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CARDIOLOGY CORNER

Cardiology News/Literature Review/2022

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CORONARY ARTERY DISEASE

1. 2021, AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. According to a recent press release (28/10/21) from ACC, this document is the 1st comprehensive guideline from the AHA and ACC focused solely on the evaluation and diagnosis of chest pain. The document noted the following key messages:

- **Accompanying Symptoms:** Chest pain is the dominant and most frequent symptom for both men and women. However, women may be more likely to also exhibit accompanying symptoms such as nausea and shortness of breath.
- **Risk Assessment Should Be Used**: Emergency department professionals' initial goals in evaluating patients with chest pain should be to identify if there are life-threatening causes and to determine if there is a need for hospitalization or testing. Unnecessary or inappropriate testing for some adults with chest pain may be reduced, especially in the emergency department and for those patients screened as low risk for a cardiac event.
- **High-Sensitivity Troponins Preferred.** High-sensitivity cardiac troponins are the preferred standard for establishing a biomarker diagnosis of acute myocardial infarction, allowing for more accurate detection and exclusion of myocardial injury.
- **Testing Not Needed Routinely for Low-Risk Patients**: Thorough screening may determine which patients are at high risk versus intermediate or low risk for a cardiac event. Patients at low risk for a cardiac event may be referred for additional evaluation in an outpatient setting rather than being admitted to the hospital.
- **Share the Decision-Making:** Shared decision making by clinicians can reduce patient fear and concerns as well as reduce extra testing. Clinically stable patients presenting with chest pain should be included in decision-making; information about risk of adverse events, radiation exposure, costs, and alternative options should be provided to facilitate the discussion.

Leslee J. Shaw et al. Circulation. 2021;144:e368–e454, https://doi.org/10.1161/CIR.0000000000001029

2. PCI vs. CABG in 3VD. Fractional Flow Reserve–Guided PCI as Compared with Coronary Bypass Surgery.

This is a multicenter (48 centers), international, non-inferiority trial, 1500 patients with three-vessel coronary artery disease (CAD) were randomly assigned to undergo CABG or FFR-guided PCI with current-generation zotarolimus-eluting stents. The primary end point was the occurrence within 1 year of a major adverse cardiac or cerebrovascular event, defined as death from any cause, myocardial infarction (MI), stroke, or repeat revascularization. The 1-year incidence of the composite primary end point was 10.6% among patients randomly assigned to undergo FFR-guided PCI and 6.9% among those assigned to undergo CABG (hazard ratio, 1.5; 95% confidence interval [CI], 1.1 to 2.2), findings that were not consistent with noninferiority of FFR-guided PCI (P=0.35 for noninferiority). The incidence of death, MI, or stroke was 7.3% in the FFR-guided PCI group and 5.2% in the CABG group (hazard ratio, 1.4; 95% CI, 0.9 to 2.1). The incidences of major bleeding, arrhythmia, and acute kidney injury were higher in the CABG group than in the FFR-guided PCI group. Therefore, in patients with three-vessel CAD, FFR-guided PCI was not found to be noninferior to CABG with respect to the incidence of a composite of death, MI, stroke, or repeat revascularization at 1 year. William F. Fearon, M. et al. Fractional Flow Reserve-Guided PCI as Compared with Coronary Bypass Surgery. *NEJM* 2022;386:128-137. doi: 10.1056/NEJMoa2112299.

STRUCTURAL HEART DISEASE

1. Global epidemiology of valvular heart disease. Valvular heart disease (VHD) is a major contributor to loss of physical function, quality of life and longevity. The epidemiology

of VHD varies substantially around the world, with a predominance of functional and degenerative disease in high-income countries, and a predominance of rheumatic heart disease (RHD) in low-income and middle-income countries. Reflecting this distribution, RHD remains by far the most common manifestation of VHD worldwide and affects approximately 41 million people. By contrast, the prevalence of calcific aortic stenosis and degenerative mitral valve disease is 9 and 24 million people, respectively. Despite a reduction in global mortality related to RHD since 1900, the death rate has remained fairly static since 2000. Meanwhile, deaths from calcific aortic stenosis have continued to rise in the past 20 years. An ageing population and advances in therapies make an examination of the changing global epidemiology of VHD crucial for advances in clinical practice and formulation of health policy. The most important key points are:

- The prevalence of VHD is growing worldwide as a consequence of improved survival and the ageing population.
- RHD remains the most prevalent form of VHD and contributes to substantial premature mortality and reduced quality of life; RHD is primarily encountered in middle-income and low-income countries and specific (usually indigenous) groups in high-income countries.
- Calcific aortic valve disease is highly age-related, and its prevalence is increasing rapidly in high-income countries.
- Endocarditis is increasing in incidence and prevalence as a consequence of improved diagnosis and an ageing, susceptible population undergoing an increasing range and complexity of medical interventions.
- Valve abnormalities are a frequent component of congenital heart disease; bicuspid aortic valve is most commonly encountered, and its prevalence seems to be uniform across the world.
- Epidemiological information on patients who have undergone surgical or transcatheter valve intervention is limited, but this population is growing exponentially (especially in high-income countries); forecasting trends is difficult owing to the rapid evolution of these interventions and of therapies that might reduce the need for interventional treatment.

Sean Coffey et al. *Nat Rev Cardiol* 2021;18:853-864. doi: 10.1038/s41569-021-00570-z.

2. 2021 ESC/EACTS Guidelines for the management of valvular heart disease: developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). This document is a comprehensive guideline from the ESC and EACTS focused on the management of valvular heart diseases. We report the most important key points:

General comments

1. Precise evaluation of the patient's history and symptomatic status, as well as proper physical examination, are crucial for the diagnosis and management of VHD.
2. Echocardiography is the key technique to diagnose VHD and assess its severity and prognosis. Other non-invasive investigations such as CMR, CCT, fluoroscopy, and biomarkers provide important additional information in selected patients. Stress testing should be widely used in asymptomatic patients. Invasive investigation, beyond preoperative coronary angiography, is restricted to situations where non-invasive evaluation is inconclusive.
3. Decision making in elderly patients requires the integration of multiple parameters, including estimation of life expectancy and anticipated quality of life, evaluation of comorbidities, and general condition (including frailty).
4. Decision making **in asymptomatic patients** weighs the risk of intervention against the expected natural history of VHD. Stress testing should be liberally performed.
5. Informed patient's expectations and values are an important part of the decision-making process.
6. Interventions (surgery or transcatheter) are indicated **in symptomatic patients** (spontaneous or exercise induced) in the absence of futility. In selected asymptomatic patients, presence of predictors of rapid symptom progression justifies early intervention when procedural risk is low.
7. **Heart Valve Centers** with multidisciplinary Heart Teams, Heart Valve Clinics, comprehensive equipment, and sufficient volumes of procedures are required to deliver high-quality care and provide adequate training.
8. **Cardiologist must** careful follow-up of symptomatic status, LV/RV size, and function is mandatory in asymptomatic patients with severe VHD if an intervention is not yet indicated.
9. In patients with AF, **NOACs are contraindicated in patients** with clinically significant mitral stenosis or mechanical valves. For stroke prevention in patients who are eligible for OAC, NOACs are recommended in preference to VKAs in patients with aortic stenosis, aortic and mitral regurgitation, or aortic bioprostheses >3 months after implantation.

Aortic regurgitation

1. The evaluation of aortic regurgitation requires careful assessment of potentially associated aortic dilatation to guide the timing and type of surgery.

Aortic stenosis

1. Diagnosis of severe aortic stenosis requires integrative evaluation of pressure gradients (the most robust measurements), AVAi, extent of valve calcification, flow conditions, and LV function.
2. Selection of the most appropriate mode of intervention

by the Heart Team should take into account clinical characteristics (age and estimated life expectancy, general condition), anatomical characteristics, the relative risks of SAVR and TAVI, the feasibility of transfemoral TAVI, local experience and outcome data, as well as informed patient preference.

Mitral regurgitation

1. Regarding imaging, **routine quantification of EROA** is an important part of the integrative evaluation for quantification and risk stratification in patients with PMR. 3D transoesophageal echocardiography is more accurate than 2D echocardiography for defining the underlying mechanism of PMR. **CMR is useful** when echocardiographic evaluation of severe PMR grade is inconclusive.
2. **Surgical mitral valve repair** is the preferred method of treatment in PMR if a durable repair can be achieved. TEER is a safe but less efficacious alternative that may be considered in patients with contraindications for surgery or high operative risk.
3. In patients with severe SMR, GDMT (including CRT if indicated) should be the first step. If the patient remains symptomatic: mitral surgery is recommended concomitantly in patients with an indication for CABG or other cardiac surgery. Isolated valve surgery may be considered in selected patients. TEER should be considered in patients not eligible for surgery and fulfilling criteria indicating an increased chance of responding to the treatment. Circulatory support devices, cardiac transplantation, or palliative care should be considered as an alternative in patients with end-stage LV and/or RV failure.

