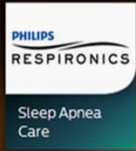
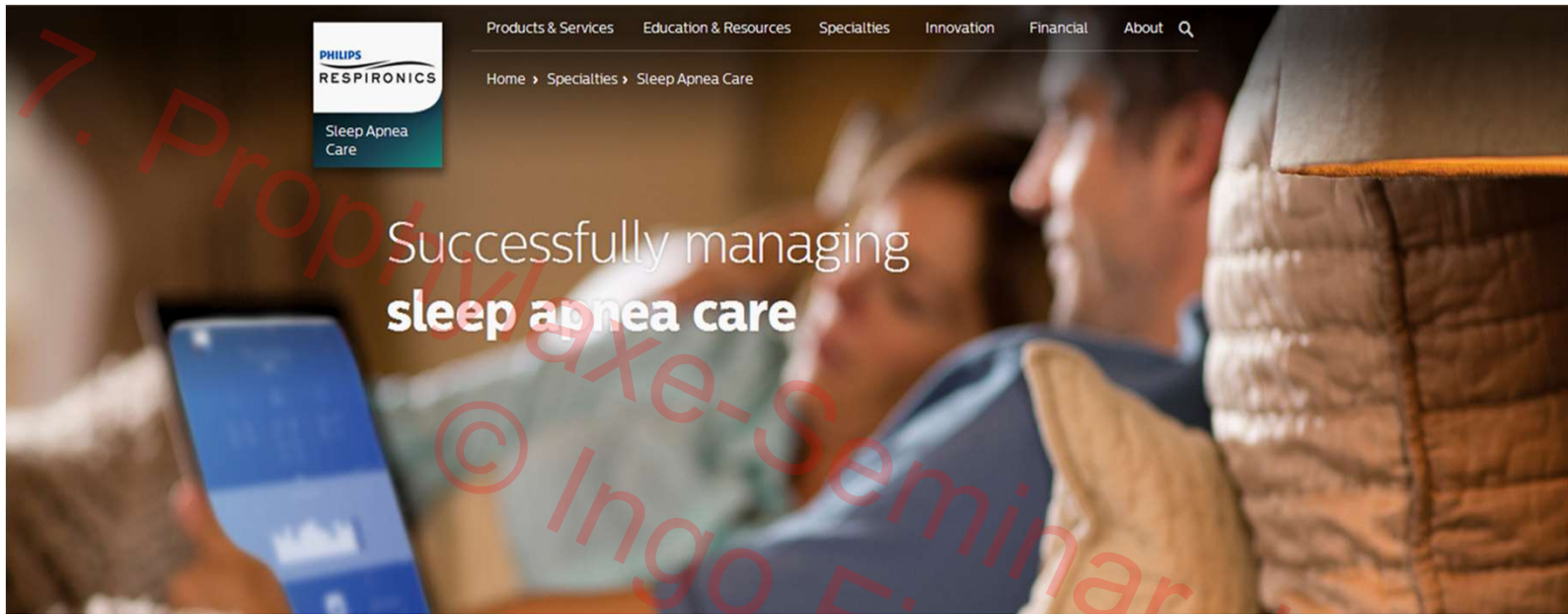


# Schlafapnoe als Risikofaktor für den Schlaganfall

I. Fietze

**CHARITÉ**  
Interdisziplinäres  
Schlafmedizinisches Zentrum  
CCM



# Successfully managing sleep apnea care

More than 22 million Americans have obstructive sleep apnea (OSA), and as many as 80 percent of sleep apnea patients in the U.S. remain undiagnosed.

Successfully managing sleep patients in today's changing healthcare environment is more challenging and costly than ever. It has become increasingly important to make diagnosing complex sleep conditions more efficient, make therapy easier for patients to live with and make ongoing care more productive and cost-effective.

Recognizing the growing need for new and better solutions, we've taken an end-to-end approach to help establish healthier patients and healthier businesses for a changing world.

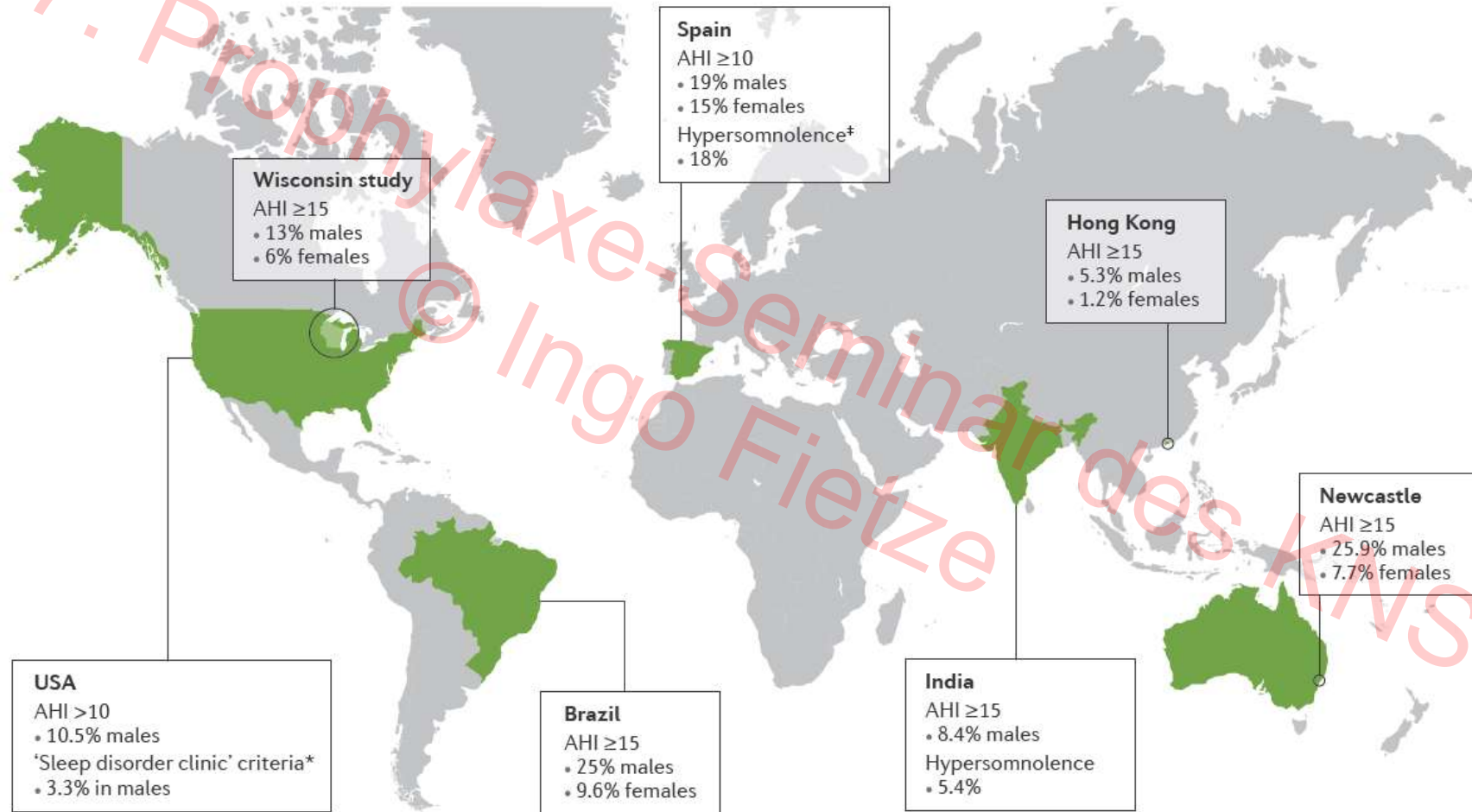
Learn more about our solutions for sleep apnea management.



