

PROGRAMME



24th International Capita Selecta Duikgeneeskunde



International Symposium The ageing diver

for dive physicians, other care professionals and instructors

Date: Saturday 27 October, 2018

Venue: Academic Medical Centre, Amsterdam

Aim

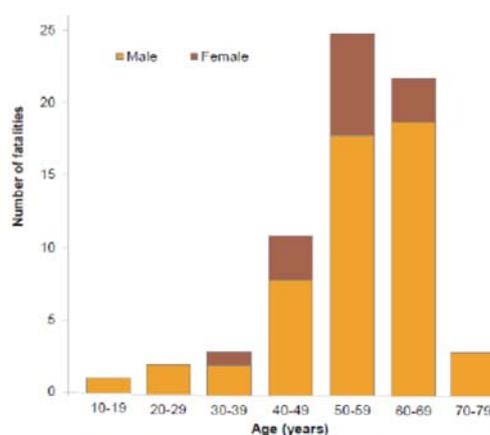
This master class aims to give insight into the detrimental effects of ageing on dive safety.

The figure (DAN Annual Diving Report 2016 Edition) below clearly indicates that divers around 60 years have an about 8 times higher risk of a fatality than a diver around 35 years. Although the risk on decompression sickness (DCS) doubles from 35 to 70 years, this disorder is seldom the cause of a fatality. Since all organs are afflicted by ageing, in particular the cardiovascular, pulmonary, muscular and sensory systems and the brain, the underlying cause (trigger of the fatality) will differ from case to case. Knowledge of these subjects is crucial for the medical examiner, the diving physician and also the teachers of dive instructors.

After this seminar, the physician will have the knowledge to decide whether an senior diver is fit to dive.

The level of this seminar is beyond that of an advanced course and therefore should be considered as a **master class**. A basic course on diving medicine (in the Netherlands e.g. by SHF or VSG) is a prerequisite for physicians.

Besides participants of the Netherlands, we also would like to welcome participants from abroad. We hope that the reduced fee is helpful to enable their attendance.



Distribution by age and sex for U.S. and Canadian scuba fatalities, 2015 (n=67)

Speakers

Olga de Bakker, PhD, sports diving physician, Hippocampus Medicus, Gouda, The Netherlands.

Jacques Regnard, Prof., PhD, diving an hyperbaric physician, Faculty of Medicine of Besançon, and University Hospital Minjoz, University of Franche Comté, France.

Rienk Rienks, PhD, cardiologist, diving physician, Utrecht Medical Centre, Utrecht, The Netherlands.

Nico Schellart, PhD, MSc, Assoc. Prof, medical physicist, Academisch Medisch Centrum, University of Amsterdam, The Netherlands.

Recommendation

The course is recommended by the Nederlandse Vereniging voor Duikgeneeskunde (NVD, Dutch Soc Dive Med).

Accreditation

In general, the level of the various lectures / subjects of the meeting are (at least) in accordance with that of EDTC and DMAC, level 1 (Medical Examiner) and Level 2D (Diving Physician). The program comprises **6 oral contact hours**.

The Dutch NICDA, NVAB and SCAS provide 6 accreditation points for the meeting and “outside own specialism” (GAIA) will yield 6 points too for GP’s, clinicians and sports diving physicians.

On completion of the entire course, including the test and when registered for accreditation the Dutch physicians will obtain their points automatically (via GAIA) or added by Capita Selecta to the NICDA and SCAS administration offices.

Physicians from outside of the Netherlands will obtain a certificate (only they) and should themselves submit a request to their own accreditation office.

General: mission of the “AMC Capita Selecta Duikgeneeskunde”.

The Capita Selecta Duikgeneeskunde (CSD), refresher courses dive medicine, are given by the Academic Medical Centre (AMC), a one-board-cooperation of the medical faculty of the University of Amsterdam (UvA) and the academic hospital with the UvA. This hospital has a special position within the Dutch academic hospitals; it is the cradle, also in Europe of a related discipline, hyperbaric medicine, performed in the “Boerema Tank”. The International Capita Selecta Diving Medicine, offered to dive physicians, has a typical ‘Alma Mater’ character.

