

-->



(<https://www.aetna.com/>)

Abdominal Aortic Aneurysm Screening

[Clinical Policy Bulletins](#) | [Medical Clinical Policy Bulletins](#)

Number: 0702

Table Of Contents

[Policy](#)

[Applicable CPT / HCPCS / ICD-10 Codes](#)

[Background](#)

[References](#)

Policy History

[Last Review](#)

10/14/2025

Effective: 03/15/2005

Next Review: 08/13/2026

[Review History](#)

[Definitions](#)

Policy

Scope of Policy

This Clinical Policy Bulletin addresses abdominal aortic aneurysm screening.

Additional Information

[Clinical Policy Bulletin](#)

[Notes](#)

I. Medical Necessity

Aetna considers one-time ultrasound screening for abdominal aortic aneurysms (AAA) medically necessary for men 65 years of age or older.

Aetna considers AAA screening experimental, investigational, or unproven for all other indications because its effectiveness for indications other than the one listed above has not been established.

II. Experimental, Investigational, or Unproven

Aetna considers the following experimental, investigational, or unproven because their effectiveness has not been established:

- C-C chemokine receptor type 2 (CCR2) PET/CT for screening abdominal aortic aneurysm (AAA)
- Evaluation of N6-methyladenosine (m6A) methylation for the diagnosis and prognosis of AAA
- Screening JAK2V617F-positive individuals for ascending aortic aneurysms
- Screening persons with large ascending aneurysms for the JAK2V617F sequence variation
- Use of artificial intelligence for screening and identification of AAA (including prediction of AAA growth and rupture), pre-operative planning and sizing of endografts, and predicting post-operative outcomes (including mortality and complications following endovascular aneurysm repair).

CPT Codes / HCPCS Codes / ICD-10 Codes

Code	Code Description
CPT codes covered if selection criteria are met:	
76706	Ultrasound, abdominal aorta, real time with image documentation, screening study for abdominal aortic aneurysm (AAA)

Code	Code Description
CPT codes not covered for indications listed in the CPB:	
<i>Artificial intelligence for the screening and identification of Abdominal Aortic Aortic Aneurysm (AAA), C-C chemokine receptor type 2 (CCR2) PET/CT, N6-methyladenosine (m6A) methylation - no specific code</i>	
81270	JAK2 (Janus kinase 2) (eg, myeloproliferative disorder) gene analysis, p. Val617Phe (V617F) variant
Other CPT codes related to the CPB:	
76770	Ultrasound, retroperitoneal (e.g., renal, aorta, nodes), real time with image documentation; complete
76775	limited
ICD-10 codes covered if selection criteria are met:	
F17.210 -	Nicotine dependence, cigarettes
F17.219	
Z13.6	Encounter for screening for cardiovascular disorders [abdominal aortic aneurysm (AAA)]
Z87.891	Personal history of nicotine dependence
ICD-10 codes not covered if selection criteria are met:	
I71.11	Aneurysm of the ascending aorta, ruptured
I71.21	Aneurysm of the ascending aorta, without rupture
I71.30 - I71.33	Abdominal aortic aneurysm, ruptured
I71.40 - I71.43	Abdominal aortic aneurysm, without rupture

Background

The U.S. Preventive Services Task Force (USPSTF) recommends one-time screening for abdominal aortic aneurysm (AAA) by ultrasonography in men aged 65 to 75 who have ever smoked. This recommendation was based on the results of published randomized controlled clinical studies of screening for abdominal aortic aneurysms (Scott et al, 1995; Vardulaki et al, 2002; Scott et al, 2002; Lindholt et al, 2002; Ashton et al, 2002; Norman et al, 2003).

The USPSTF found good evidence that screening for AAA and surgical repair of large AAAs (5.5 cm or more) in men aged 65 to 75 who have ever smoked (current and former smokers) leads to decreased AAA-specific mortality. The USPSTF found that there is good evidence that abdominal ultrasonography, performed in a setting with adequate quality assurance (i.e., in an accredited facility with credentialed technologists), is an accurate screening test for AAA. The USPSTF also identified, however, important harms of screening and early treatment, including an increased number of surgeries with associated clinically-significant morbidity and mortality, and short-term psychological harms. Based on the moderate magnitude of net benefit, the USPSTF concluded that the benefits of screening for AAA in men aged 65 to 75 who have ever smoked outweigh the harms.

The USPSTF made no recommendation for or against screening for AAA in men aged 65 to 75 who have never smoked. Although the USPSTF found good evidence that screening for AAA in men aged 65 to 75 who have never smoked leads to decreased AAA-specific mortality, there is a lower prevalence of large AAAs in men who have never smoked compared with men who have ever smoked; thus, the USPSTF determined that the potential benefit from screening men who have never smoked is small. The USPSTF also weighed the harms of screening and early treatment, and concluded that the balance between the benefits and harms of screening for AAA is too close to make a general recommendation in this population.

The USPSTF recommended against routine screening for AAA in women. The USPSTF explained that, because of the low prevalence of large AAAs in women, the number of AAA-related deaths that can be prevented by screening this population is small. The USPSTF concluded that the harms of screening women for AAA outweigh the benefits.

The USPSTF reported that one-time screening to detect an AAA using ultrasonography is sufficient. They concluded that there is negligible health benefit in re-screening those who have normal aortic diameter on initial screening. The USPSTF concluded that, for most men, 75 years may be considered an upper age limit for screening. Patients can not benefit from screening and subsequent surgery unless they have a

reasonable life expectancy. The USPSTF explained that increased presence of co-morbidities for people aged 75 and older decreases the likelihood that they will benefit from screening.

It is generally recommended that patients with AAA of 5.5 cm or greater seek open surgical repair. Open surgical repair for an AAA of at least 5.5 cm leads to an estimated 43 % reduction in AAA-specific mortality in older men who undergo screening. However, there is no current evidence that screening reduces all-cause mortality in this population.

The USPSTF reported that, in men with intermediate-sized AAAs (4.0 to 5.4 cm), periodic surveillance offers comparable mortality benefit to routine elective surgery with the benefit of fewer operations. The USPSTF found no evidence to support the effectiveness of any intervention in those with small AAAs (3.0 to 3.9 cm); the USPSTF noted, however, that, there are expert opinion-based recommendations in favor of periodic repeat ultrasonography for these patients.

Repeat abdominal ultrasound testing every 6 months has been recommended for men with abdominal aortic aneurysms greater than 4 cm in diameter, and every 2 years for men with smaller abdominal aortic aneurysms (Lederle, 2003).

Color flow duplex ultrasound scanning has been used as an surveillance modality for clinically significant endoleaks in patients who have undergone endovascular repair of AAAs. Sun (2006) systematically reviewed the findings of diagnostic value of color duplex ultrasound (US) in the follow-up of endovascular repair of AAAs. Studies comparing the diagnostic accuracy of color duplex US with that of computed tomographic (CT) angiography were included, and analysis was performed of the detection of endoleaks and measurement of aneurysm diameter. A total of 21 studies (39 separate comparisons) met the criteria and were included for analysis. Pooled estimates of sensitivity, specificity, positive-predictive value (PPV), negative-predictive value (NPV), and accuracy of color duplex US compared with CT angiography (with 95 % confidence interval [CI]) were 66 % (52 to 81 %), 93 % (89 to 97 %), 76 % (65 to 87 %), 90 % (86 to 95 %), and 91 % (86 to 97 %), respectively, for unenhanced color duplex US; and 81 % (52 to 100 %), 82 % (68 to 97 %), 58 % (26 to 90 %), 95 % (87 to 100 %), and 98 % (91

to 100%), respectively, for enhanced color duplex US. The sensitivity in the detection of endoleak was significantly improved with contrast material-enhanced color duplex US compared with unenhanced color duplex US ($p < 0.05$); however, no significant difference was found regarding the specificity, PPV, NPV, and accuracy between unenhanced and enhanced color duplex US ($p > 0.05$). Color duplex US was insensitive in measurement of aneurysm diameter compared with CT angiography in most situations. The authors concluded that color duplex US is not as accurate as CT angiography and can not replace CT angiography in the follow-up of endovascular aortic repair of AAAs. However, the use of contrast material-enhanced color duplex US resulted in improvement of diagnostic accuracy in the detection of endoleak and warrants further study.