Germany: 5.6 Mio  
(Diabetes: 7.5 Mio)

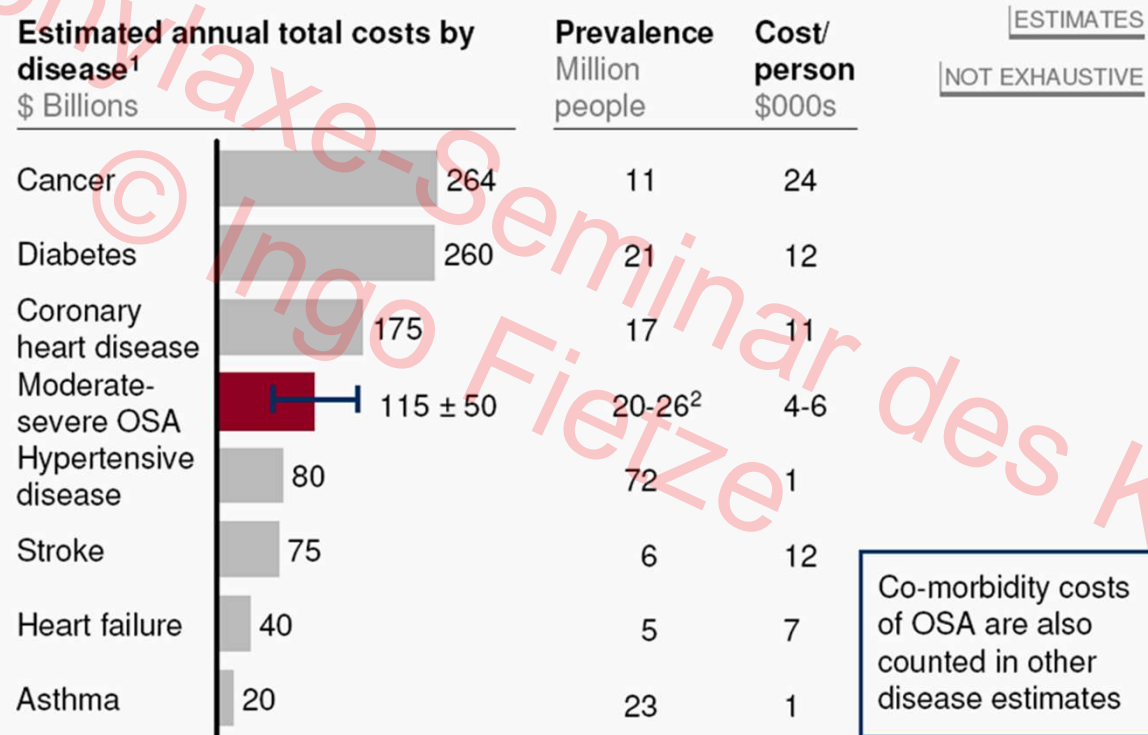


# Prävalenz von SBAS



# Kosten der Schlafapnoe

**Moderate – severe OSA has significant economic cost relative to other diseases, yet requires a relatively inexpensive treatment approach**

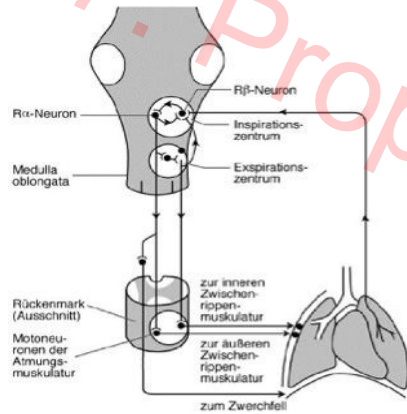


<sup>1</sup> Total cost estimation approach varies by disease in ways that cannot be easily compensated for (e.g., inclusion of mortality and/or morbidity costs). Estimates for diseases other than OSA largely included less costs.

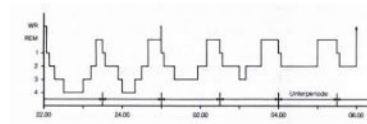
<sup>2</sup> Assumes prevalence of moderate – severe OSA is 6.5% - 8.5%

SOURCE: American Heart Association; American Diabetes Association; National Heart; Lung and Blood Institute, American Cancer Society

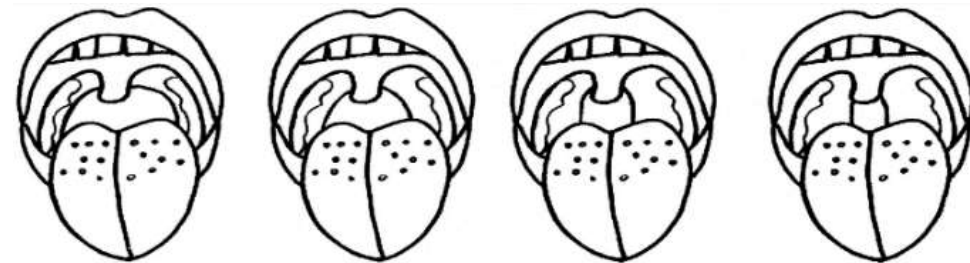
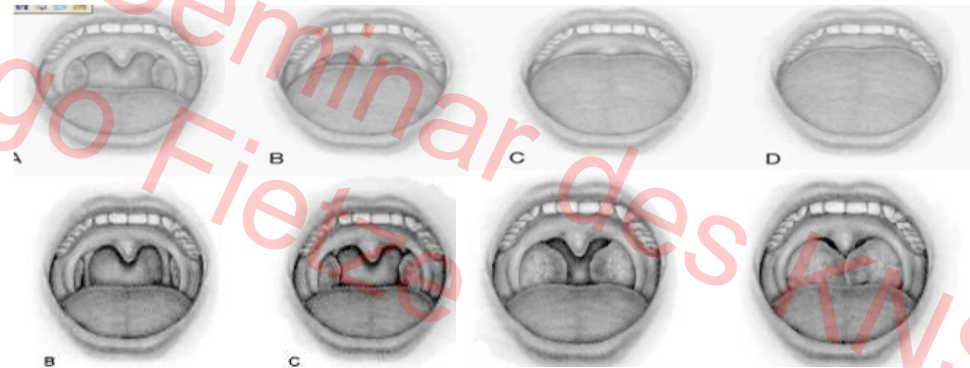
# Der Phänotyp Schlafapnoe