Mitral stenosis

1. PMC is currently the standard of care in patients with severe rheumatic mitral stenosis and favorable valve anatomy.
2. Decision making as to the type of intervention used in patients with unfavorable anatomy is still a matter of debate and must take into account the multifactorial nature of predicting the results of PMC.

Tricuspid regurgitation

1. Relevant tricuspid regurgitation requires early intervention to avoid 2-ndary damage of the RV.
2. Tricuspid regurgitation should be liberally treated at the time of left-sided valve surgery. Isolated surgery of severe secondary tricuspid regurgitation (with or without previous left-sided valve surgery) requires comprehensive assessment of the underlying disease, pulmonary hemodynamics, and RV function.

Prosthetic valves

1. The choice between a mechanical prosthesis and a bioprosthesis should be patient-centered and multifactorial based on patient characteristics, the indication for lifelong anticoagulation, the potential and risks of a re-intervention, and the informed patient preference.
2. Clinical assessment of prosthetic valves should be performed yearly and as soon as possible if new cardiac symptoms occur.

Alec Vahanian, et al. *European Heart Journal*, 2022;43(7):561-632. doi: 10.1093/eurheartj/ehab395.

ARRYTHMIAS

2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy: developed by the Task Force on cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology (ESC) With the special contribution of the European Heart Rhythm Association (EHRA). We present the key points:

- In the evaluation of candidates for permanent pacemaker implantation (PPI), a thorough and detailed pre-operative evaluation is recommended. This should always include careful history taking and physical examination, laboratory testing, documentation of the type of bradyarrhythmia requiring treatment, and cardiac imaging. In selected cases, additional tests, EPS, and/or genetic testing are indicated.
- Ambulatory ECG monitoring is useful in the evaluation of patients with suspected bradycardia or cardiac conduction disorder, to correlate rhythm disturbances with symptoms. Choice of type of monitoring should be based on frequency and nature of symptoms and patient preferences.
- In patients with SND including those with bradycardia–tachycardia type of SND, when symptoms can clearly be attributed to bradyarrhythmia, cardiac pacing is indicated.
- In patients with SR and permanent or paroxysmal 3rd or 2nd degree type 2 or high-degree AVB, cardiac pacing is indicated irrespective of symptoms.
- In patients with permanent AF and permanent or paroxysmal AVB, single-lead ventricular pacing is indicated.
- In patients with syncope and unexplained falls, the diagnosis should be ascertained using the available diagnostic methods before pacemaker treatment is considered.
- In patients with symptomatic HF and LVEF≤35% despite OMT who are in SR and have LBBB QRS morphology, CRT is recommended when QRS duration is ≥150 ms, and should be considered when QRS duration is 130–149 ms. For patients with non-LBBB QRS morphology, evidence for benefit of CRT is less convincing, especially with normal PR and QRS duration <150 ms. CRT should not be used in patients with HF and QRS duration <130 ms, unless there is need for ventricular pacing.
- Selection of patients for CRT based on imaging is limited to the measurement of LVEF, whereas the assessment of other factors, such as extent of myocardial scar, presence of mitral regurgitation, or RV systolic function, is important to anticipate potential non-responders who may need additional treatments (e.g. mitral valve intervention).

