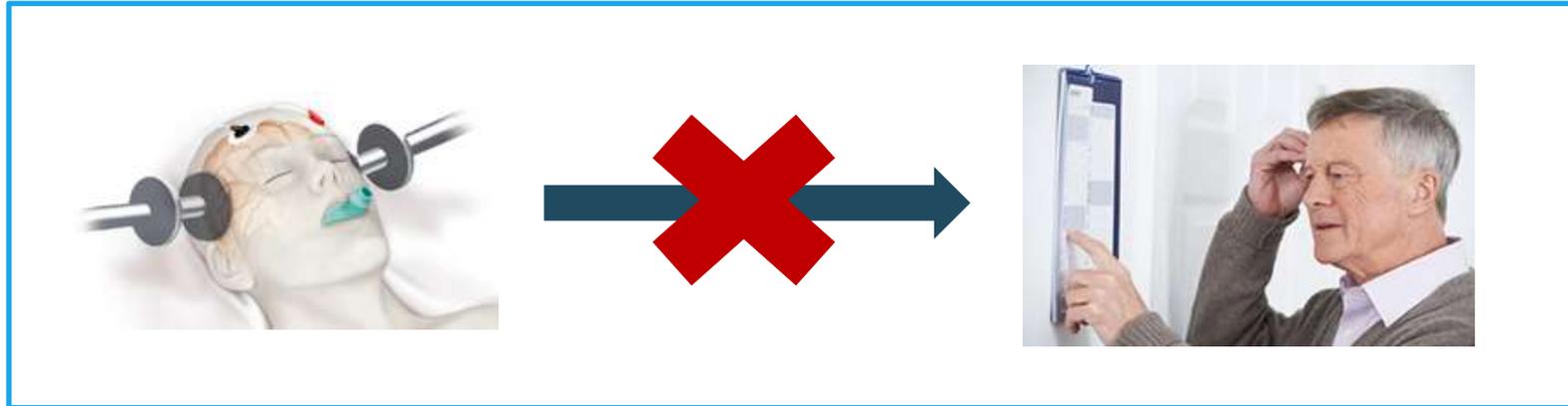
5,901 patients (3,5%) treated with ECT



162,144 patients (96,5%) not treated with ECT



So, is ECT associated with risk of dementia?



Thank you