Kim et al (2007) estimated the benefits, in terms of AAA-related and all-cause mortality, and cost-effectiveness of ultrasonography screening for AAA in a group that was invited to screening compared with a group that was not invited at a mean 7-year follow-up. Population-based sample of 67,770 men aged 65 to 74 years were included in this analysis. Patients with an AAA detected at screening had surveillance and were offered surgery after pre-defined criteria were met. Mortality data were obtained after flagging on the national database. Unit costs obtained from large samples were applied to individual event data for the cost analysis. The hazard ratio was 0.53 (95 % CI: 0.42 to 0.68) for AAA-related mortality in the group invited for screening. The rupture rate in men with normal results on initial ultrasonography has remained low: 0.54 rupture (CI: 0.25 to 1.02 ruptures) per 10,000 person-years. In terms of all-cause mortality, the observed hazard ratio was 0.96 (CI: 0.93 to 1.00). At the 7-year follow-up, cost-effectiveness was estimated at \$19,500 (CI: \$12,400 to \$39,800) per life-year gained based on AAA-related mortality and \$7,600 (CI: \$3,300 to infinity) per life-year gained based on all-cause death. Inclusion of deaths from aortic aneurysm at an unspecified site, which may include some thoracic aortic aneurysms, may have under-estimated the treatment effect. The authors concluded that these findings from a large, pragmatic randomized trial showed that the early mortality benefit of screening ultrasonography for AAA is maintained in the longer term and that the cost-effectiveness of screening improves over time.

In a Cochrane review on screening for AAA, Cosford and Leng (2007) concluded that there is evidence of a significant reduction in mortality from AAA in men aged 65 to 79 years who undergo ultrasound screening. However, there is insufficient evidence to demonstrate benefit in women.

Eckstein and colleagues (2009) stated that ultrasonography of the abdominal aorta is a safe and technically simple method of detecting AAAs. These investigators performed a meta-analysis of population-based, randomized controlled trials (RCTs) of ultrasonographic screening for the detection of AAA. A total of 4 RCTs showed that ultrasonographic screening was associated with a significant lowering of AAA-related mortality in men aged 65 to 80 after it had been performed for 3 to 5 years (risk reduction 44 %, odds ratio [OR] 0.56, 95 % CI: 0.44 to 0.72) and after it had been performed for 7 to 15 years (risk reduction 53 %, OR 0.47, 95 % CI: 0.25 to 0.90). Screening of AAA was also associated with a significant lowering of the overall mortality after 7 to 15 years, but not in the first 5 years. Ultrasonographic screening led to a significant increase in the number of elective AAA operations performed and to a 50 % reduction of the number of emergency operations for ruptured AAA. The authors concluded that ultrasonographic screening for AAA is a technically simple diagnostic test that is associated with a major reduction of AAA-related mortality. In view of the higher prevalence of AAA among the elderly, it is recommended that all men aged 65 or older and all men and women with a family history of AAA should be systematically screened.

Koolemay et al (2009) noted that the evidence-based guideline "Diagnosis and treatment of abdominal aortic aneurysm" is applicable to all patients with an atherosclerotic fusiform or ruptured AAA. An AAA with a diameter less than 5.5 cm is treated conservatively and monitored by sonographic surveillance. All patients are advised secondary prevention with anti-platelet therapy, statin therapy, treatment of hypertension and smoking cessation. Depending on co-morbidity, the indication for an operation is an AAA diameter of 5.5 cm. The anatomical characteristics of the AAA guides the choice for an open operation or endovascular aneurysm repair (EVAR). In view of the lower peri-operative mortality,

EVAR is the treatment of choice. Due to the high prevalence of AAA in siblings of patients with an AAA, the screening of these family members should be considered.

Brown et al (2013) stated that small AAAs (3.0 cm to 5.4 cm in diameter) are monitored by US surveillance. The intervals between surveillance scans should be chosen to detect an expanding aneurysm prior to rupture. These researchers performed a meta-analysis to limit risk of aneurysm rupture or excessive growth by optimizing US surveillance intervals. Individual patient data from studies of small AAA growth and rupture were assessed. Studies were identified for inclusion through a systematic literature search through December 2010. Study authors were contacted, which yielded 18 data sets providing repeated US measurements of AAA diameter over time in 15,471 patients. Abdominal aortic aneurysms diameters were analyzed using a random-effects model that allowed for between-patient variability in size and growth rate.

Rupture rates were analyzed by proportional hazards regression using the modeled AAA diameter as a time-varying covariate. Predictions of the risks of exceeding 5.5-cm diameter and of rupture within given time intervals were estimated and pooled across studies by random effects meta-analysis. Abdominal aortic aneurysms growth and rupture rates varied considerably across studies. For each 0.5-cm increase in AAA diameter, growth rates increased on average by 0.59 mm per year (95 % CI: 0.51 to 0.66) and rupture rates increased by a factor of 1.91 (95 % CI: 1.61 to 2.25). For example, to control the AAA growth risk in men of exceeding 5.5 cm to below 10 %, on average, a 7.4-year surveillance interval (95 % CI: 6.7 to 8.1) is sufficient for a 3.0-cm AAA, while an 8-month interval (95 % CI: 7 to 10) is necessary for a 5.0-cm AAA. To control the risk of rupture in men to below 1 %, the corresponding estimated surveillance intervals are 8.5 years (95 % CI: 7.0 to 10.5) and 17 months (95 % CI: 14 to 22). The authors concluded that in contrast to the commonly adopted surveillance intervals in current AAA screening programs, surveillance intervals of several years may be clinically acceptable for the majority of patients with small AAA.

Thompson et al (2013) noted that small AAAs (3.0 to 5.4 cm in diameter) are usually asymptomatic and managed by regular US surveillance until they grow to a diameter threshold (commonly 5.5 cm) at which surgical intervention is considered. The choice of appropriate surveillance

intervals is governed by the growth and rupture rates of small AAAs, as well as their relative cost-effectiveness. These investigators provided the evidence base for small AAA surveillance strategies. This was achieved by literature review, collation and analysis of individual patient data, a focus group and health economic modelling. These researchers undertook systematic literature reviews of growth rates and rupture rates of small AAAs. The databases MEDLINE, EMBASE on OvidSP, Cochrane Central Register of Controlled Trials 2009 Issue 4, ClinicalTrials.gov, and controlled-trials.com were searched from inception up until the end of 2009. They also obtained individual data on 15,475 patients from 18 surveillance studies. Systematic reviews of publications identified 15 studies providing small AAA growth rates, and 14 studies with small AAA rupture rates, up to December 2009 (later updated to September 2012). The authors developed statistical methods to analyze individual surveillance data, including the effects of patient characteristics, to inform the choice of surveillance intervals and provide inputs for health economic modelling. They updated an existing health economic model of AAA screening to address the cost-effectiveness of different surveillance intervals. In the literature reviews, the mean growth rate was 2.3 mm/year and the reported rupture rates varied between 0 and 1.6 ruptures per 100 person-years. Growth rates increased markedly with aneurysm diameter, but insufficient detail was available to guide surveillance intervals. Based on individual surveillance data, for each 0.5-cm increase in AAA diameter, growth rates increased by about 0.5 mm/year and rupture rates doubled. To control the risk of exceeding 5.5 cm to below 10 % in men, on average a 7-year surveillance interval is sufficient for a 3.0-cm aneurysm, whereas an 8-month interval is necessary for a 5.0-cm aneurysm. To control the risk of rupture to below 1 %, the corresponding estimated surveillance intervals are 9 years and 17 months. Average growth rates were higher in smokers (by 0.35 mm/year) and lower in patients with diabetes (by 0.51 mm/year). Rupture rates were almost 4-fold higher in women than men, doubled in current smokers and increased with higher blood pressure. Increasing the surveillance interval from 1 to 2 years for the smallest aneurysms (3.0 to 4.4 cm) decreased costs and led to a positive net benefit. For the larger aneurysms (4.5 to 5.4 cm), increasing surveillance intervals from 3 to 6 months led to equivalent cost-effectiveness. The authors concluded that surveillance intervals of several years are clinically acceptable for men with AAAs in the range 3.0 to 4.0 cm. Intervals of around 1 year are

suitable for 4.0 to 4.9-cm AAAs, whereas intervals of 6 months would be acceptable for 5.0 to 5.4-cm AAAs. These intervals are longer than those currently employed in the UK AAA screening programs. Lengthening surveillance intervals for the smallest aneurysms was also shown to be cost-effective. Future work should focus on optimizing surveillance intervals for women, studying whether or not the threshold for surgery should depend on patient characteristics, evaluating the usefulness of surveillance for those with aortic diameters of 2.5 to 2.9 cm, and developing interventions that may reduce the growth or rupture rates of small AAAs.