In the first place, these Capita Selecta present discipline-wise education in dive and caisson/tunnelling medicine. In addition, they also give education in new developments as they occur in the academic hospitals and medical faculties. This implies that, within the lectures, the characteristics of disorders are discussed, including their diagnostics and treatment, from the point of view of the present academic state of the art.

In short, the Capita Selecta are marked by a mix of education in the dive medicine of the respective discipline and up-to-date education in the discipline itself. Also, the Capita Selecta will pay attention to the requirements of the medical examination.

The Capita Selecta are aimed for non-specialized physicians, first line physicians, sports and occupational physicians, professional dive physicians, clinical doctors and paramedical academics and technicians. This holds irrespective the nationality of the participant; the lectures are given in English.

In general, the lecturers often have their affiliation with academic hospitals and research institutes, and have an international reputation in patient care, academic education and/or medical research as becomes clear from their curriculum vitae.

To have lower thresholds for the courses, the venue is easy to reach and centrally located, and moreover the course is low-budget.

Programme committee

Nico Schellart (chair, medical physicist and diving physiologist), Tjeerd van Rees Vellinga (occupational and hyperbaric physician), and Marga Schweigmann (hyperbaric & diving physician), Peter Westerweel (internist-haematologist) and ad hoc the lecturers.

Executive committee

Nico Schellart (course director) and Hans van Dam (administrative manager)

Responsibility

The Capita Selecta Duikgeneeskunde are given under the responsibility of the Academic Medical Centre, Univ. of Amsterdam (course leader Nico Schellart). The organization is by the Stichting Duik Research (SDR)¹⁾ and Biomed. Eng & Physics, AMC (Prof. Dr. A.G.J.M. van Leeuwen, chair).

Announcements

Ongoing announcements about future courses can be found at www.duikresearch.org, <http://www.capitaselectaduikgeneeskunde.nl/nl/>, or are communicated by E-mail.

¹⁾ SDR is a non-profit organisation aimed to promote dive safety. Work for SDR is done voluntarily.

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Programme

Symposium 'The Ageing Diver'

8:30-9:15 **Welcome**

9:15-9:30 Introduction, Nico Schellart

1. **9:30 -10:15 Jacques Regnard**, Physiology of the healthy ageing heart.

2. **10:15 -11:00 Nico Schellart**, Ageing of sensory systems.

Break

3. **11:20-12:05 Jacques Regnard**, Physiology of the ageing muscular system.

4. **12:05-12:50 Rienk Rienks**, clinical aspects of cardiovascular system.

Lunch

5. **13:40-14:25 Jacques Regnard**, Physiology of the ageing lung.

6. **14:25-15:05, Nico Schellart**, a. Ageing of the brain. b. Ageing and DCS risk.

Break

7 **15:25-16:10, Olga de Bakker**, The medical examination of the older diver. Cases.

8 **16:10-16:30 Round Table**; what should senior divers always do, what never to do and what is recommended.

16:30 - 16:50 Test.

Refreshments

Lecturing time includes 5-10 min of discussion.

Contact time: 5h45



Disclaimer: Capita Selecta Duikgeneeskunde (i.e. AMC and SDR) is bound to execute the educational program, but small program changes are under reserve.

The lecturers



Olga de Bakker



Jacques Regnard



Rienk Rienks



Nico Schellart

Olga de Bakker graduated in medicine in 1983 at the Free University in Amsterdam and did scientific work in the Placenta laboratorium for 6 years. She obtained her doctorate in 1986 on a dissertation of amniotic prolactin and the fetal membranes. From 1989 to 2010 she worked in the Public Health sector, especially in forensic medicine and baby- and child-care. In 2006 she took the basic course in diving medicine from Scott Haldane and from then on she annually followed several refresher and advanced courses on diving medicine. She is a certified medical examiner of divers (NICDA and SCAS) and since 2007 runs her own diving examination practice in Gouda where she now examines about 400 divers yearly. She is a diver since 2007, certified by CMAS and PADI (advanced open water, Nitrox).