## Das Schlaf-Wach-Zentrum



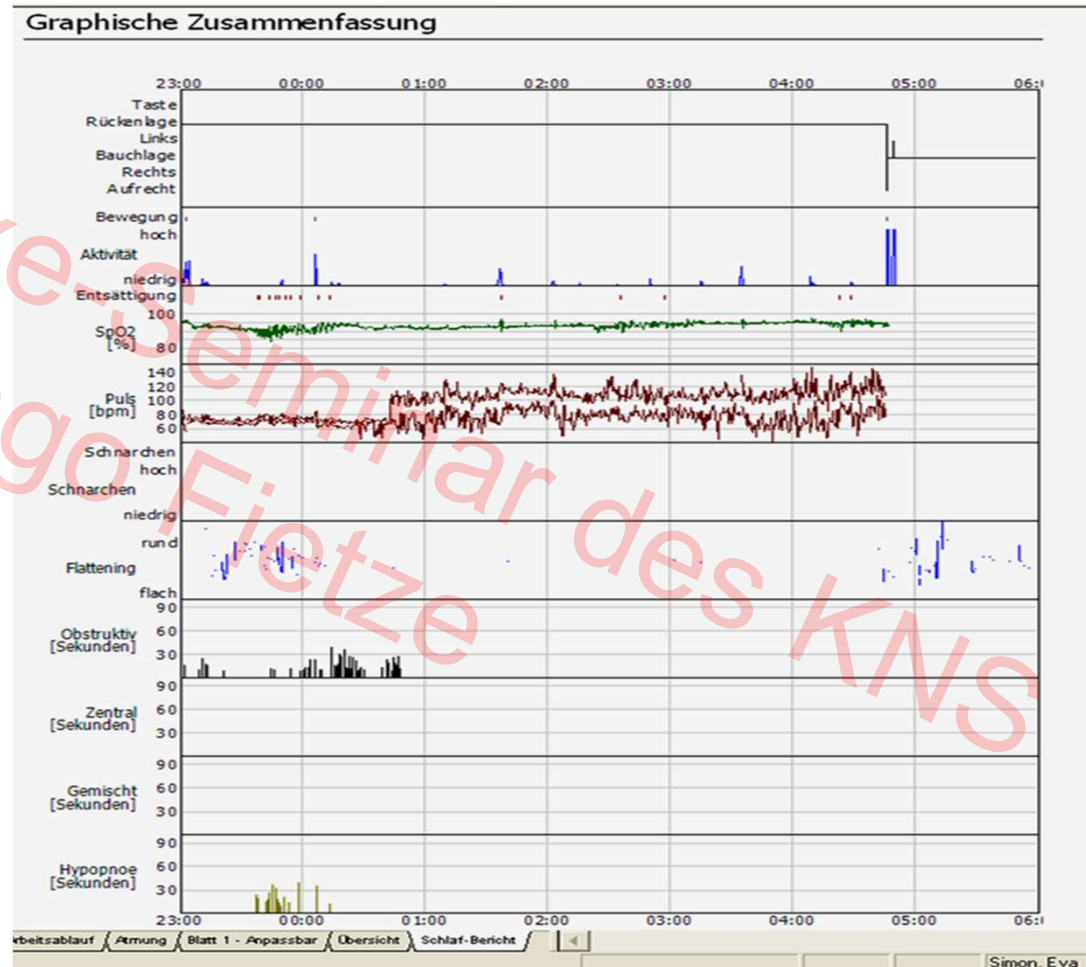
## Anatomie



- Alter
- Geschlecht
- BMI
- Medikamente
- Hormone

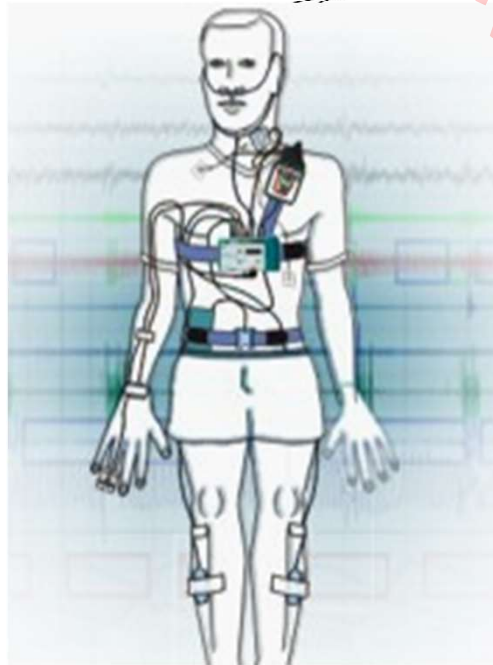
...

# Ambulantes Monitoring

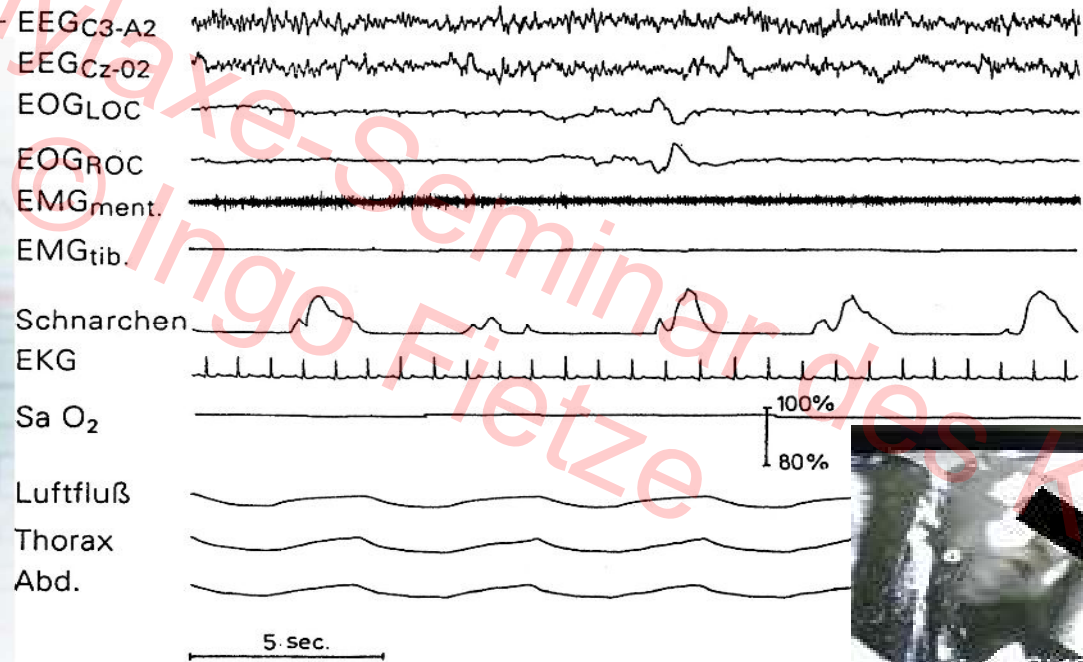




## Wie wird Schlaf gemessen?



- Video



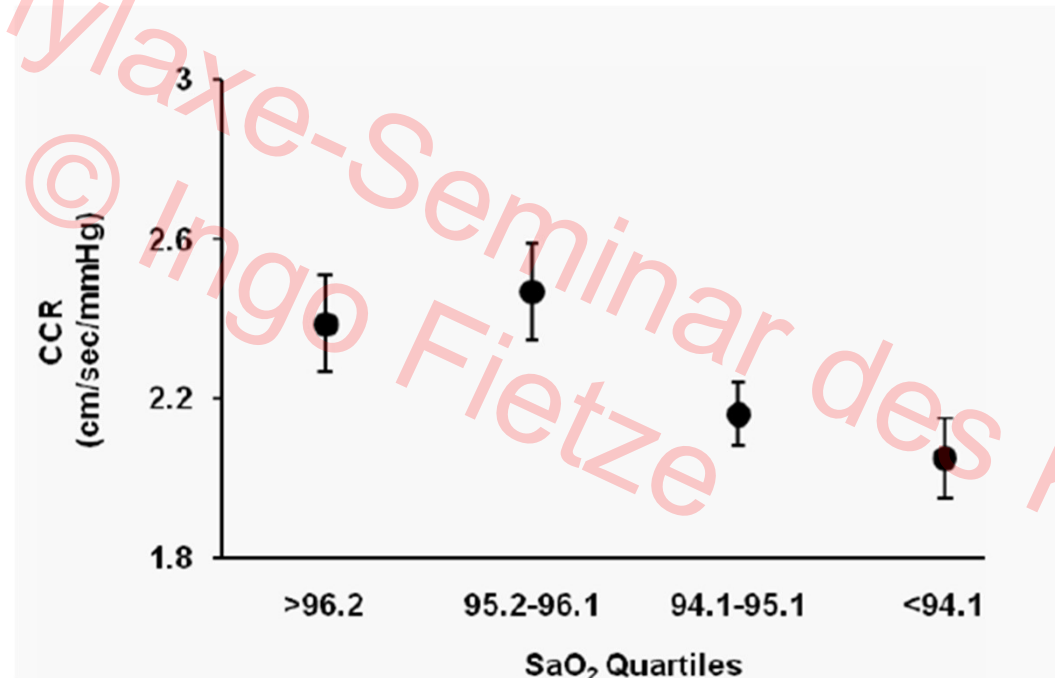
# OSAS und zerebrale CO<sub>2</sub> Reaktivität

WSCS

-n=373

-Atemantworttest  
auf CO<sub>2</sub> am Tage

-Hyperkapnische  
Vasodilatation der  
zerebralen  
Zirkulation ist  
gedämpft bei  
OSA, in  
Abhängigkeit vom  
AHI