On behalf of the USPSTF, Guirguis-Blake et al (2014) systematically reviewed evidence about the benefits and harms of ultrasonography screening for AAAs in asymptomatic primary care patients. Data sources included MEDLINE, the Database of Abstracts of Reviews of Effects, the Cochrane Central Register of Controlled Trials (January 2004 through January 2013), clinical trial registries, reference lists, experts, and a targeted bridge search for population-based screening RCTs through September 2013. English-language, population-based, fair- to good-quality RCTs and large cohort studies for AAA screening benefits as well as RCTs and cohort and registry studies for harms in adults with AAA were selected for analysis. Reviews of 4 RCTs involving 137,214 participants demonstrated that 1-time invitation for AAA screening in men aged 65 years or older reduced AAA rupture and AAA-related mortality rates for up to 10 and 15 years, respectively, but had no statistically significant effect on all-cause mortality rates up to 15 years. Screening was associated with more overall and elective surgeries but fewer emergency operations and lower 30-day operative mortality rates at up to 10- to 15-year follow-up. One RCT involving 9,342 women showed that screening had no benefit on AAA-related or all-cause mortality rates. The authors concluded that one-time invitation for AAA screening in men aged 65 years or older was associated with decreased AAA rupture and AAA-related mortality rates; but had little or no effect on all-cause mortality rates.

LeFevre (2014) reported the update of the 2005 UUSPSTF recommendation on screening for AAA. The USPSTF commissioned a systematic review that assessed the evidence on the benefits and harms

of screening for AAA and strategies for managing small (3.0 to 5.4 cm) screen-detected AAAs. These recommendations apply to asymptomatic adults aged 50 years or older.

- The USPSTF recommends 1-time screening for AAA with ultrasonography in men aged 65 to 75 years who have ever smoked. (B recommendation).
- The USPSTF recommends that clinicians selectively offer screening for AAA in men aged 65 to 75 years who have never smoked. (C recommendation).
- The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for AAA in women aged 65 to 75 years who have ever smoked. (I statement).
- The USPSTF recommends against routine screening for AAA in women who have never smoked. (D recommendation).

Abdominal Aortic Aneurysm Screening in Women

Ulug and colleagues (2016) stated that although women represent an increasing proportion of those presenting with abdominal aortic aneurysm (AAA) rupture, the current prevalence of AAA in women is unknown. The contemporary population prevalence of screen-detected AAA in women was investigated by both age and smoking status. These researchers performed a systematic review of studies screening for AAA, including over 1,000 women, aged at least 60 years, done since the year 2000. Studies were identified by searching Medline, Embase and CENTRAL databases until January 13, 2016. Study quality was assessed using the Newcastle-Ottawa scoring system. A total of 8 studies were identified, including only 3 based on population registers. The largest studies were based on self-purchase of screening. Altogether 1,537,633 women were screened. Overall AAA prevalence rates were very heterogeneous, ranging from 0.37 to 1.53 %: pooled prevalence 0.74 (95 % confidence interval [CI]: 0.53 to 1.03) %. The pooled prevalence increased with both age (more than 1 % for women aged over 70 years) and smoking (more than 1 % for ever smokers and over 2 % in current smokers). The authors concluded that the current population prevalence of screen-detected AAA in older women is subject to wide demographic variation. However, in ever smokers and those over 70 years of age, the prevalence is over 1 %.

Chabok and associates (2016) noted that 4 randomized trials of men aged 65 to 80 years showed that aneurysm-related mortality was reduced by 40 % by ultrasound screening. Screening is considered economically viable when the prevalence of abdominal aortic aneurysm (AAA) is 1.0 % or higher. This is not the case for women, in whom the prevalence of AAA is less than 1 %. These investigators determined the prevalence of AAA 3.0 cm or larger in women screened with ultrasound imaging, the risk factors associated with AAA in this population, and whether high-risk groups can be identified with an AAA prevalence of 1 % or greater.

Demographic data and risk factors were collected from the first 50,000 women who attended for private cardiovascular screening in the UK. Tests included ultrasound screening for AAA, ankle brachial pressure index (ABPI), carotid duplex imaging for carotid atherosclerosis, and electrocardiography for atrial fibrillation. AAA was detected in 82 of 50,000 women screened; these aneurysms were rare below the age of 66 years (7 of 24,499). In the 66 to 85 years age group there were 72 AAAs in 25,170 women (0.29 %). Univariable analysis demonstrated that a history of stroke/transient ischemic attack (TIA), hypertension, smoking, atrial fibrillation, ABPI of less than 0.9 and internal carotid artery stenosis of at least 50 % were associated with an increased prevalence of AAA ($p < 0.001$). In multivariable linear logistic regression of risk factors, age 76 years or more, history of stroke/TIA, hypertension and smoking were independent predictors of AAA. This model had an area under the receiver operating characteristic (ROC) curve (AUC) of 0.711 (95 % CI: 0.649 to 0.772) and could identify 2,235 women who had 22 AAAs (prevalence 0.98 %). By adding ABPI, atrial fibrillation and carotid stenosis, the prediction improved to an AUC of 0.775 (0.724 to 0.826). This model could identify 3,701 women who had 58 AAAs (prevalence 1.57 %). The authors concluded that this report should stimulate consideration of a targeted AAA screening program for women aged over 65 years.

Soderberg and colleagues (2017) reported on the natural history of a population-based cohort of 70-year old women with screening detected dilated aortas, and systematically reviewed publications reporting the rate of intact infra-renal aneurysm repair in women. In a previous study, 5,140 (74 %) of 6,925 invited women attended an US examination of the abdominal aorta at age 70 years. All 52 women with screening detected sub-aneurysms (SA, diameter of 25 to 29 mm) and AAA (diameter of

greater than or equal to 30 mm), were followed for 5 years with US. Infra-renal aortic diameters, AAA repair, all-cause and AAA specific mortality, and risk factors were recorded. In addition, a systematic review was conducted of the rate of intact infra-renal aneurysm repair in women. A total of 33 (0.6 %) women had a SA at the age of 70; 2 (6 %) declined follow-up, 5 (15 %) had died, and 26 were re-examined after 5 years follow-up at age 75; 12 of 26 (46 %) had progressed to AAAs, where 1 was directly qualified for surgery. Smoking ($p = 0.010$) and aortic diameter ($p = 0.040$) were associated with progression to AAA. A total of 19 (0.4 %) women had an AAA at age 70; 2 (11 %) had died, 6 (32 %) had been electively repaired with no 30-day mortality, and 11 (58 %) had an AAA still under surveillance after 5 years follow-up at age 75 years. In the systematic search, 4 studies with heterogeneous cohorts were identified and data on natural history were extracted and reviewed. The authors concluded that screening detected AAAs and sub-aneurysms are clinically relevant in women. Within 5 years of detection a high proportion of AAAs required elective surgery, and a high proportion of sub-aneurysms progress to AAAs. Consequently, surveillance of sub-aneurysms in women with reasonable life expectancy can be considered. Publications on repair rate in women with intact AAAs were scarce and heterogeneous.

Furthermore, an UpToDate review on "Screening for abdominal aortic aneurysm" (Mohler, 2017) states that "The prevalence of AAAs is negligible in individuals under the age of 60, particularly women, but then increases dramatically with age. Screening studies show that AAA occurs in 4 to 9 % of individuals over the age of 60. However, most (57 to 88 %) of these aneurysms are ≤ 3.5 cm in diameter. Clinically important aneurysms over 4.0 cm in diameter are present in about 1 % of men between the ages of 55 and 64; the prevalence increases by 2 to 4 % per decade thereafter ... AAAs are 4 to 6 times more common in men than in women. In addition, AAAs develop in women about 10 years later than in men. A model to identify women with multiple cardiovascular risk factors who are at particularly high risk for AAA and may benefit from screening has been developed combining 2 United States data sets, but remains to be validated in other populations ... Only one study examined population-based screening in women, a population in whom the prevalence of AAA is significantly lower than in men (1.3 versus 7.6 %). Screening had no effect on AAA-related mortality (OR 1.0, 95 % CI 0.14-7.07) or all-cause

mortality (OR 1.05, 0.92-1.19) at 5-year and 10-year follow-up ... The USPSTF advises against screening women who have never smoked, but conclude that evidence is insufficient to assess the benefits and harms of screening women aged 65 to 75 who have ever smoked ... The Society for Vascular Surgery issued updated guidelines in 2009 recommending one-time screening for all men older than 65 (and at 55 if family history is positive) and screening for women older than 65 who have smoked or have a family history. The guidelines cite that, although the prevalence of AAA is lower in women than men, rupture rates are higher in women and life expectancy is longer ... The Canadian Society for Vascular Surgery recommends screening for men between age 65 and 75 who are candidates for surgery. Recommendations are not to screen women > 65 years on a population basis, but to individualize screening for women with multiple risks (smoking, cerebrovascular disease, and family history)".

