

Overall research theme:

Cardiovascular regulation by the autonomic nervous system with special reference to the pathophysiological causes of syncope

Latest update:

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Characteristics of the research group:

The research group has many years of experience in both clinical and experimental work related to the autonomic control of the cardiovascular system. The department has the facilities for the study of immediate hemodynamic changes in relation to various stimulations of the afferent autonomic nerves and combines this with the study of neuroendocrine adaptations primarily in relation to subjects with recurrent syncope. The department has the largest hemodynamic database in this context with more than 1.000 cases.

Running projects: Titles and abstracts:

Assessment of baroreceptor function in elderly patients with carotic sinus syndrome.

Carotic sinus syndrome is frequently encountered in elderly patients as a cause of recurrent syncope and falls. Carotid massage will in some of these patients elicit cardiac arrest with durations of more than three seconds (cardioinhibitory response). It is a commonly held belief that the vagal nerve degenerates with increasing age and it is known that vagal activity - as measured by heart rate variability - declines dramatically with age. It is contradictory that cardioinhibitory responses can be elicited in elderly subjects with a supposedly degenerated vagal nerve. The purpose of the study is thus to test the integrity of the baroreflex arc through neck chamber stimulation in combination with pharmacological blockade at different levels of the reflex arc. The purpose is also to develop a method for quantification of baroreceptor function in elderly people.

Central hemodynamics and neuroendocrine function in severe autonomic failure.

Severe autonomic failure may result from disruption of one or more parts of the baroreflex arc. Ross' Syndrome affects the afferent part, Multiple System Atrophy disrupts the central part, Pure Autonomic Failure affects the efferent part, and dopamine beta-hydroxylase deficiency interrupts the synthesis of catecholamines. The postural hemodynamic changes with regard to heart rate and blood pressure are uniform between the various causes and the purpose of the study is to supplement these measures by assessment of central blood volume and cardiac output and to study neuroendocrine adjustments at various levels of the reflex arc.

Pre- and postganglionic autonomic regulation of hemodynamics in patients with amyotrophic lateral sclerosis (ALS).

The purpose of the study is to evaluate, in what degree the autonomic nervous system is involved in ALS. Since the cause of ALS is still unknown, this could bring useful new information of the affection of different parts of the nervous system. If we could find any relation to the stage of the disease, it may suggest that a detected dysfunction is merely an unspecific consequence of long lasting degenerative disease or an essential part of the disease itself. A demonstration of loss of autonomic control may contribute to the deterioration seen in ALS because of diminished normal cardiovascular reactions to e.g. standing and physical strain. Atrophy and reduced strength of skeletal muscles are dominant signs in

ALS. This may be caused by both central affection of the motor cortex and the cortico-spinal tract and more peripheral involvement of the anterior horn cells. Therefore, we have found it relevant to examine both the centrally and the peripherally mediated sympathetic vascular reflexes in skeletal muscle. The study is performed in collaboration with Departments of Neurology at Bispebjerg Hospital and Roskilde Amts Sygehus.

The validity of neurovascular tests in differentiating Parkinson's Disease (PD) from Multiple System Atrophy (MSA).

The purpose of the study is to evaluate the validity of various tests of autonomic control of the cardiovascular system in differentiating movement disorders affecting the brain stem, cerebellum, and the basal ganglions. MSA or Parkinson Plus MSA is a sporadic, progressive, adult onset disorder characterized by autonomic dysfunction, Parkinsonism, and ataxia in any combination. The differential diagnosis is especially difficult in cases where striatonigral degeneration is the prominent feature. The differential diagnosis is important due to different effects of antiparkinson treatment in MSA and PD and due to the different prognosis in the two conditions. As autonomic dysfunction is one of the characteristic features of MSA we found it relevant to examine the various neurovascular tests to develop a proper diagnostic strategy.

The study is performed in collaboration with Departments of Neurology at Bispebjerg Hospital and Rigshospitalet.

Reevaluation of the diagnosis of epilepsy.

Recent study have pointed to the fact that a large fraction of patients suffering from epilepsy are misdiagnosed. In short, epileptic attacks commences with convulsions and are followed by loss of consciousness, whereas reflex syncope start with loss of consciousness and is often followed by convulsions. As the described changes are brought about within a very short time span the differential diagnoses is often difficult. Misdiagnosis may be the cause of treatment failure, but more disturbingly may be the reason for the increased occurrence of sudden cardiac death in epilepsy. The purpose of the study is to investigate neurovascular and cardiac function in patients with epilepsy and to develop a diagnostic strategy for this clinical entity.

The study is performed in collaboration with Departments of Neurology at Rigshospitalet and Glostrup Hospital.

Publications related to the projects described above:

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- Nielsen BM, Mehlsen J, Behke K. Altered balance in the autonomic nervous system in schizophrenic patients. *Clin.Physiol.* 1987; 8: 193 - 99.
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- Mehlsen J, Trap-Jensen J. Haemodynamics in postural hypotension - effects of the beta-adrenoceptor partial agonists xamoterol and pindolol. *Eur.Heart J.* 1990; 11(suppl.A): 56 - 58.
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- Mehlsen J, Trap-Jensen J. Differential effects of beta-adrenoceptor partial agonists in patients with postural hypotension. *Eur.J.Clin.Pharmacol.* 1993; 44: 7 – 11
- Mehlsen J, Hædersdal C, Stokholm KH. Dependency of blood pressure upon filling in patients with severe postural hypotension. *Scan.J.Clin.Lab.Invest.* 1994; 54: 281 - 284.
- Mehlsen J, Hædersdal C, Stokholm KH. Det arterielle blodtryk afhængighed af hjertets fyldning ved svær ortostatisk hypotension. *Ugeskr.Læger* 1995, 157: 295 - 297.
- Johansen TL, Kambskar G, Mehlsen J. Hjerterefrekvensvariationer til vurdering af det autonome nervesystem. En oversigt. *Ugeskr Læger* 1997 Nov 3;159(45):6666-71
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