## Bildgebung und OSA

Detektion anatomischer Besonderheiten der oberen Atemwege

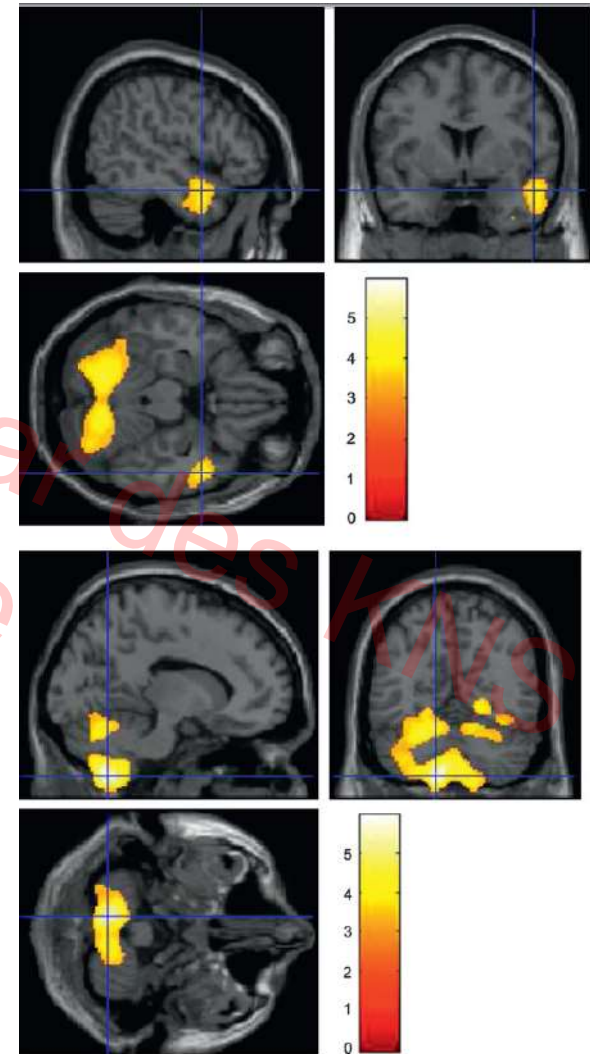
Detektion von viszeralem Fett

Detektion von Veränderungen (Akt.Abnahme) im ZNS: linkes Cerebellum und rechter mittl. Temporallappen (Motorkoordination, Gedächtnis, Aufmerksamkeit, Kognition)

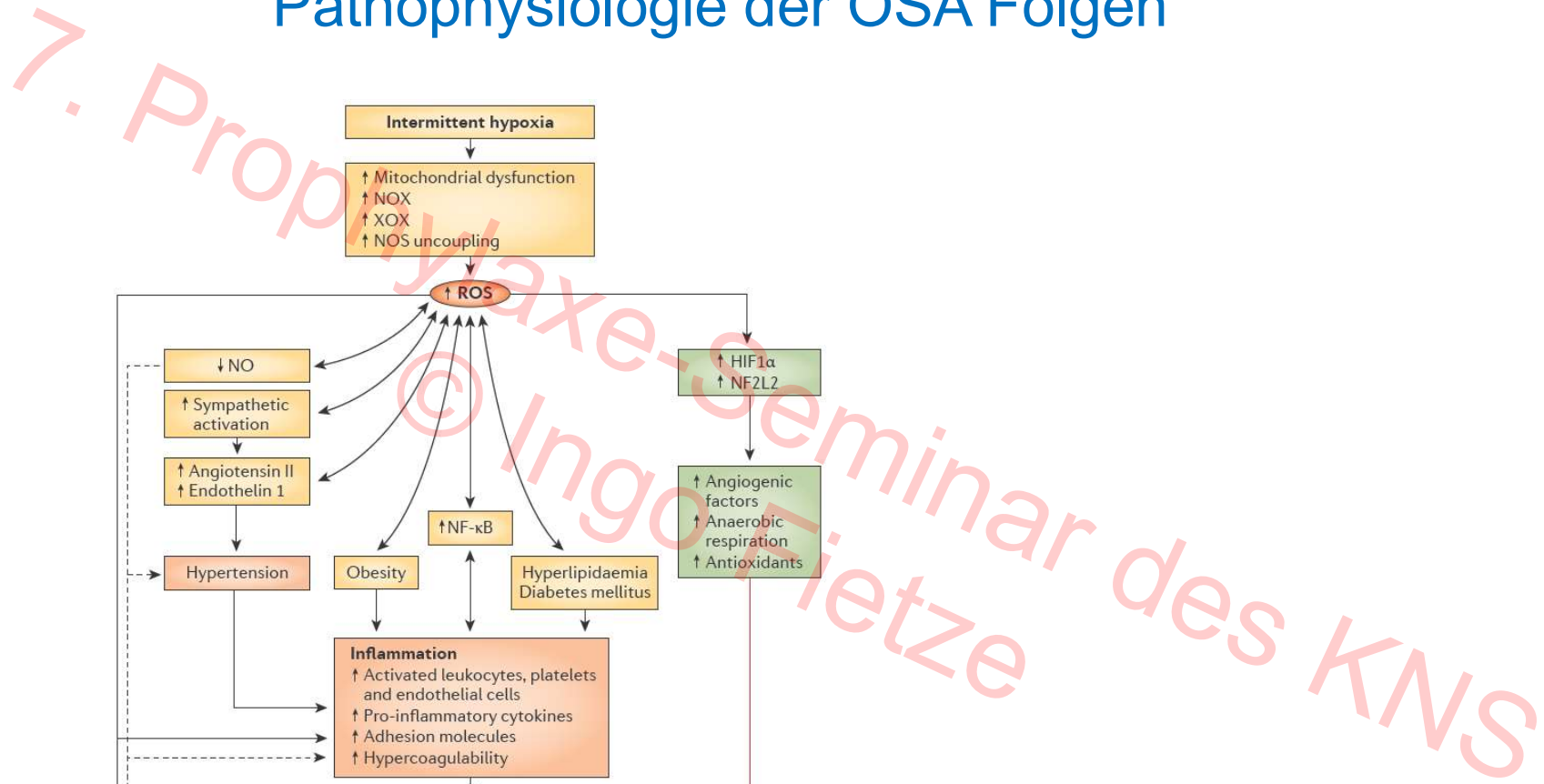
Kompensatorisch Zunahme der task-related Hirnregionen

Reduktion der mamillary bodies (gehören zum limb.System und z.T. HoT) führen zu Gedächtnisstörungen (ähnlich wie bei Alkoholismus oder Alzheimer)

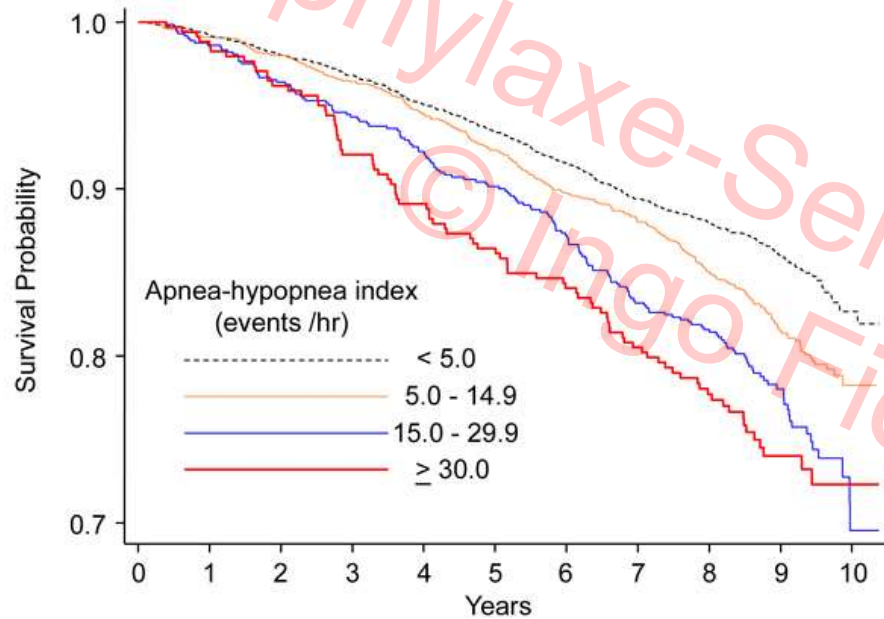
Morell et al. Thorax 2010;65(10)



# Pathophysiologie der OSA Folgen



## Risiko OSA



At risk:	6294	6205	6110	6001	5868	5732	5566	5411	4756	2357	300
Deaths:	0	59	143	241	359	478	616	757	875	989	1046