The Canadian Task Force on Preventive Health Care's "Recommendations on screening for abdominal aortic aneurysm in primary care" (2017) stated that "Women have much lower rates of AAA than men, and there is no direct evidence that screening women has a positive impact on their health". The Canadian Task Force on Preventive Health Care recommended not screening women for AAA (strong recommendation; very low quality of evidence).

Duncan et al (2021) stated that population-wide US screening program for AAA for men have already been established in some countries. Women account for 1/3 of aneurysm-related mortality and are 4 times more likely to experience an AAA rupture than men. Whole-population screening for AAA in women is unlikely to be clinically or economically effective. These researchers examined the outcomes of a targeted AAA screening program for women at high-risk of AAA. Women aged 65 to 74 years deemed at high-risk of having an AAA (current smokers, ex-smokers, or with a history of coronary artery disease) were invited to attend US screening (July 2016 to March 2019) for AAA in the Female Aneurysm screening STudy (FAST). Primary outcomes were attendance for screening and prevalence of AAA. Biometric data, medical history, quality of life (QOL) and aortic diameter on US imaging were recorded prospectively. Some 6,037 women were invited and 5,200 attended screening (86.7 %); 15 AAAs larger than 2.9 cm were detected (prevalence 0.29 (95 % CI: 0.18 % to 0.48 %). Current smokers had the

highest prevalence (0.83 % (95 % CI: 0.34 % to 1.89 %) but lowest attendance (75.2 %); 3 AAAs greater than 5.5 cm were identified and referred for consideration of surgical repair; 1 woman underwent repair. There was a significant reduction in patient-reported QOL scores following screening. The authors concluded that a low prevalence of AAA was detected in high-risk women, with lowest screening uptake in those at highest risk. Moreover, these researchers stated that screening for AAA in high-risk women may not be beneficial.

These investigators stated that the hypothesis of the study was that a targeted screening program for women with risk factors for developing AAA would be an effective way of detecting AAA early in women and address the perceived disadvantage in a disease that remains highly morbid in the female population. However, although it remains the case that 1/3 of AAA deaths recorded in England are in women, screening between 65 and 74 years of age does not appear to be a clinically effective way of identifying AAA early in women. Longer-term follow-up of the cohort of 55 diseased aortas will help further to define the natural history of AAA in women; however, in a rare disease that is becoming rarer it is becoming increasingly difficult to provide good-quality evidence for the best methods of screening and detection, let alone follow-up and treatment. These researchers stated that a larger study would not be of benefit to calculate prevalence more accurately in what has been established as a rare disease (in women), even in those women deemed at high-risk for developing it. The authors stated that health services worldwide should exercise great caution before considering implementation of targeted screening of women for AAA.

Expanding Abdominal Aortic Aneurysm Screening

O'Donnell and colleagues (2020) noted that both the USPSTF and the UK National Institute for Health and Care Excellence (NICE) are re-evaluating their screening paradigms for AAAs. Currently, most countries that screen for AAA do so only in male ever-smokers between the ages of 65 and 75 years and in patients with a family history of AAA. However, these recommendations are based primarily on screening trials predating the endovascular era. The wider applicability of endovascular aneurysm repair and its safety profile, especially in the elderly, have changed the risk-benefit of repair and, by extension, screening. This is despite the

decreasing prevalence of AAA thanks to improved medical therapies and lower smoking rates. This evidence summary critically examined the evidence behind screening and the potential for expanded screening.

The authors stated that although expanded screening holds the potential to prevent many deaths from aneurysm-related mortality, caution is needed. More than 1/3 of the repairs in the U.S. are currently conducted for aneurysms that did not meet the diameter criteria set forth in guidelines (although many may have been for other indications, such as saccular aneurysms, rapid growth, symptoms, tenderness, concomitant iliac aneurysms, or other concerns). Strong guidance from professional societies, stake-holders, and thought leaders is critical to guard against over-use and to ensure that the patient's interests remain at the forefront. Furthermore, currently available risk models for peri-operative risk and long-term survival could aid clinicians in deciding who to screen and who to repair. These investigators noted that the field of vascular surgery has changed dramatically since the time of the screening trials and the original USPSTF guidelines. They argue that the recently drafted NICE guidelines for AAA screening more accurately reflect the currently available data than the USPSTF guidelines. Patients older than 65 years (including women and those older than 75 years) with at least 1 risk factor and a life expectancy of greater than 5 years as well as patients older than 50 years with a strong family history should be offered a 1-time screening US examination. The cost of screening is low, and those populations have sufficiently high prevalence of the disease and experience relatively low morbidity and mortality after elective repair, especially with EVAR.

Carnevale and associates (2020) noted that USPSTF guidelines are the most widely used criteria for screening for AAA. However, when the USPSTF criteria are applied retrospectively to a group of patients who have undergone treatment for AAA, there are many patients who satisfy none of the AAA screening criteria. The more sensitive Society for Vascular Surgery (SVS) guidelines have expanded the criteria for screening for AAA with the hope of capturing a greater fraction of those individuals who can undergo treatment for their AAA before presenting with AAA rupture. These investigators determined the number of patients who would have been identified as having criteria for screening for AAA by both the USPSTF and SVS criteria, in a cohort of patients who have

undergone treatment for AAA. They examined demographic, co-morbidity, and peri-operative complication data for all patients undergoing endovascular and open AAA repair in the Vascular Quality Initiative (VQI). Patients meeting each of the screening criteria were identified. Clinical factors and demographic variables were collected. These researchers identified 55,197 patients undergoing AAA repair in the VQI, including 44,602 patients who underwent EVAR and 10,595 patients undergoing open repair. Of these, the USPTF guidelines would have identified fewer than 1/3 of patients (32 % EVAR and 33 % open repair). Applying the SVS guidelines increased the number meeting criteria for screening by 6 % and 12 % for the EVAR and open repair cohorts, respectively. Finally, adoption of the expanded SVS guidelines (including the "weak recommendations") would have identified an additional 34 % of EVAR patients and 21 % of open AAA repair patients. Use of the expanded criteria would have resulted in 27 % of patients undergoing EVAR and 33 % of patients undergoing open AAA repair who would not have met any screening criteria. In EVAR patients not meeting the criteria, 52 % were younger than 65 years had a history of heavy smoking. Of all those who did not meet screening criteria, ruptured AAA was twice as prevalent as those who met screening criteria (8.5 % versus 4.4 %; $p \leq 0.0001$). The authors concluded that the SVS guidelines substantially expanded the proportion of patients that would potentially be captured in screening programs; however, 1/4 to 1/3 of patients treated for AAA would remain potentially unidentified by any current screening guidelines. Two sub-populations existed within this unscreened at-risk group, including, in particular, smokers between the ages of 50 and 64 years and elderly patients with no smoking history. They stated that these findings suggested that expanding the criteria for AAA screening and diligence during physical examinations in evaluating for the presence of AAA should be considered and investigated further, to allow for early detection and elective treatment when indicated.

The authors stated that this study had several drawbacks. First, it was a cohort taken from a surgical post-operative registry. Although all the patients had AAA, it is unknown how these AAA were found and whether these patients were or were not actually screened. Second, these findings were based on patients treated via an EVAR or open surgical approach for infra-renal aneurysms and did not include patients who were observed and managed expectantly, especially those with smaller

aneurysms, or those managed with more complex repairs such as fenestrated EVAR or open repair with renal or visceral artery reconstructions. Despite this limitation, these researchers would not expect that including these additional cases from the VQI would have changed the results significantly. Third, the amount of tobacco use was not recorded in the VQI and, thus, could not be quantified, making it impossible to evaluate any dose-dependent association with AAA to guide future screening studies. Finally, there was no way to examine if patients presenting to an emergency department in extremis were capable of providing a full history and, if they died peri-operatively, this information would not be recorded.