- In patients with permanent AF, symptomatic HF, LVEF ≤35%, and QRS ≥130 ms who remain in NYHA class III or ambulatory IV despite OMT, CRT should be considered.
- For patients with AF and CRT, AVJ ablation should be considered when at least 90–95% effective biventricular pacing cannot be achieved.
- For patients with high-degree AVB and an indication for cardiac pacing who have HFrEF (LVEF <40%), CRT rather than RV pacing is recommended.
- His-bundle pacing (HBP) may result in normal or near-normal ventricular activation, and is an attractive alternative to RV pacing. To date, no data from randomized trials support that HBP is non-inferior to RV pacing with respect to safety and efficacy. Therefore, HBP may be considered for selected patients with AVB and LVEF >40%, who are anticipated to have >20% ventricular pacing. In patients offered HBP, implantation of an RV lead used as 'backup' for pacing should be considered individually. HBP may correct ventricular conduction in a subset of patients with LBBB and may therefore be used in lieu of biventricular pacing for HBP-based CRT in selected patients. In patients treated with HBP, device programming tailored to specific requirements of HBP must be ensured.
- Implanting a leadless pacemaker should be considered when no upper extremity venous access exists, when risk of device pocket infection is particularly increased, and in patients on hemodialysis.
- Patients undergoing TAVI are at increased risk of developing AVB. Decisions regarding cardiac pacing after TAVI should be taken based upon pre-existing and new conduction disturbances. Ambulatory ECG monitoring for 7–30 days or EPS may be considered in patients post-TAVI with new LBBB or progression of pre-existing conduction anomaly, but not yet any indication for a pacemaker.
- In patients undergoing surgery for endocarditis or tricuspid valve surgery who have or develop AVB under surgery, placement of epicardial pacing leads during surgery should be considered.
- To reduce the risk of complications, pre-operative antibiotics must be administered before CIED procedures, chlorhexidine–alcohol should be preferred for skin antisepsis, and cephalic or axillary vein access should be attempted as first choice.
- Heparin bridging should be avoided in CIED procedures to minimize the risk of hematoma and pocket infection.
- In patients undergoing a CIED reintervention procedure, using an antibiotic-eluting envelope may be considered to reduce the risk of infection.
- In the majority of patients with a pacemaker or CRT, a well-indicated MRI can be performed if no epicardial leads, abandoned or damaged leads, or lead adaptors/extenders are present, and certain precautions are taken.
- Radiation therapy can be offered to patients with a pacemaker or CRT if an individualized treatment planning and risk stratification is done beforehand and the device is interrogated as recommended around the period of radiation therapy.
- Remote device management is valuable for earlier detection of clinical problems and technical issues, and may allow longer spacing between in-office follow-ups.
- The principles of patient-centred care and shared decision-making should be used in the consultation both pre-operatively and during follow-up for patients considered for or living with a pacemaker or CRT.

Michael Glikson, et al. *European Heart Journal*, 2021; 42:3427-3520. doi.org/10.1093/eurheartj/ehab364

PREVENTIVE CARDIOLOGY

2021, ESC Guidelines on cardiovascular disease prevention in clinical practice: developed by the Task Force for cardiovascular disease prevention in clinical practice with representatives of the European Society of Cardiology and 12 medical societies with the special contribution of the European Association of Preventive Cardiology (EAPC). We present the most important key messages of the new guidelines:

- The **major risk factors for ASCVD** are: cholesterol, BP, cigarette smoking, DM, and adiposity.
- **10-year CVD risk** (https://www.cvriskcalculator.com/) is estimated in apparently healthy people aged 40–69 years with SCORE2, and in people aged ≥70 years with SCORE2-OP.
- **Psychosocial stress** is associated with risk of ASCVD.
- **CAC scoring is the best-established imaging modality** to improve CVD risk stratification.
- **Frailty** is a functional risk factor of both CV and non-CV morbidity and mortality and frailty assessment serves to build an individualized care plan with predefined priorities.
- **Positive family history** of premature ASCVD should be followed by comprehensive CVD risk assessment.
- Current data does not support the use of **genomic risk scores** in CVD risk assessment in primary prevention.
- **Air pollution** is strongly associated with ASCVD.
- **CKD** is an independent risk factor for ASCVD, and ASCVD is the leading cause of death in CKD.

A short-term reduction in **albuminuria** by approximately 30% upon starting RAAS inhibition is associated with improved CV and kidney outcomes.

- **SGLT2 inhibitors** are associated with long-term benefits in CV and renal risks.
- **AF** is associated with an increased risk of death and an increased risk of CVD.
- There is an **overlap between cancer and CV risk factors**. CV risk in patients with cancer depends on both the CV toxicity of treatments and patient-related factors.