**Hypertonie**

**Vorhofflimmern**

**Herzinsuffizienz**

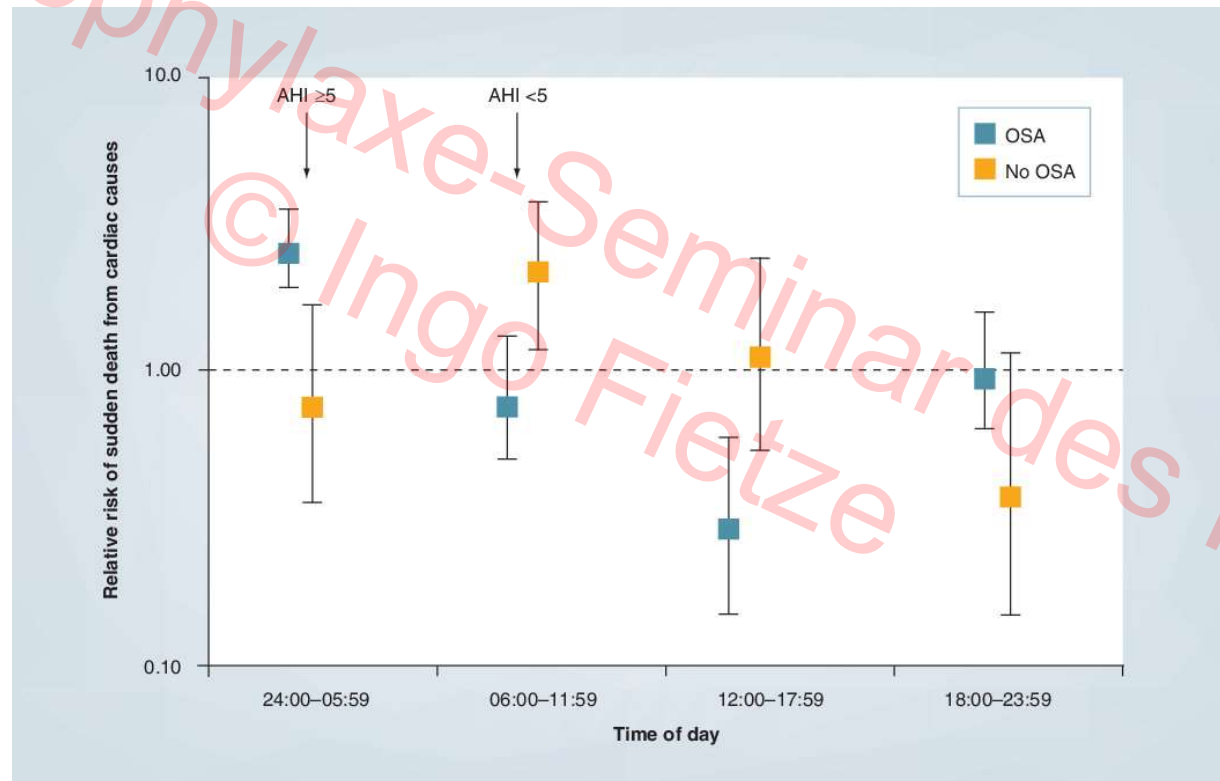
**KHK**

**Schlaganfall**

**D.mellitus**

**Artherosklerose**

# Obstructive sleep apnea: novel trigger and potential therapeutic target for cardiac arrhythmias



## Prävalenz von SBAS bei Herz-Kreislauf-erkrankungen

Reported prevalence of obstructive sleep apnea in cardiovascular conditions.

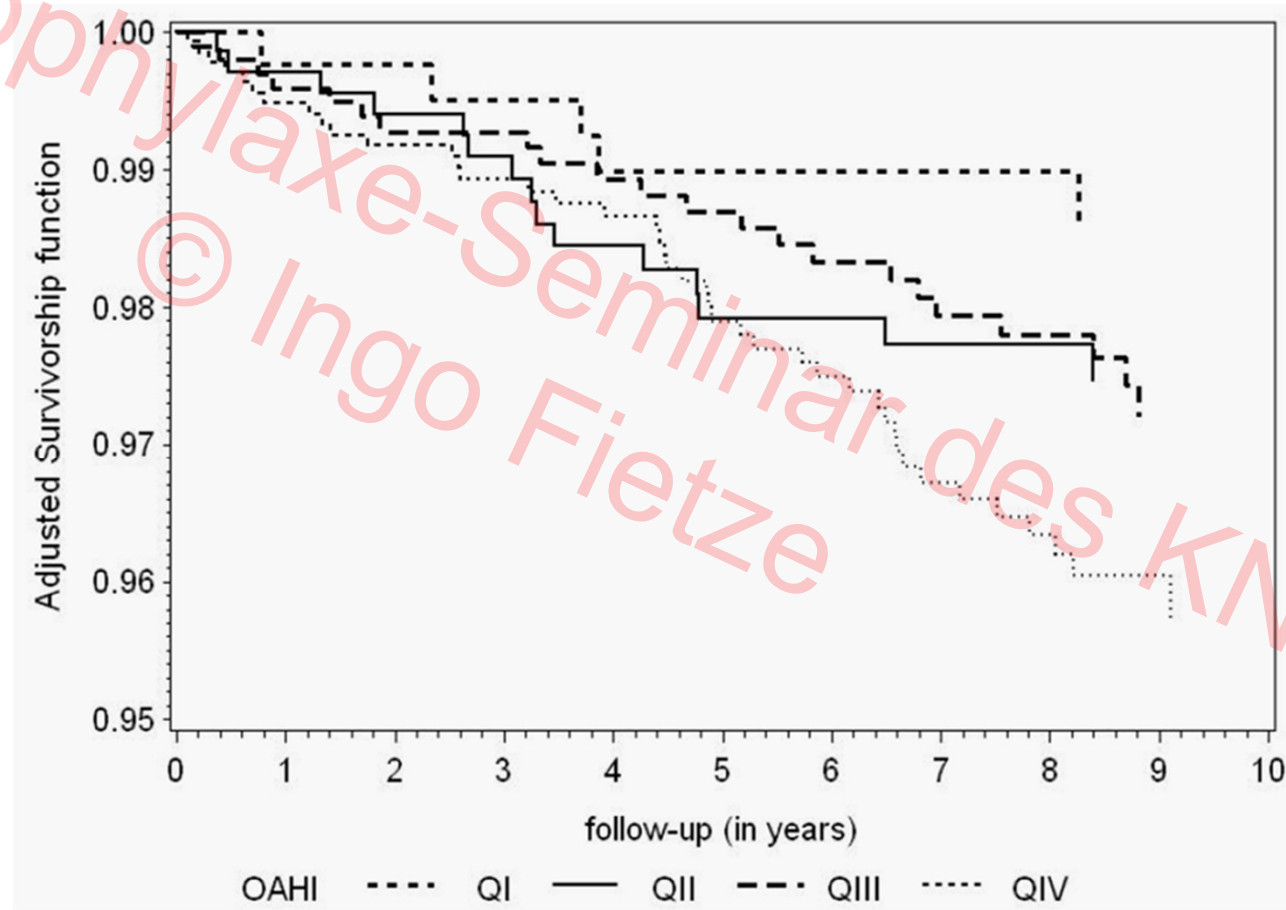
Condition	Prevalence (range as percent)
Hypertension	30–83
Ischemic heart disease	30–58
Stroke	43–91
Heart failure (impaired systolic function)	12–53
Heart failure (preserved systolic function)	40 <sup>a</sup>
Hypertrophic cardiomyopathy	40
End stage renal disease	40–60

<sup>a</sup> For apnea–hypopnea index >5 events/h.