Artificial Intelligence in Abdominal Aortic Aneurysm

Raffort et al (2020) noted that AAA is a life-threatening disease, and the only curative treatment relies on open or endovascular repair. The decision to treat relies on the evaluation of the risk of AAA growth and rupture, which can be difficult to evaluate in practice. Artificial intelligence (AI) has revealed new insights into the management of cardiovascular diseases (CVDs); however, its use in AAA has been poorly described. These researchers examined the available evidence on the potential applications of AI in patients with AAA. They carried out a comprehensive literature review; the Medline database was searched according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search strategy used a combination of keywords and included studies using AI in patients with AAA published between May 2019 and January 2000; 2 authors independently screened titles and abstracts and conducted data extraction. The search of published literature yielded 34 studies with distinct methodologies, aims, and study designs. AI was used in patients with AAA to improve image segmentation and for quantitative analysis and characterization of AAA morphology, geometry, and fluid dynamics. AI allowed computation of large data sets to identify patterns that may be predictive of AAA growth and rupture. Several predictive and prognostic programs were also developed to examine patients' post-operative outcomes, including mortality and complications following endovascular aneurysm repair. The authors concluded that although the field of AI in patients with AAA is still in its infancy, it appears to offer various potential applications in medical practice. It may aid in the interpretation and analysis of AAA imaging by

enabling automatic quantitative measurements and a precise characterization of AAA morphology, geometry, and fluid dynamics as well as of the presence of intra-luminal thrombus and calcifications. Although further studies are needed, it could lead to the development of new software to help surgeons in pre-operative planning and sizing of endografts. External validation is needed, and the generalizability of results may need multi-center registries taking into account a broad spectrum of patient demographics. With use of AI, the combination of clinical, biologic, and imaging characteristics of patients would allow development of robust and accurate predictive and prognostic scores of AAA evolution and risk of rupture. That kind of approach could aid surgeons to better evaluate the indications for surgical repair. Finally, it would also help to better predict the post-operative outcomes and to adapt the surveillance of patients undergoing AAA repair. Such approaches may improve precision medicine and allow a personalized therapeutic approach to be proposed.

In a systematic review, Kodenko et al (2022) focused on the use of AI for opportunistic AAA detection in CT. These investigators employed PubMed as the primary source for the literature search and Google Scholar as a supplementary source of evidence. They searched through February 2, 2022. All studies on automated AAA detection or segmentation in non-contrast abdominal CT were included. For bias assessment, these researchers developed and used an adapted version of the QUADAS-2 checklist. They included 8 studies with 355 cases, of which 273 (77 %) contained AAA. The highest risk of bias and level of applicability concerns were observed for the "patient selection" domain, due to the 100 % pathology rate in the majority (75 %) of the studies. The mean sensitivity value was 95 % (95 % CI: 87 % to 100 %), the mean specificity value was 96.6 % (95 % CI: 75.7 % to 100 %), and the mean accuracy value was 95.2 % (95 % CI: 54.5 % to 100 %). Four studies (50 %) carried out diagnostic accuracy estimation, with only 1 study having data on all diagnostic accuracy metrics; thus, these researchers performed a narrative synthesis. The authors concluded that these findings indicated high study heterogeneity, further studies are needed, focused on balanced datasets with non-contrast CT scans and the use of reporting standards for satisfactory results' reproducibility.

The authors stated that this study had 2 main drawbacks. First, despite these findings showing the high diagnostic accuracy of AI for the automatic detection of AAA detection on a non-contrast CT, there were some concerns on the applicability and safety of the reviewed models in a clinical setting. The main reasons for the concerns were the sampling bias and the hidden stratification. Only 2 studies (25 %) included non-pathological cases in the testing datasets. Moreover, 62.5 % of included studies used a single AAA-positive CT scan to validate their algorithm, which did not allow estimation of the accuracy, specificity, and sensitivity. Because of this, these researchers believed that the reported values of the sensitivity and specificity may be artificially high and need to be re-assessed using standardized protocol and a high-quality independent testing dataset. Second, only a few studies met the inclusion criteria. However, the number of studies was not as important as their methodological quality: even if there were more studies, the methodological flaws and inflated diagnostic accuracy values cause doubts of the feasibility of meta-analysis. This is a well-known problem of reviews of AI studies that needs regulatory attention. Perhaps consideration should be given not only to the reporting standardization of papers on diagnostic accuracy (STARD-AI) but also to AI-specific analyses in systematic reviews of such papers.

In a retrospective, single-center study, Camara et al (2022) trained a foundational convolutional neural network (CNN) for screening CT angiography (CTA) scans for the presence of infra-renal AAAs for future predictive modeling and other AI applications. From January 2015 to January 2020, a Health Insurance and Accountability Act (HIPAA)-compliant, institutional review board (IRB)-approved, retrospective clinical study analyzed contrast-enhanced (CE) abdominopelvic CTA scans from 200 patients with infra-renal AAAs and 200 propensity-matched control patients with non-aneurysmal infra-renal abdominal aortas. A CNN was trained to binary classification on the input. For model improvement and testing, transfer learning using the ImageNet database was applied to the VGG-16 base model. The image dataset was randomized to sets of 60 %, 10 %, and 30 % for model training, validation, and testing, respectively. A stochastic gradient descent was used for optimization. The models were assessed by testing validation accuracy and the AUC. Preliminary data showed a non-random pattern of accuracy and detectability. Iterations (10 or less) of the model characteristics

generated a final custom CNN model reporting an accuracy of 99.1 % and AUC of 0.99. Misjudgments were analyzed via review of the heat maps generated via gradient weighted class activation mapping overlaid on the original CT images. The greatest misjudgments were observed in small aneurysms (less than 3.3 cm) with mural thrombus. The authors concluded that preliminary data from a CNN model have shown that the model can accurately screen and identify CTA findings of infra-renal AAAs. This model serves as a proof-of-concept (POC) to proceed with potential future directions to include expansion to predictive modeling and other AI-based applications.

The authors stated that this study had several drawbacks. First, this was a retrospective, single-center study with a limited number of queried imaging studies that had met the exclusion criteria (i.e., ruptured aneurysm, prior repair of an infra-renal AAA, and/or protocol errors [absence of intravenous contrast material, timing issues]). However, with the development of their training technique and method, these researchers have the tools to continue to optimize their protocol to train the CNN to potentially mitigate these variables. Second, the sample size was under-powered, especially for a sub-analysis according to aneurysm size and morphology, quantification of mural thrombus, or quantification of aortic calcifications. The present model was trained as a binary classifier on a modest graphics processing unit (GPU) with limited computation power. However, this research group will be moving their future projects to a dedicated AI core laboratory with a 10-fold increase in processing power. This will allow for a more robust analysis of exponentially larger data sets with multiple categorical and continuous imaging variables. Third, the present model is not 100 % accurate, demonstrating a less than 1 % misjudgment rate. These errors had mostly occurred with aneurysms of less than 3.3 cm in size with mural thrombus. These findings likely resulted from difficulties in resolving pixel groups with less than 3 mm of spatial resolution; a task that is difficult for radiologists to reliably reproduce without image manipulation such as imaging magnification and window level changes.

In a commentary on the study by Camara et al (2022), Lareyre et al (2023) noted that they read with great interest the recent development of an AI-derived method to allow automatic detection of AAAs. Using datasets composed of 200 CTA from patients with an AAA and 200

matched control patients with a non-aneurysmal infra-renal aorta, Camara and colleagues developed a method using a CNN. Testing showed the robust accuracy of the model (99.1 %, with an AUC of 0.99). Their results pointed to the interest of such an application for the screening for AAAs. The VGG-16 neural network architecture was used to develop the AAA detection system, and transfer learning was applied to the neural network. It would be interesting to determine the accuracy of the CNN before transfer learning to show the added value of transfer learning to the pipeline. The use of CNN to classify aneurysm from non-pathologic aortas has so far been poorly reported. Nevertheless, several studies had shown the interest in CNN to develop a fully automatic segmentation of AAA. These studies showed good accuracy for the methods compared with human experts and demonstrated the feasibility of using AI for automatic measurement of the AAA maximal diameter. Thus, CNN offers perspectives to develop applications oriented toward screening and identification of AAA and new tools to facilitate its anatomic characterization, which could improve pre-operative planning and follow-up. As stated by Camara et al, in addition to the development of advanced imaging analysis, machine learning (ML) has the potential to build predictive models of patients' outcomes. Several studies had underlined the interest to better examine AAA growth, the risk of rupture, and the risk of post-operative complications, including mortality and re-intervention. Lareyre et al stated that AI has the potential to enhance precision medicine; however, further studies are needed to determine the accuracy and external validation. They stated that applications for clinical practice can hopefully be expected within the next few years.