- **Exercise should be strongly advised**, in particular aerobic exercise, to prevent cardiotoxicity.
- **COPD** is a major risk factor for CVD, especially ASCVD, stroke, and HF. COPD patients should be investigated for CVD. Moreover, COPD patients are prone to arrhythmias and sudden cardiac death. Common COPD medications are usually safe in terms of CV adverse events.
- **Chronic inflammatory,** Infection with HIV conditions and periodontitis increase CVD risk.
- **Migraine, particularly migraine with aura**, is independent risk factor for stroke and ischemic cardiac disease. The risk of ischemic stroke in subjects with migraine with aura is magnified by the use of combined hormonal contraceptives and cigarette smoking.
- Non-restorative **sleep and a sleep duration** that varies significantly up or down from the **optimum of 7 h** are associated with increased CV risk.
- **Mental disorders** are common in the general population (12-month prevalence of 27%) and are associated with excess mortality. The onset of CVD increases the risk of mental disorders by 2.2-fold, leading to a worse prognosis. Some **mental disorders**—even symptoms of anxiety and depression—are associated with the development of CVD and with a worse prognosis in those with existing CVD (CHD, arterial hypertension, AF, HF).
- **Non-alcoholic fatty liver disease (NAFLD)** is associated with other cardiometabolic risk factors. Patients with NAFLD should be evaluated for other cardiometabolic risk factors.
- **Preeclampsia** and pregnancy-related hypertension are associated with a higher risk of CVD.
- **Polycystic ovary syndrome** confers a significant risk for future development of DM.
- **Erectile Dysfunction** is associated with future CV events and mortality in men. CVD risk should be assessed in men with ED.
- **Aerobic Physical Activity** in combination with resistance exercise and the reduction of sedentary time are recommended for all adults.
- A **healthy diet** lowers the risk of CVD and other chronic diseases. A shift from a more **animal- to plant-based food** pattern may reduce CVD.
- **Stopping smoking** rapidly reduces CVD risk and is the most cost-effective strategy for ASCVD prevention. There is strong evidence for medication-assisted interventions: NRT, bupropion, varenicline, and drugs in combination. The most effective are assistance using drug therapy and follow-up support. Adolescence is the most vulnerable period for the uptake of smoking, with lifelong consequences.
- **Lower is better: the effect of LDL-C** on the risk of CVD appears to be determined by both the baseline level and the total duration of exposure to LDL-C.
- **When hypertension is suspected**, the diagnosis should be confirmed by repeated office BP measurement at different visits, or ABPM or HBPM. Many patients with hypertension will be at sufficient risk to benefit from statin therapy for primary prevention. Antiplatelet therapy is indicated for 2-ndary prevention.
- **Management of hyperglycaemia** reduces the risk of microvascular complications and, to a lesser extent, the risk of CVD. Glycemic targets should be relaxed in older adults and frail individuals. New antihyperglycaemic drugs are particularly important for persons with type 2 DM with existing ASCVD and HF or renal disease, broadly irrespective of glycaemia levels.
- **Alcohol intake** is associated with increased CV mortality, and alcohol use is the leading risk factor for premature death and disability among people aged 15–49 years. Healthcare providers may inquire about alcohol intake in every medical evaluation and should inform patients that alcohol is energy-dense: it provides 7 kcal/g and no nutrients.

Frank L J Visseren, et al. *European Heart Journal*, 2021, 42:3227–3337. doi.org/10.1093/eurheartj/ehab484

Herein we present the most important issues and key points presented in the recent ESC congress in Barcelona, Spain, 2022:

- The **SECURE** is a randomized study which compares the use of a **polypill, containing Aspirin (100mg), ACE inhibitor** (ramipril 2.5, 5, or 10mg) and **Statin** (atorvastatin 20 or 40mg), with the usual care in elderly patients with recent myocardial infarction. The polypill strategy reduced the risk of cardiovascular death, nonfatal MI, nonfatal ischemic stroke, or urgent revascularization by almost 30%.
- The **INVICTUS** a multicenter (24 countries) **Study** showed that in patients [4,565 patients (72.3% women) with mean age 50.5 years] with **atrial fibrillation (AF)** due to **rheumatic heart disease** (inclusion criteria: CHA_2DS_2-VASc score of at least 2, mitral stenosis with a mitral-valve area $<2.0cm^2$, or echocardiographic evidence of left atrial spontaneous echo contrast or left atrial thrombus), the use of **Rivaroxaban** was associated with a higher risk of major cardiovascular events compared with vitamin K antagonist (VKA) therapy.
- The 15-**month results** of **MASTER DAPT trial** showed that the preserved ischemic benefits and reduced bleeding risk seen with the **one month of** DAPT among high-bleeding risk patients undergoing percutaneous coronary intervention (PCI) continue beyond the first year.
- **The ADVOR trial**. Adding acetazolamide to conventional loop diuretics can improve the rate of decongestion in hospitalized acute decompensated heart failure (HF) patients better than diuretics alone. In comparison, the use of IV acetazolamide and loop diuretics in ADVOR was associated with a 46% higher chance of successful decongestion after 72 hours, which translated to a 42.2%

success rate in the acetazolamide group versus a 30.5% success rate in the placebo group ($P < 0.001$). he mean index hospitalization in the acetazolamide group was 8.8 days, compared with 9.9 days in the placebo group (RR 0.89; 95% CI 0.81-0.98). The findings were generally consistent across all prespecified subgroups. In safety analyses, rates of the combined renal safety endpoint, hypokalemia, and hypotension were similar for both groups. In four patients on acetazolamide and in one on placebo, renal replacement therapy was required during hospitalization ($P = 0.21$).