Jacques Regnard graduated as MD and in Sports Medicine, and later in Diving and Hyperbaric Medicine at the university René Descartes (Paris). He was involved in field and laboratory studies about human physiology during cold exposure and exercise. He conducted pulmonary functional testing in university hospitals. He published studies on lung function, bronchial reactivity, pulmonary heat exchanges and vascular airway behaviour (PhD in 1990). He then studied autonomic cardiovascular control in health and disease. As a professor of Physiology at the University of Franche Comté from 1993, he teaches Physiology, directed PhD degrees, and has set up functional testing of vascular function. He also is the author of many original papers of respiratory, cardiovascular, and exercise physiology. His recent publications and current work deal in particular with integrated cardiovascular, renal and respiratory responses to immersion and diving, with concomitant influences of hyperoxia and autonomic/endocrine stimulations. He is member of EUBS, president of the Société de Médecine Subaquatique et Hyperbare de langue française. He used to be an avid SCUBA diver.

Rienk Rienks graduated in medicine in 1981 and was confirmed as cardiologist in 1986. He has been trained at the Utrecht University Hospital. Since 1983 while working at the Utrecht Medical Centre, UMC, he obtained his doctorate in 1991 on a dissertation on the applications of lasers in cardiology. Detached at the Centraal Militair Hospitaal in Utrecht since 1995, he cares for military personnel. His main interest lies in diving, aeromedical and sports cardiology. Considered a national authority on hypo- and hyperbaric cardiology he fills several consultancies. He is a former member of the board of the Dutch Society for Sports Medicine, VSG, and participates in several committees of the Dutch Society for Cardiology (NVvC) and VSG. He is member of the UHMS. He started to dive in 1982 during his tenure as a resident in Curacao. He is PADI and NAUI certified as advanced open water, rescue and Nitrox diver.

Nico Schellart graduated as biologist and specialized in physiological and biomedical physics. He investigated visual information processing of the retina, resulting in a PhD in 1973 (University of Amsterdam). He is an associate professor with the dept. of Biomedical Engineering and Physics of the AMC and was associate editor of a bioengineering journal. He has investigated information processing of the visual and auditory system in the brain, with animals and humans by fundamental and clinical EEG and MEG research. His neuroscience studies have been published in some 150 papers, abstracts and contributions in textbooks and he published an electronic free textbook on biomedical physics. He has studied the brain and the visual system under hypoxic and hyperoxic conditions both in the lab and in the field, including pre-cordial Doppler and cerebral radiation damage. He has published the about 20 dysbaric and HBOT studies in leading journals and in conference proceedings. He is regularly reviewer of journals and teaches diving physiology, is member of EUBS and NVD, was member of UHMS (during Obama administration), and often participated with contributions in their annual meetings. Also, he has tested the technical and physiological performance of dozens of dive computers (www.duikresearch.org), and is a recreational Scuba- and formerly a free diver.

Aim and description of lectures

Olga de Bakker

The medical examination of the older diver. Cases

The aim of this presentation is to make the (sport) diving physician aware that the medical examination of the older and senior (>60 years) diver should pay more attention to the organ systems which show a higher vulnerability to dysfunction under water.

Examining the ageing diver is custom work. One does not only have to deal with the physical conditions of the diver, but with a multitude of other aspects surrounding him or her. By presenting several commonly occurring cases in an interactive way we will go through these factors and follow step-wise the work of the diving medical examiner.

Jacques Regnard

Physiology of the healthy ageing heart

The aim of the lecture is to describe how the changes by ageing of heart and vascular functions progressively narrow the range in which the heart can successfully cope with the requirements of physical exercise and of immersion.

Ageing involves changes in tissue structure (histology) of the heart and the arteries that in turn affects their physiology. The progression of these changes will be discussed as well as how they depend on individual features and life-style. Changes, in particular as a progressive decrease in cardiac output, and increase in blood pressure, will be reviewed. The influence of a sedentary as compared to an active lifestyle with regular exercising will be demonstrated. It will become clear how endothelial function, autonomic vasomotor control and baroreflexes, i.e. control systems, adjust their activity in order to maintain functional performance, until they are also afflicted by ageing. The differences in the evolution of ageing of the physiology of the active diver-sportsman and the sessile, often obese, diver will be addressed together with a prognosis on their diving safety. Increases in cardiac preload (trunk blood pooling) and increasing demands on ventricular-arterial coupling are present during immersion, even at rest. How these demands change more while immersed than on land with increased exercising intensity and other requirements associated with diving will be explained. Age puts a ceiling on the functional ability to successfully cope with these strains and simultaneously increases the energetic cost of maintaining a stable cardiac output. The ageing diver with impaired physiological performance is subjected to increasingly greater risk of heart damage.