Aortic Aneurysm Risk and Somatic JAK2V617F Variation

Obel et al (2025) stated that the somatic JAK2V617F sequence variation, a key driver of myeloproliferative neoplasms (MPNs), has been associated with increased risk of aortic aneurysms. In a population-based, multi-center study, these researchers examined the associations between the JAK2V617F variant allele frequency (VAF) and ascending, descending, and abdominal aortic aneurysms. In the DANCAVAS I and II Trials (Danish Cardiovascular Screening), a total of 15,000 individuals underwent cardiovascular risk assessments including blood samples and non-contrast ECG-gated CT scans. In this cross-sectional sub-study, individuals with screening-detected aortic aneurysms (≥ 45 mm

ascending, ≥ 35 mm descending, or ≥ 30 mm abdominal), random aneurysm-free male controls, and all women (only included during the DANCAVAS I pilot study) were tested for the JAK2V617F sequence variation. A total of 8,056 individuals (90.9 % men, mean age of 68 ± 4 years) were tested for the JAK2V617F sequence variation, which presented an overall prevalence of 7.1 %. Ascending, descending, and abdominal aneurysm prevalences were 6.6 %, 2.9 %, and 6.8 %, respectively. In JAK2V617F-negative participants ($n = 7,486$), JAK2V617F-positive participants with VAF of less than 1 % ($n = 491$), and JAK2V617F-positive participants with VAF of 1 % or higher ($n = 79$), ascending aortic aneurysms were observed in 6.4 %, 9.0 %, and 16.5 %, respectively ($p < 0.001$). No significant differences were observed across sequence variation groups for descending and abdominal aneurysms. Among JAK2V617F-positive individuals, the median VAF was higher in those with ascending aneurysm (9.5 %; inter-quartile range [IQR], 3.0 to 40.0) than in controls (4.4 %; IQR, 1.8 to 20.0; $p = 0.021$). Ascending aortic diameter correlated modestly with VAF (Spearman $\rho = 0.10$; $p = 0.026$). No significant correlations were observed for descending or abdominal diameters. For ascending aneurysms, JAK2V617F VAF of less than 1 % and 1 % or higher presented adjusted ORs of 1.4 (95 % CI: 1.01 to 2.0; $p = 0.045$) and 2.7 (95 % CI: 1.5 to 5.1; $p = 0.002$), respectively, compared with JAK2V617F-negative controls. For each doubling in VAF, the risk for ascending aneurysm increased by 11 % (p adjusted = 0.013). The JAK2V617F sequence variation was not significantly associated with descending or abdominal aneurysms after adjusting for co-variates and using these VAF thresholds. The authors concluded that in a study population of primarily men aged 60 to 74 years, the somatic JAK2V617F sequence variation was strongly and independently associated with ascending aortic aneurysms, presenting a positive correlation between aneurysm size and JAK2V617F VAF. On the other hand, no convincing associations were observed for descending or abdominal aneurysms. These investigators stated that the findings of this trial suggested potential clinical applications, including screening JAK2V617F-positive individuals, especially those with higher VAFs, for ascending aortic aneurysms, and screening patients with large ascending aneurysms for the JAK2V617F sequence variation. They stated that JAK2V617F sequence variation may serve as a novel biomarker for risk stratification and clinical decision-making in the management of ascending aortic aneurysms. Moreover, these investigators stated that

future research should focus on prospective studies to clarify the causal relationship between the JAK2V617F sequence variation and ascending aortic aneurysms. Longitudinal studies could aid in determining whether a JAK2V617F sequence variation would increase the risk of aneurysm progression, need for surgical management, or adverse aortic events.

This would be of great interest because risk factors for adverse aortic events in addition to aortic diameter are strongly needed for the thoracic aorta. Moreover, mechanistic studies examining the biological effects of the JAK2V617F sequence variation on aortic wall integrity could provide valuable insights into the specific vulnerability of the ascending aorta.

Such studies may open new avenues for therapeutic interventions aimed at mitigating the impact of JAK2V617F-related inflammation in ascending aortic aneurysm development. Intervention studies with interferon-alpha or JAK1 (Janus kinase 1) or JAK2 (Janus kinase 2) inhibitors in JAK2V617F-positive patients with MPNs and aneurysms are encouraged to examine if such interventions could inhibit aneurysm progression while simultaneously reducing JAK2V617F VAF.

The authors stated that this trial had several drawbacks. First, the cross-sectional design prevented establishing causality in the observed association between ascending aortic aneurysms and the JAK2V617F sequence variation, although the positive correlation between ascending aortic diameter and VAF suggested such a relationship. Given the rarity of adverse aortic events, especially in the ascending aorta and in the general population, with only 17 type A aortic dissections identified in the entire DANCAVAS cohort during a 5-year follow-up period, the currently available DANCAVAS data do not support longitudinal studies to examine this potential association adequately, and future studies are needed to examine if the JAK2V617F sequence variation would predict adverse aortic events in high-risk populations. Second, the study population included mainly White men from Denmark between 60 and 74 years of age, which may limit the generalizability of the findings to other populations. Third, aortic root dimensions were not measured in the ascending aorta because of potential inaccuracies when using non-contrast CT scans. Fourth, aortic measurements were carried out by multiple radiographers, introducing the possibility of inter-observer variability. However, previous evaluations within the DANCAVAS

framework showed excellent consistency among radiographers, especially for mid-ascending aortic measurements, with an average mean deviation of 0.1 ± 1.3 mm.

N6-Methyladenosine (m6A) Methylation in Abdominal Aortic Aneurysms

Wang and Sun (2025) noted that AAA is a type of cardiovascular disease. Sudden aortic rupture and subsequent bleeding are the main causes of mortality due to AAA. N6-methyladenosine (m6A) methylation, the most common epi-transcriptomic modification in eukaryotic mRNAs, plays an important role in the regulation of gene expression. m6A methylation markedly influences the development and progression of AAA. These researchers highlighted the mechanism of m6A methylation in AAA, including current research progress and future prospects. From a mechanistic perspective, m6A methylation exerts its influence on AAA-related genes by modulating the post-transcriptional levels of RNA; thus, impacting the pathological process of AAA. In terms of clinical applications, the mechanisms by which m6A methylation regulators influence their development and progression in AAA involve multiple target genes and signaling pathways. These regulatory factors affect inflammatory immunomodulation, cell proliferation, apoptosis and endogenous processes by modulating the m6A modification status of target genes and the activity of immune-related signaling pathways. Thus, for the prevention and treatment of AAA, current therapeutic strategies should consider the interactions and synergistic regulation among m6A methylation regulators to demonstrate the integrated effects of the entire regulatory network in AAA development. The authors concluded that a more comprehensive understanding of the precise mechanisms of m6A methylation in AAA should be attained, which will support the development of innovative therapeutic strategies aimed at m6A methylation and establish a basis for the early diagnosis and treatment of AAA.

These researchers stated that the development of AAA is a multi-factorial process and it is important to develop standard protocols for early screening of AAA, treatment of lesion progression as well as prevention of AAA rupture, from the characterization and etiology of AAA to the in-depth molecular mechanisms of the AAA formation process. First, the

regulatory mechanisms of m6A methyltransferases and m6A demethylases should be examined to understand their expression changes in AAA and their association with disease progression. Second, the functions of m6A-modified recognition proteins should be examined to understand how they regulate m6A-modified target genes and immune signaling pathways. Lastly, the interactions and synergistic regulation among m6A methylation regulators should be investigated to examine the integrated effects of the whole regulatory network in AAA development. In addition, the association between the level of m6A modification and the clinical prognosis of AAA should be investigated to provide new insights and methodologies for the early diagnosis and treatment of AAA.