# OSAS und Schlaganfall

SHHS

- n=5422
- 8.7 Jahre
- Sign. Zshg OSA & Schlaganfall bei den Männern, unabh. vom AHI (Zunahme des Risikos por Quartile um 6%), bei den Frauen erst ab AHI > 25/h

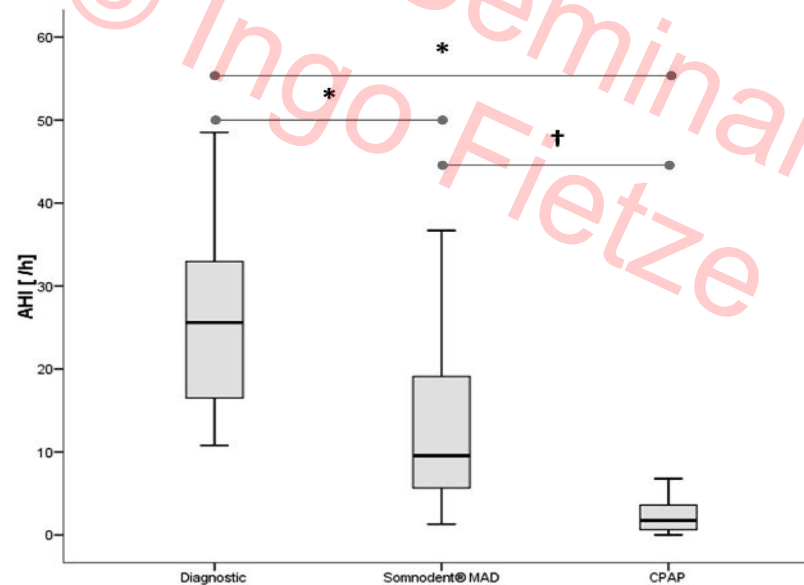


# Die Protrusionsschiene

Parameter	Diagnostic	Somnodent® MAD	CPAP
REM [%-TST]	15.9 ± 5.6	18.2 ± 5.2 *	19.9 ± 5.0 *
N3 [%-TST]	18.9 ± 10.0	21.3 ± 11.0	22.8 ± 11.7 *
TST [min]	400.3 ± 51.4	394.5 ± 59.4	400.5 ± 59.1
WASO [min]	51.0 ± 34.9	44.2 ± 39.2	58.5 ± 46.9
SE [%]	86.9 ± 7.9	88.2 ± 9.4	85.8 ± 11.6



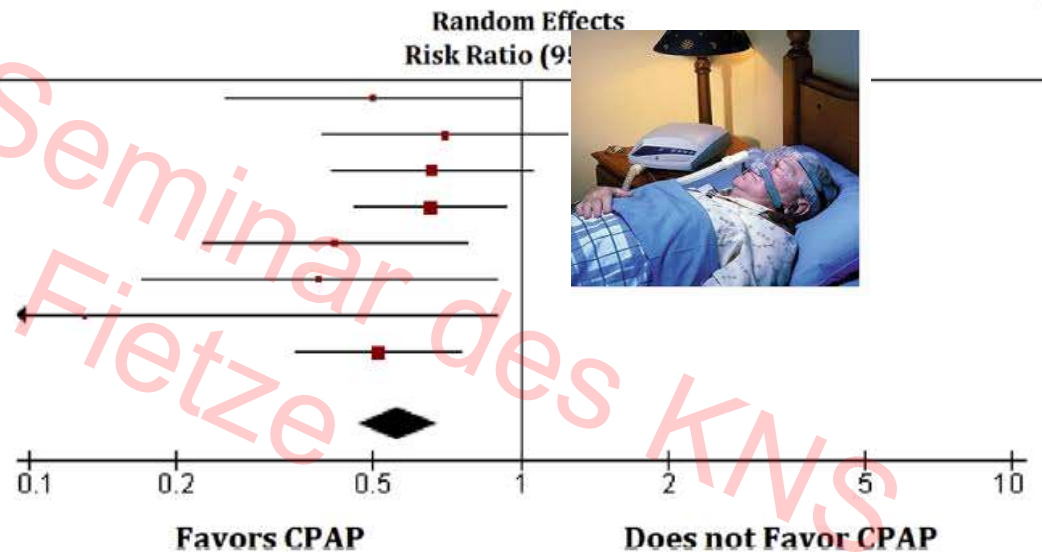
48 Patienten  
 AHI 18.0 ± 11.9/h  
 Alter 49.5 ± 11.8 Jahre  
 BMI 28.3 ± 4.7 kg/m<sup>2</sup>  
 ESS 9.2 ± 3.2  
 M/F 33/7



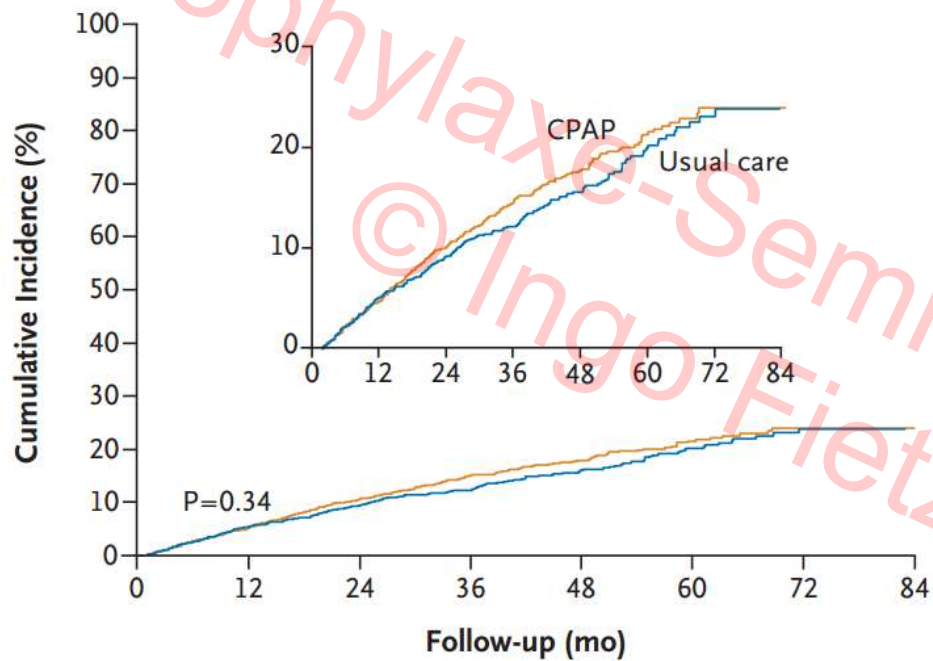
# Meta-Analysis of Continuous Positive Airway Pressure as a Therapy of Atrial Fibrillation in Obstructive Sleep Apnea

Study	log Risk Ratio	SE	Weight	Risk Ratio (95% CI)
Kanagala 2003	-0.690	0.349	7.5%	0.50 [0.25, 0.99]
Jongnarangsin 2007	-0.351	0.29	10.8%	0.70 [0.40, 1.24]
Craig 2008	-0.416	0.24	15.8%	0.66 [0.41, 1.06]
Patel 2010	-0.421	0.181	27.7%	0.66 [0.46, 0.94]
Naruse 2013	-0.868	0.316	9.1%	0.42 [0.23, 0.78]
Bazan 2013	-0.942	0.422	5.1%	0.39 [0.17, 0.89]
Fein 2013	-2.04	0.982	0.9%	0.13 [0.02, 0.89]
Neilan 2013	-0.664	0.198	23.2%	0.51 [0.35, 0.76]
<b>Total (95% CI)</b>			<b>100%</b>	<b>0.56 [0.47, 0.68]</b>

Heterogeneity Tau = 0.0 Chi<sup>2</sup> = 5.91, df = 7 (p = 0.55), I<sup>2</sup> = 0%  
 Test for overall effect Z = 6.00 (p < 0.001)