The medical self-certification form and/or the medical fitness to dive assessment should consider the functional decline by ageing, specifically in view of the individual objectives of the diving activities.

Physiology of the ageing lung

The aim of the lecture is to describe the changes that occur in lung function while ageing, and how they influence the requirements of breathing at rest and with physical activity during the dive.

Changes in lung structure and function begin slowly during the third decade of life and become more and more visible during the fifth decade and later. The consequences of the histological changes in airways, lung tissue, and changes in chest wall stiffness, vertebral column and respiratory muscle strength on lung function will be discussed. All these changes impair respiratory mechanics, such that for instance an actual given minute ventilation needs progressively more work of breathing. These changes come to light only during substantial ventilatory demands on high level physical activity. Hence, they are –unfortunately – rarely noted in sedentary subjects. The functional impairments of intercurrent diseases (COPD...) or airways-irritating additional factors (smoking, air pollution...) is addressed. How the major impact of lung ageing on fitness is determined by the work of breathing on land and while immersed will be explained. Other burdening factors like hydrostatic pressure, the transthoracic pressure difference (changing along the dive profile), wet suit and equipment strapping impose a restrictive loading to chest and abdominal walls. It will be explained why older divers load their heart more than young divers and how this may lead to right-to-left imbalance, as it occurs in development of pulmonary oedema. Prevention of incidents relies on a clear understanding of the intricate mechanisms, in order to properly set objectives and procedures

of dives by taking into account the physical strains and the physiological limits that ~~may be~~ are lowered by aging.

Physiology of the ageing muscular system

The aim of the lecture is to give insight into the deterioration of muscular performance due to ageing and its consequences for dive safety

Natural (healthy) ageing causes changes in muscle structure and function. Genetic, neural and hormonal ageing changes are involved. A brief description of age-triggered changes in muscle fibre synthesis, mitochondrial function and reactive oxygen species release, muscle motor innervation and microvascular function will be presented. The mechanisms of the decrease in muscle power and contraction efficiency will be discussed. All these changes cause earlier fatigue of the ageing muscles as well as a lowered stability of muscle action. As a consequence, endurance performance decreases. Aging-linked changes may be different for the various muscular systems and they occur with large inter-individual differences. The effect of regular exercising on ageing will be shown. During immersion (dive), the ageing changes lower the extent of healthy coping with metabolic and non-metabolic strains. Assessing fitness to dive should rely on evaluation of functional abilities in view of the strains to be faced as inferred from the goals and circumstances of the personal activity choices.

Rienk Rienks

Cardiovascular (CV) ageing of divers

The aim of the lecture is to elucidate that the ageing CV-system is a time-bomb during the dive when a senior diver is not willing to take several safety measures to avoid a CV-diving fatality.

The diving population is aging. Diving fatality statistics show continuously a preponderance of older divers. The majority of these fatalities is caused by atherosclerotic coronary disease. Age is an important cardiovascular risk factor. In addition, risk factors like hypertension, diabetes mellitus, overweight/obesity and lack of exercise are more prevalent among the older divers. The various risk factors are interconnected. Proper treatment of the risk factors may significantly reduce the risk of an acute coronary event in or out of the water. Apart from the cardiovascular risk factors, there is also the decreasing exercise capacity at higher age. Physiologically, the heart muscle and the arteries stiffen while aging. The maximum heart rate decreases, as does the stroke volume. However, the good news is that by regular exercise the decline in cardiac function and the stiffening of the arteries may be slowed or reversed to some extent. So, proper treating of cardiovascular risk factors and regular exercise may improve the safety of diving for older divers. Also, an adaptation of the diving to a less strenuous profile for the older diver with a reduced exercise capacity may improve safety.

Nico Schellart

Ageing of sensory systems

The aim of this lecture is to elucidate that ageing has an enormous influence on performance of all sensory systems without any exception. The diving physicians will be made aware that this deterioration is a serious threat to diving safety.