- Full results (with a median follow up of 2.3 years) of the randomized **DELIVER trial**, demonstrated that 6,263 patients (mean age 72 years; 44% women) under sodium-glucose cotransporter-2 (SGLT2) inhibitors (dapagliflozin 10 mg once daily) provide benefits to patients with heart failure irrespective of the ejection fraction, (LVEF), by reducing the rate of CV death or worsening of heart failure.
- **PANTHER** randomized 1:1 (almost 24.000 patients; 21.7% women; with mean age 64years) study (**P2Y12 inhibitor vs. aspirin monotherapy in patients with CAD**. Long-term antiplatelet therapy with aspirin is the cornerstone of secondary prevention in patients with established atherosclerosis. Life-long aspirin is the standard of care after an initial course of dual antiplatelet therapy (DAPT) with a P2Y12 inhibitor plus aspirin in patients with an ACS or undergoing PCI. However, studies comparing P2Y12 inhibitor (clopidogrel or ticagrelor) versus aspirin monotherapy have yielded mixed results. The PANTHER revealed that the overall risk of major bleeding did not differ, whereas gastrointestinal bleeding and hemorrhagic stroke occurred less frequently in patients receiving a P2Y12 inhibitor than aspirin monotherapy.
- According to data from **SCAAR** Registry pretreatment with UFH was associated with a reduction in coronary artery occlusion among patients with STEMI, without increasing the risk of major in-hospital bleeding. Regarding mortality, a reduction was found with UFH pretreatment, but this effect was not robust over all sensitivity analyses and residual confounding cannot be excluded.
- **Octogenarians should walk 10 minutes a day to prolong life:** In the entire study population of 7,047 adults, 1,037 (14.7%) participants did moderate intensity physical activity and 773 (10.9%) did vigorous intensity physical activity. Only 538 participants (7.6%) met the guideline recommendations for moderate-to-vigorous intensity physical activity. Of the 2,996 participants who walked at a slow pace every week, 999 (33%) also did moderate or vigorous intensity physical activity. The researchers analyzed the associations between walking, all-cause mortality, and cardiovascular mortality after adjusting for energy expended on moderate-to-vigorous intensity physical activity. Compared to inactive individuals, those who walked at least one hour per week (i.e. the three highest walking categories) had 40% and 39% lower relative risks of all-cause and cardiovascular mortality, respectively. The researchers conclude that: "Walking was linked with a lower likelihood of dying in older adults, regardless of whether or not they did any moderate-to-vigorous intensity physical activity. Identifying the minimum amount of exercise that can benefit the oldest old is an important goal since recommended activity levels can be difficult to achieve. Our study indicates that walking even just one hour every week is advantageous to those aged 85 years and older compared to being completely inactive. The take home message is to keep walking throughout life."
- **Smoking is even more damaging to the heart than previously thought** The study used data from the 5th Copenhagen City Heart Study which investigated cardiovascular risk factors and diseases in the general population. A total of 3,874 participants aged 20 to 99 years without heart disease were enrolled. A self-administered questionnaire was used to obtain information on smoking history and to estimate pack-years, which is the number of cigarettes smoked through life. One pack-year is defined as 20 cigarettes smoked every day for one year. Participants had an ultrasound of the heart, called echocardiography, which provides information about its structure and how well it is working. The researchers compared the echocardiography measures of current smokers versus never smokers after adjusting for age, sex, body mass index, hypertension, high cholesterol, diabetes and lung function. The average age of participants was 56 years and 43% were women. Nearly one in five participants were current smokers (18.6%), while 40.9% were former smokers and 40.5% had never smoked. Compared to never smokers, current smokers had thicker, weaker and heavier hearts. Increasing pack-years were associated with pumping less blood. Dr. Holt explained: "We found that current smoking and accumulated pack-years were associated with worsening of the structure and function of the left heart chamber – the most important part of the heart. Furthermore, we found that over a 10-year period, those who continued smoking developed thicker, heavier and weaker hearts that were less able to pump blood compared to never smokers and those who quit during that time".

In addition, new guidelines presented regarding:

- Cardio-oncology
- Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death
- Non-Cardiac Surgery: Cardiovascular Assessment and Management
- Pulmonary Hypertension