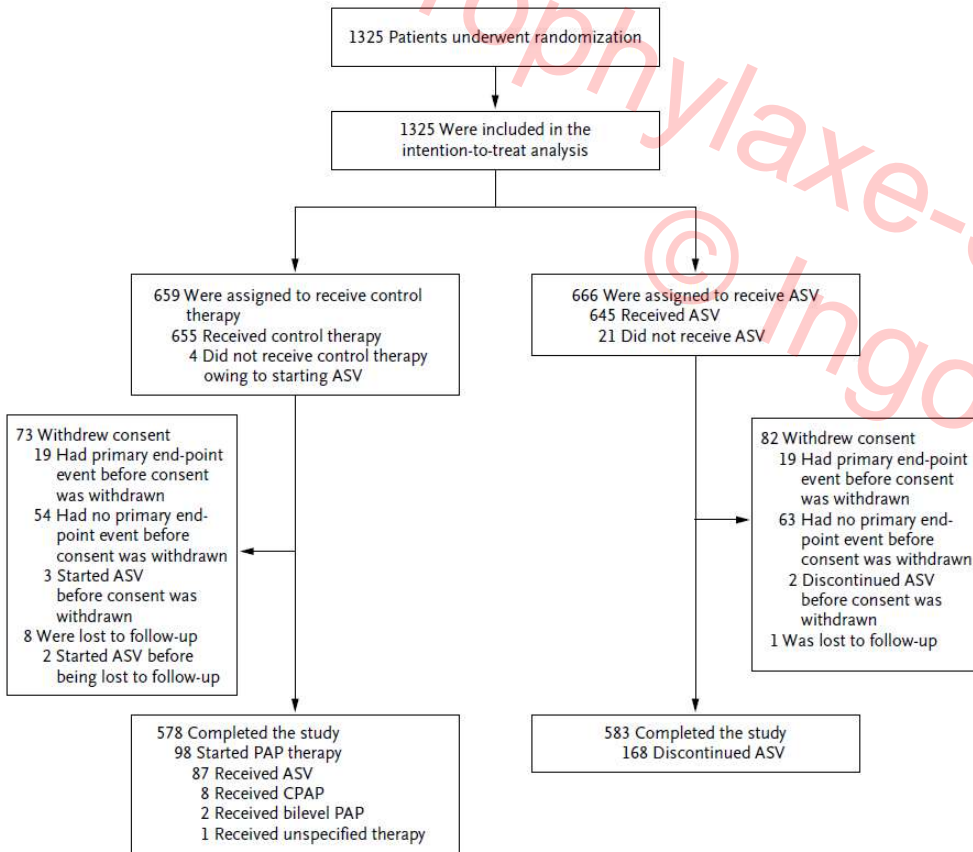
# Cardiovascular Events in Obstructive Sleep Apnea - Can CPAP Therapy SAVE Lives



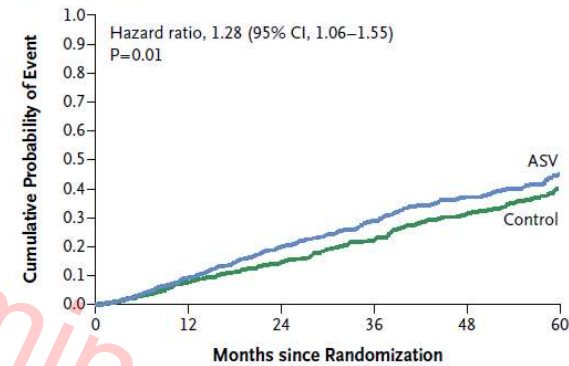
The primary composite end point was death from cardiovascular causes, myocardial infarction, stroke, or hospitalization for unstable angina, heart failure, or transient ischemic attack. Secondary end points included other cardiovascular outcomes, health-related quality of life, snoring symptoms, daytime sleepiness, and mood.

No. at Risk								
CPAP	1346	1222	1118	754	482	278	146	146
Usual care	1341	1211	1108	727	499	290	103	103

# Erhöhte Mortalität nach Einleitung einer ASV Therapie der Chenye Stokes Atmung bei Patienten mit Herzinsuffizienz

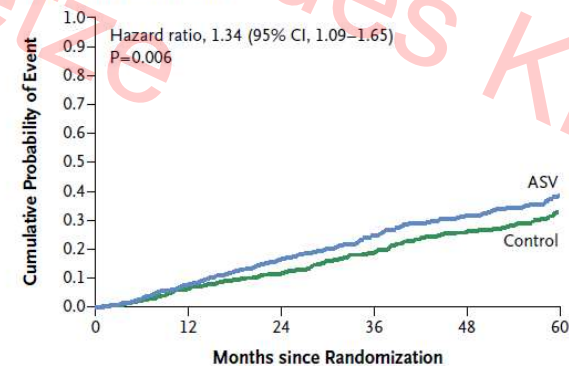


Death from Any Cause



No. at Risk	0	12	24	36	48	60
Control	659	563	493	334	213	117
ASV	666	555	466	304	189	97

Death from Cardiovascular Causes

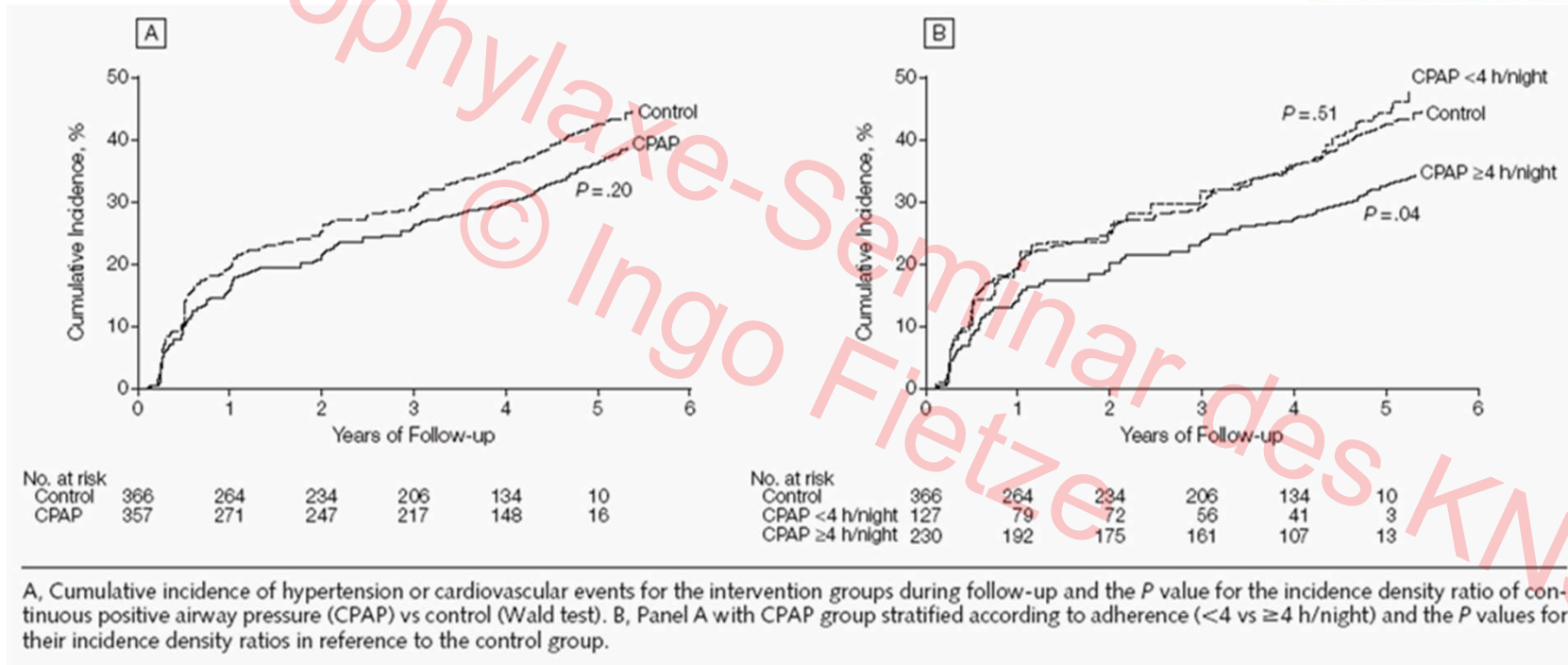


No. at Risk	0	12	24	36	48	60
Control	659	563	493	334	213	117
ASV	666	555	466	304	189	97

# CPAP Effekt auf die Hypertonie Inzidenz

The Sleep Heart Health Study: a progress report

723 OSA-Patienten, ESS<10; 357 CPAP, 366 Ko



CPAP senkt den Blutdruck um 2mmHg, CPAP ist effektiver bei resistenter Hypertonie.  
CPAP plus Gewichtsabnahme ist noch effektiver