Since vision under water is the primary system to get information from the outside world, be it for dive safety, working under water or for leisure, the emphasis is on this system. The deterioration with age of the most important abilities of vision (acuity, contrast vision, etc.) will be treated. Some are more important for daily life and this rather well matches their importance for under water vision. Audition, the ultimate system for human communication, is often a stepchild for under water work and recreation. It will be made clear that its role cannot be ignored and its impact for the ageing diver needs to be elucidated. The role of most other sensory systems, smell and taste, those located in the skin, the sense of balance and proprioception will be discussed together with their ageing and its influence on dive safety.

Ageing of the brain

The aim of this short presentation is to emphasize that ageing of the brain has a substantial effect on cognitive performance. The lecture will start with the neuro- and psychophysiology of the ageing

brain. It will be made clear that the decline of cognitive performance directly affects dive safety. Fatigue is a major enemy of dive safety. How do senior divers cope with that?

Ageing and risk on DCS

The aim of this short presentation is to make clear that age is an important, likely the most important demographic parameter that increases DCS risk.

The literature will be reviewed and the increasing DCS risk will be quantified. DCS is influenced by nitrogen narcosis and hypercapnia. Does the susceptibility to these disorders increase with age?

Fees

Physician with Dutch registration (BIG):	€ 135,-
Physician with a non-Dutch registration:	€ 90,-
Non- physician:	€ 60,-

The following Dutch accreditations are included in the fee.

NICDA:

NVAB:

SCAS:

Outside own field¹⁾

¹⁾ for Cp's, clinicians, sports diving physicians and other Absg-physicians.

The fee includes electronic reader, test, certificate (only for physicians without Dutch BIG registration), lunch and drinks.

Registration: www.capitaselectaduikgeneeskunde.nl.

Hotels

Suggestions for nearby hotels are:

Hotel Abcoude

Kerkplein 7, 1391 GJ Abcoude

+31 294 281 271, info@hotelabcoude.nl

Rooms from ca. 85 €/day

Bus connection with AMC: no. 120 and no. 126, 2 times per hour (ca. 15 min).

Hotel Fletcher

Schepenberweg 50, 1105 AT Amsterdam

+31 (0)20- 3113670 , <http://www.fletcherhotelamsterdam.nl/locatie>

Rooms from ca. 150 €/day

Walking distance (ca. 20 min in total)

Entertainment

Stay one more night for culture and entertainment in one of the most exciting cities of Europe.

The **Koninklijk Concertgebouw** (Royal Concert Hall)

- (*Ticket should be ordered long in advance*).

The **Muziek Theater** (Stopera)

- (*Ticket should be ordered long in advance*).

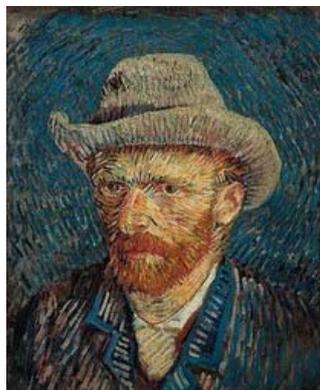
And many more flamboyant podium art theatres.

Museums

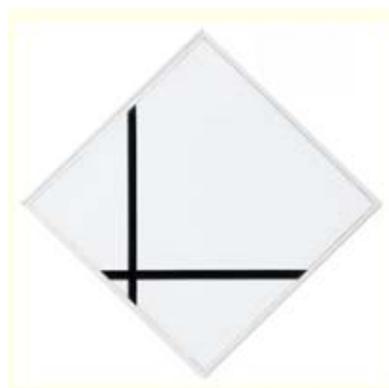
- **Rijksmuseum** (The National Museum), completely renovated and with the Vatican Museum and the Louvre one of the best general museum of the world.
- **Van Gogh Museum**
- **Stedelijk Museum** (City Museum) with 20 Century Art
- Many more attractive museums.



Rijksmuseum
Rembrandt van Rijn
The "Nachtwacht"



Van Gogh Museum
Vincent van Gogh
Self-portrait



Stedelijk Museum,
Piet Mondriaan
Composition with 2 lines



Scheepvaartmuseum



The Amsterdam Canals