C-C Chemokine Receptor Type 2 (CCR2) PET/CT for the Detection of Abdominal Aortic Aneurysm Wall Instability

Elizondo-Benedetto et al (2025) noted that risk stratification of AAAs is an unmet clinical need. Patients often remain asymptomatic until AAAs acutely rupture. Current imaging techniques focus on AAA diameter and growth rate, neglecting key cellular and molecular processes. In a prospective, case-control, single-center, pilot study, these researchers examined the feasibility of positron emission tomography (PET)/CT imaging of C-C chemokine receptor type 2 (CCR2) to aid in the diagnosis of AAA wall instability. This trial included patients with AAAs ($n = 10$) and without AAAs ($n = 9$). Participants received intravenous (IV) administration of a CCR2-specific radiotracer, followed by PET/CT assessment. Surgical AAA specimens were collected to evaluate CCR2 content and extracellular matrix integrity. PET/CT signals were evaluated in the AAA wall in the para-renal, mid-infrarenal, and aneurysm sac, and analyzed relative to patient demographics, AAA anatomical segmentation, as well as wall rupture potential index (RPI). The AAA group was elderly (aged 70.7 ± 7.3 years), with an aneurysm diameter of 4.86 ± 0.75 cm, and a higher prevalence of hyperlipidemia and statin use. Regardless of the anatomical segment analyzed, AAA surgical patients showed a higher CCR2 radiotracer signal in the aortic tissue than others. However, no correlation was observed between the radiotracer signal and the AAA diameter. Patients with a higher radiotracer signal, especially in the AAA posterior wall of the maximum-diameter region, were significantly correlated with RPI ($p = 0.03$). Histomorphologic analysis revealed significantly elevated CCR2 levels, along with increased macrophage

infiltration, matrix metalloproteinase (MMP) activity, and severe elastin degradation. The authors concluded that this first-in-human study showed that CCR2 PET/CT molecular imaging was feasible and could identify increased wall instability in individuals with AAAs, especially in those at higher risk of disease progression. Moreover, these researchers stated that future studies will aim to develop a larger multi-center study to validate these preliminary findings and broaden clinical applicability.

The authors stated that this pilot study had several drawbacks. First, being a single-center study, the generalizability of these findings to other populations and clinical practice settings is limited. More importantly, the relatively small number of patients in each group ($n = 10$ for the AAA group; and $n = 10$ in the non-AAA group) may have reduced the statistical power and the ability to detect smaller differences. Second, as a pilot and first-in-human study, these investigators focused on examining the feasibility of in-vivo PET/CT imaging of CCR2 in AAAs without stratifying patients into medical observation versus surgical treatment groups.

Consequently, although prospective follow-up showed an early trend of increased AAA growth in the high CCR2 signal group, the lack of sufficient longitudinal aneurysm rupture outcome data limited the statistical significance of these findings. Third, although these researchers focused primarily on CCR2 signaling, this approach potentially overlooked other relevant inflammatory pathways and factors that likely also contribute to AAA progression and rupture. Fourth, despite the advanced nature of PET/CT imaging, inherent limitations related to resolution and specificity might have affected the accuracy of CCR2 signal measurements, which the authors have tried to mitigate routinely with their various analytical approaches. Fifth, patient anatomical variations sometimes prevented these researchers from gathering standardized uptake value (SUV) data from specific locations within the restricted PET/CT segment. This limitation was due to both anatomical differences and the objective to minimize radiation exposure.

References

The above policy is based on the following references:

1. Argyriou C, Georgiadis GS, Kontopodis N, et al. Screening for abdominal aortic aneurysm during transthoracic echocardiography: A systematic review and meta-analysis. *Eur J Vasc Endovasc Surg.* 2018;55(4):475-491.
2. Ashton HA, Buxton MJ, Day NE, et al. The Multicentre Aneurysm Screening Study (MASS) into the effect of abdominal aortic aneurysm screening on mortality in men: A randomised controlled trial. *Lancet.* 2002;360(9345):1531-1539.
3. Bird AN, Davis AM. Screening for abdominal aortic aneurysm. *JAMA.* 2015;313(11):1156-1157.
4. Camara J., Tomihama RT, Pop A, et al. Development of a convolutional neural network to detect abdominal aortic aneurysms. *J Vasc Surg Cases Innov Tech.* 2022;8(2):305-311.
5. Canadian Task Force on Preventive Health Care. Recommendations on screening for abdominal aortic aneurysm in primary care. *CMAJ.* 2017;189(36):E1137-E1145.
6. Carnevale ML, Koleilat I, Lipsitz EC, et al. Extended screening guidelines for the diagnosis of abdominal aortic aneurysm. *J Vasc Surg.* 2020;72(6):1917-1926.
7. Chabok M, Nicolaides A, Aslam M, et al. Risk factors associated with increased prevalence of abdominal aortic aneurysm in women. *Br J Surg.* 2016;103(9):1132-1138.
8. Chun KC, Teng KY, Van Spyk EN, et al. Outcomes of an abdominal aortic aneurysm screening program. *J Vasc Surg.* 2013;57(2):376-381.
9. Cosford PA, Leng GC. Screening for abdominal aortic aneurysm. *Cochrane Database Syst Rev.* 2007;(2):CD002945.
10. Dabare D, Lo TT, McCormack DJ, Kung VW. What is the role of screening in the management of abdominal aortic aneurysms? *Interact Cardiovasc Thorac Surg.* 2012;14(4):399-405.
11. Desjardins B, Dill KE, Flamm SD, et al; American College of Radiology. ACR Appropriateness Criteria® pulsatile abdominal mass, suspected abdominal aortic aneurysm. *Int J Cardiovasc Imaging.* 2013;29(1):177-183.

12. Duncan A, Maslen C, Gibson C, et al. Ultrasound screening for abdominal aortic aneurysm in high-risk women. *Br J Surg.* 2021;108(10):1192-1198.
13. Eckstein HH, Böckler D, Flessenkämper I, et al. Ultrasonographic screening for the detection of abdominal aortic aneurysms. *Dtsch Arztebl Int.* 2009;106(41):657-663.
14. Eldrup-Jorgensen J, Kraiss LW, Chaikof EL, et al. Vascular Quality Initiative assessment of compliance with Society for Vascular Surgery clinical practice guidelines on the care of patients with abdominal aortic aneurysm. *J Vasc Surg.* 2020;72(3):874-885.
15. Elizondo-Benedetto S, Sultan D, Wahidi R, et al. Pilot first-in-human CCR2 PET/CT to detect abdominal aortic aneurysm wall instability. *Theranostics.* 2025;15(12):5518-5528.
16. Expert Panel on Vascular Imaging; Lee YJ, Aghayev A, Azene EM, et al. ACR appropriateness criteria® screening for abdominal aortic aneurysm. *J Am Coll Radiol.* 2024;21(6S):S286-S291.
17. Ferket BS, Grootenboer N, Colkesen EB, et al. Systematic review of guidelines on abdominal aortic aneurysm screening. *J Vasc Surg.* 2012;55(5):1296-1304.
18. FitE J, Gimenez E, Soto B, et al. Systematic review on abdominal aortic aneurysm screening cost-efficiency and methodological quality assessment. *Int Angiol.* 2021;40(1):67-76.
19. Fleming C, Whitlock EP, Beil T, Lederle F. Primary care screening for abdominal aortic aneurysm. Evidence Synthesis No. 35. Prepared by the Oregon Evidence-based Practice Center under Contract No. 290-02-0024. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ); February 2005.
20. Fleming C, Whitlock EP, Beil T, Lederle F. Screening for abdominal aortic aneurysm: A best-evidence systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med.* 2005;142:203-211.
21. Galician Agency for Health Technology Assessment (AVALIA-T). Efficacy and effectiveness of screening for abdominal aortic aneurysm in a population at risk. Cost-effectiveness analysis. Applicability inside the National Healthcare System. Santiago de Compostela, Spain: Galician Agency for Health Technology Assessment (AVALIA-T); 2008.
22. Guirguis-Blake JM, Beil TL, Senger CA, Whitlock EP. Ultrasonography screening for abdominal aortic aneurysms: A

- systematic evidence review for the U.S. Preventive Services Task Force. Ann Intern Med. 2014;160(5):321-329.
23. Hanly AM, Javad S, Anderson LP, et al. Screening for abdominal aortic aneurysms in cardiovascular patients. J Surg Res. 2006;132(1):52-55.
24. Hendriksson M, Lundgren F. One-time screening for abdominal aortic aneurysm in 65-year-old men. A decision-analytic model with lifetime estimates of costs and health outcomes [summary]. Technical Report. Linkoping, Sweden: Center for Medical Technology Assessment (CMT), Linkoping University; April 2005.
25. Kim LG, P Scott RA, Ashton HA, Thompson SG; Multicentre Aneurysm Screening Study Group. A sustained mortality benefit from screening for abdominal aortic aneurysm. Ann Intern Med. 2007;146(10):699-706.
26. Kodenko MR, Vasilev YA, Vladzymyrskyy AV, et al. Diagnostic accuracy of AI for opportunistic screening of abdominal aortic aneurysm in CT: A systematic review and narrative synthesis. Diagnostics (Basel). 2022;12(12):3197.
27. Koelemay MJ, Henebiens M, Vahl AC; Nederlandse Vereniging voor Vaatchirurgie. Guideline "Diagnosis and treatment of abdominal aortic aneurysm". Ned Tijdschr Geneeskde. 2009;153:A572.
28. Lareyre F, Adam C, Carrier M, Raffort J. Convolutional neural network for automatic detection and characterization of abdominal aortic aneurysm. J Vasc Surg Cases Innov Tech. 2023;9(1):101088.
29. Lederle FA. Ultrasonographic screening for abdominal aortic aneurysms. Ann Intern Med. 2003;139(6):516-522.
30. LeFevre ML. Screening for abdominal aortic aneurysm: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2014;161(4):281-290.
31. Lim LS, Haq N, Mahmood S, Hoeksema L; ACPM Prevention Practice Committee; American College of Preventive Medicine. Atherosclerotic cardiovascular disease screening in adults: American College Of Preventive Medicine position statement on preventive practice. Am J Prev Med. 2011;40(3):381.e1-e10.
32. Lindholt JS, Juul S, Fasting H, Henneberg EW. Hospital costs and benefits of screening for abdominal aortic aneurysms. Results