# The Association between Nocturnal Cardiac Arrhythmias and Sleep-Disordered Breathing: The DREAM Study

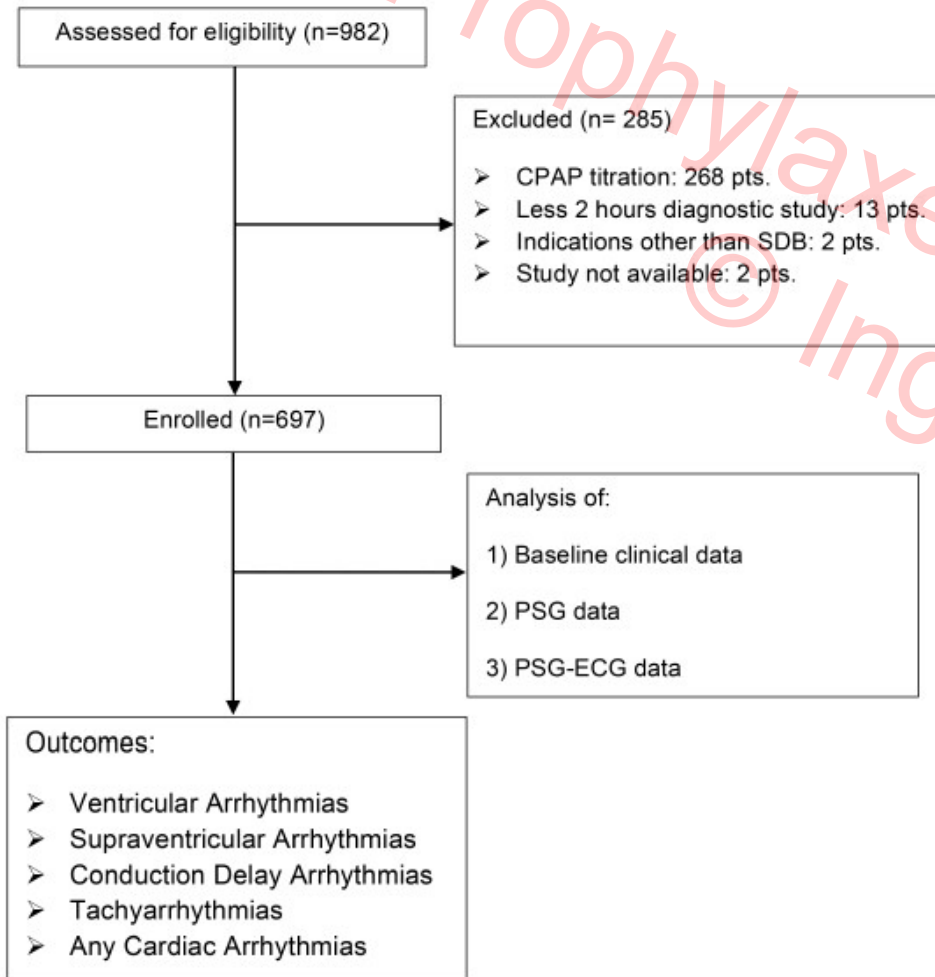
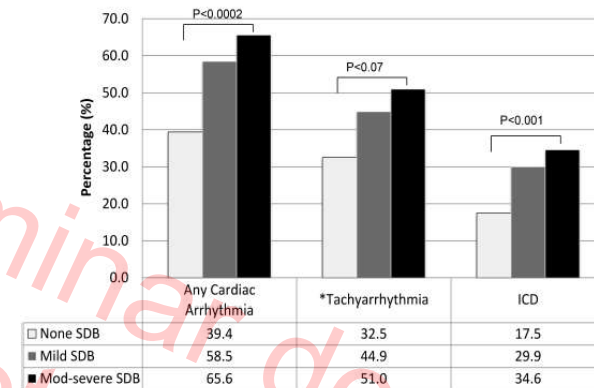


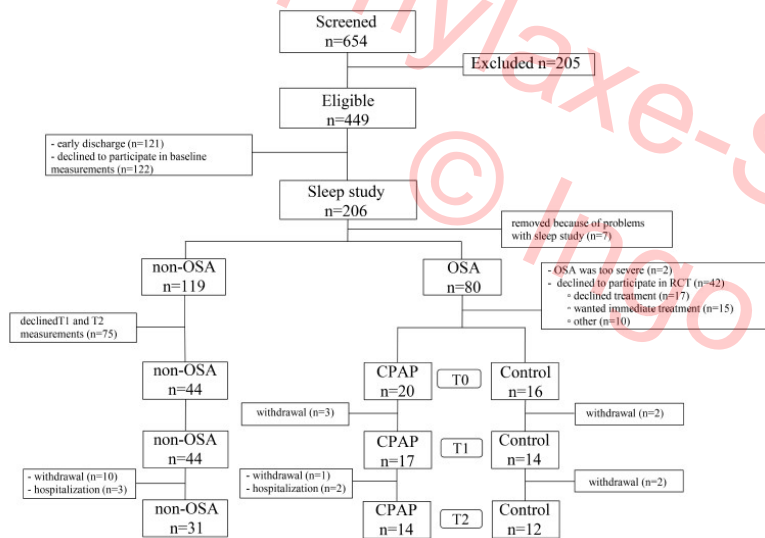
Figure 3—Adjusted model of association between SDB and nocturnal cardiac arrhythmias.



Adjusted for: age, BMI, gender, cardiovascular (CVD) risk factors (hypertension, smoking status, diabetes, fasting total cholesterol, LDL, and HDL cholesterol), CVD disease (angina, coronary artery disease, myocardial infarction, congestive heart failure, cerebrovascular disease, pacemaker, history of CABG, and PCI). \*Tachyarrhythmia is defined as ventricular and supraventricular tachycardia. ICD, intraventricular conduction delay.

Je höher der Schlafapnoe-Ausprägungsgrad, desto höher die Prävalenz von Arrhythmien

# Effects of CPAP on Cognitive and Functional Outcome of Stroke Patients with OSA: A Randomized Controlled Trial

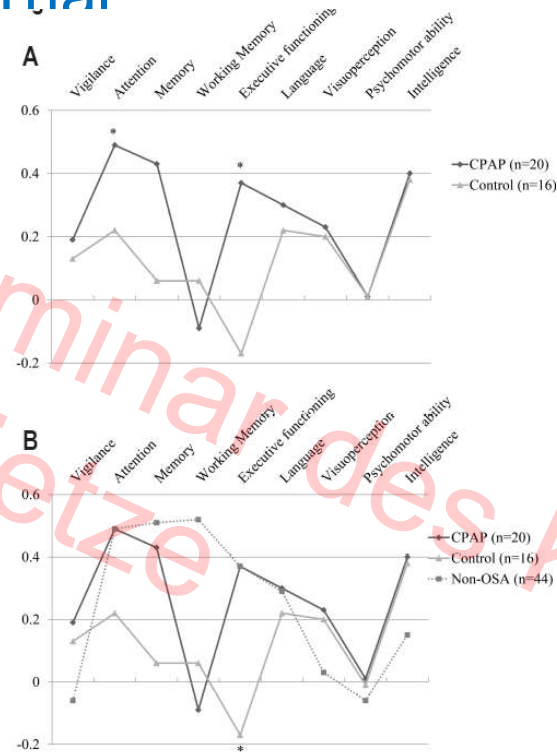


T1: 4 Wochen

T2: 8 Wochen

Zielparameter: kognitive Funktion anhand von 13 unterschiedlichen Tests

CPAP verbessert die kognitiven Funktionen bei Stroke Patienten mit einem OSA



# Schlaganfall und OSAHS

Guidelines for the Primary Prevention of Stroke. A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association.

## *Recommendations*

1. Because of its association with other vascular risk factors and cardiovascular morbidity, evaluation for SDB through a detailed history and, if indicated, specific testing is recommended, particularly in those with abdominal obesity, hypertension, heart disease, or drug-resistant hypertension (*Class I; Level of Evidence A*).
2. Treatment of sleep apnea to reduce risk of stroke might be reasonable, although its effectiveness is unknown (*Class IIb; Level of Evidence C*).