- from a randomised population screening trial. *Eur J Vasc Endovasc Surg.* 2002;23(1):55-60.
33. Lindholt JS, Norman P. Screening for abdominal aortic aneurysm reduces overall mortality in men. A meta-analysis of the mid- and long-term effects of screening for abdominal aortic aneurysms. *Eur J Vasc Endovasc Surg.* 2008;36(2):167-171.
34. Lindholt JS, Sorensen J, Søgaard R, Henneberg EW. Long-term benefit and cost-effectiveness analysis of screening for abdominal aortic aneurysms from a randomized controlled trial. *Br J Surg.* 2010;97(6):826-834.
35. Longo C, Upchurch GR Jr. Abdominal aortic aneurysm screening: Recommendations and controversies. *Vasc Endovascular Surg.* 2005;39(3):213-219.
36. Meenan RT, Fleming C, Whitlock EP, et al. Cost-effectiveness analyses of population-based screening for abdominal aortic aneurysm: Evidence synthesis. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ); February 2005.
37. Mohler ER, III. Screening for abdominal aortic aneurysm. UpToDate [online serial]. Waltham, MA: UpToDate; reviewed May 2017.
38. Mussa FF. Screening for abdominal aortic aneurysm. *J Vasc Surg.* 2015;62(3):774-778.
39. Norman PE, Jamrozik K, Lawrence-Brown MM, et al. Population based randomised controlled trial on impact of screening on mortality from abdominal aortic aneurysm. *BMJ.* 2004;329:1259-1262.
40. O'Donnell TFX, Landon BE, Schermerhorn ML. The case for expanding abdominal aortic aneurysm screening. *J Vasc Surg.* 2020;71(5):1809-1812.
41. Obel LM, Skovbo JS, Diederichsen ACP, et al. Aortic aneurysm risk and somatic JAK2V617F variation: Insights from a multicenter, population-based cardiovascular screening study. *Circulation.* 2025 Jun 4 [Online ahead of print].
42. Oliver-Williams C, Sweeting MJ1, Turton G, Parkin D, et al; Gloucestershire and Swindon Abdominal Aortic Aneurysm Screening Programme. Lessons learned about prevalence and growth rates of abdominal aortic aneurysms from a 25-year ultrasound population screening programme. *Br J Surg.* 2018;105(1):68-74.

43. Ontario Ministry of Health and Long-Term Care, Medical Advisory Secretariat (MAS). Ultrasound screening for abdominal aortic aneurysms. Health Technology Policy Assessment. Toronto, ON: MAS; 2006.
44. Patel N, Dalmia VK, Carnevale M, et al. Identification and characterization of new candidates for abdominal aortic aneurysm screening in patients outside of current accepted guidelines. *J Vasc Surg.* 2023;78(1):89-95.
45. Raffort J, Adam C, Carrier M, et al. Artificial intelligence in abdominal aortic aneurysm. *J Vasc Surg.* 2020;72(1):321-333.
46. RESCAN Collaborators, Bown MJ, Sweeting MJ, Brown LC, et al. Surveillance intervals for small abdominal aortic aneurysms: A meta-analysis. *JAMA.* 2013;309(8):806-813.
47. Saucy F, Deglise S, Holzer T, et al. Abdominal aortic aneurysm: What about screening? *Curr Pharm Des.* 2015;21(28):4084-4087.
48. Scott RA, Bridgewater SG, Ashton HA. Randomized clinical trial of screening for abdominal aortic aneurysm in women. *Br J Surg.* 2002;89(3):283-285.
49. Scott RA, Vardulaki KA, Walker NM, et al. The long-term benefits of a single scan for abdominal aortic aneurysm (AAA) at age 65. *Eur J Vasc Endovasc Surg.* 2001;21(6):535-540.
50. Soderberg P, Wanhaugen A, Svensjo S. Five year natural history of screening detected sub-aneurysms and abdominal aortic aneurysms in 70 year old women and systematic review of repair rate in women. *Eur J Vasc Endovasc Surg.* 2017;53(6):802-809.
51. Sun Z. Diagnostic value of color duplex ultrasonography in the follow-up of endovascular repair of abdominal aortic aneurysm. *J Vasc Interv Radiol.* 2006;17(5):759-764.
52. Swedish Council on Technology Assessment in Health Care (SBU). Screening for abdominal aortic aneurysms - early assessment briefs (Alert). Stockholm, Sweden: SBU; 2003.
53. Swedish Council on Technology Assessment in Health Care (SBU). Screening for abdominal aortic aneurysm. SBU Alert Report No. 2008-04. Stockholm, Sweden: SBU; 2008.
54. Thompson SG, Ashton HA, Gao L, Scott RA; Multicentre Aneurysm Screening Study Group. Screening men for abdominal aortic aneurysm: 10 year mortality and cost effectiveness results from the randomised Multicentre Aneurysm Screening Study. *BMJ.* 2009;338:b2307.

55. Thompson SG, Brown LC, Sweeting MJ, et al. Systematic review and meta-analysis of the growth and rupture rates of small abdominal aortic aneurysms: Implications for surveillance intervals and their cost-effectiveness. *Health Technol Assess.* 2013;17(41):1-118.
56. U.S. Preventive Services Task Force (USPSTF). Screening for abdominal aortic aneurysms: Recommendation statement. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ); 2005.
57. U.S. Preventive Services Task Force; Owens DK, Davidson KW, Krist AH , et al. Screening for abdominal aortic aneurysm: US Preventive Services Task Force recommendation statement. *JAMA.* 2019;322(22):2211-2218.
58. Ulug P, Powell JT, Sweeting MJ, et al; SWAN Collaborative Group. Meta-analysis of the current prevalence of screen-detected abdominal aortic aneurysm in women. *Br J Surg.* 2016 Aug;103(9):1097-1104.
59. Upchurch GR Jr, Schaub TA. Abdominal aortic aneurysm. *Am Fam Physician.* 2006;73(7):1198-1204.
60. Vardulaki KA, Walker NM, Couto E, et al. Late results concerning feasibility and compliance from a randomized trial of ultrasonographic screening for abdominal aortic aneurysm. *Br J Surg.* 2002;89(7):861-864.
61. Wang K, Sun Z. The role of m6A methylation in abdominal aortic aneurysms: Mechanisms, progress and future perspectives (Review). *Mol Med Rep.* 2025;32(1):199.
62. Ying AJ, Affan ET. Abdominal aortic aneurysm screening: A systematic review and meta-analysis of efficacy and cost. *Ann Vasc Surg.* 2019;54:298-303.



Copyright Aetna Inc. All rights reserved. Clinical Policy Bulletins are developed by Aetna to assist in administering plan benefits and constitute neither offers of coverage nor medical advice. This Clinical Policy Bulletin contains only a partial, general description of plan or program benefits and does not constitute a contract. Aetna does not provide health care services and, therefore, cannot guarantee any results or outcomes. Participating providers are independent contractors in private practice and are neither employees nor agents of Aetna or its affiliates. Treating providers are solely responsible for medical advice and treatment of members. This Clinical Policy Bulletin may be updated and therefore is subject to change.

Copyright © 2001-2025 Aetna Inc.

[Language services can be provided by calling the number on your member ID card. For additional language assistance:](#) [Español](#) | [中文](#) | [Tiếng Việt](#) | [한국어](#) | [Tagalog](#) | [Русский](#) | [العربية](#) | [Kreyòl](#) | [Français](#) | [Polski](#) | [Português](#) | [Italiano](#) | [Deutsch](#) | [日本語](#) | [فارسی](#) | [Other Languages...](#) |  (<http://www.aetna.com/individuals-families/contact-aetna/information-in-other-languages.html>)