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**Financial Disclosure:** None reported.

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## INVITED COMMENTARY

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### Efforts to Optimize Patient Benefit From Inferior Vena Cava Filters

Theoretically, retrievable inferior vena cava (IVC) filters offer the advantage of prevention of pulmonary embolism (PE) without the associated risks of long-term permanent devices. Confidence in the efficacy and safety of retrievable IVC filters has led to a doubling in the placement of these devices over the past decade.<sup>1</sup> However, Medicare database analysis showed that of the 65 041 devices placed in 2008, only an estimated 15% were retrieved.<sup>1</sup> As these devices may be associated with significant complications, which increase over time, including a high risk of future deep vein thrombosis (DVT) and IVC thrombosis, all efforts should be made to avoid unnecessary long

indwelling time. The US Food and Drug Administration (FDA) released a statement in August 2010 urging clinicians to remove these devices as soon as the risk of PE has subsided. This was based on finding nearly 1000 reported complications associated with these devices, a review prompted by an article published in the *Archives* that described an alarmingly high filter fracture rate with certain devices.<sup>2,3</sup>

Barriers to IVC filter retrieval include physician refusal, perhaps due to lack of appreciation for consequences of permanent devices, ongoing contraindication to anticoagulation, long indwelling time, and loss of patients to follow-up. To decrease the number of IVC filters that are left in place permanently, we should first help educate clinicians to identify appropriate candidates for placement. Recent studies suggest that only half of all IVC filter placements were appropriate per professional society guidelines.<sup>4</sup> Next, a system should be in place to track the fate of the device. Leaving this up to the patient or primary care physician is not acceptable. Institution of an IVC filter clinic has been shown to result in a 2-fold increase in retrieval rates.<sup>5</sup> A weekly multidisciplinary review of filter placement request and indication, repositioning, and retrieval resulted in an 80% reduction in retained devices without an absolute indication.<sup>6</sup> Mandatory postmarketing registries would provide a way to assess safety and efficacy of various devices and could provide valuable information on both complication retrieval rates.

In this issue of the *Archives*, Godoy-Garcia and colleagues<sup>7</sup> advance this field further with their report of their experience with removal of IVC filters after a prolonged indwelling time. In their cohort, the most common indication for placement was prevention of venous thromboembolism (VTE) when pharmacologic prophylaxis was contraindicated (53%), followed by VTE despite anticoagulation (31%) and contraindications to anticoagulation secondary to bleeding complications in patients with known VTE (9%).

While the only available randomized control trial evaluating IVC filter efficacy shows a reduction in both short- and long-term recurrence of PE in patients with acute DVT, these patients all received anticoagulation and therefore were not representative of the patients who most commonly receive these devices.<sup>8,9</sup> There is currently no high-level data to support the most common use of IVC filters, that is prevention of VTE in patients who are not on anticoagulation.

**IVC Filter Placement.** The controversy surrounding patient selection for IVC filter placement is reflected in the disparate recommendations found in guidelines from various sources (**Table**). The only currently agreed-on indication for IVC filter placement is prevention of PE in the setting of DVT and a contraindication to anticoagulation. Other indications remain controversial. While filters were once commonly placed in patients who developed recurrent or progressive DVT or PE despite anticoagulation, now most experts recommend an increase in intensity of anticoagulation or initiation of an alternative anticoagulant rather than placement of a device. Despite practitioners' concerns, free-floating thrombus

**Table. Recommendations for IVC Filter Placement**

Indication for IVC Filter Placement	ACCP <sup>10</sup>	AHA <sup>11</sup>	British Committee for Standards in Hematology <sup>12</sup>	Thrombosis Interest Group of Canada <sup>13</sup>
Acute VTE and contraindication to anticoagulation	Yes	Yes	Yes	Yes If proximal DVT present
VTE despite anticoagulation	Yes	Yes	Maybe High intensity oral anticoagulation or LMWH should be considered prior to placement of filter	No Anticoagulation should be intensified or alternative agent started. IVC filter will not prevent progression
Preoperatively in patients who have had recent VTE (within one month) and must have anticoagulation interrupted for surgery	NR	NR	Yes (VTE within 4 weeks prior to surgery)	YES (VTE within 2 weeks prior to major surgery)
Proximal DVT in patient with poor cardiopulmonary reserve	NR	Yes	NR	There is no agreement on definition of poor reserve
Free-floating thrombus	NR	NR	No	No
Thrombolysis with proximal DVT	NR	NR	No	No
Primary prophylaxis in selected high risk patients (surgical, trauma, etc)	No	NR	NR	No

Abbreviations: ACCP, American College of Chest Physicians; AHA, American Heart Association; DVT, deep venous thrombosis; IVC, inferior vena cava; LMWH, low-molecular-weight heparin; NR, not reported; VTE, venous thromboembolism.

has not been associated with increased risk of embolization and is not an indication for device placement. Inferior vena cava filters are often considered in patients with recent PE, poor cardiopulmonary reserve, and residual proximal DVT, but the lack of demonstrated mortality benefit challenges this practice.

**IVC Filter Retrieval.** Because retrievable filters often become permanent, the risk-benefit analysis performed prior to placement should involve weighing the long-term consequences of recurrent DVT and IVC thrombosis with reduction in nonfatal PE. Inferior vena cava filters should be used primarily in patients who have acute VTE with an absolute contraindication to anticoagulation and should be removed as soon as full-dose anticoagulation can be safely tolerated. Health care providers should remember that while these devices may decrease the risk of PE, they do not prevent DVT nor are they a substitute for anticoagulant treatment of VTE. While recommended retrieval time varies by filter type, Godoy-Garcia and colleagues<sup>7</sup> offer data to suggest that later removal was relatively safe for those devices studied. Through a combination of increasing appropriate use, increased retrieval, and more data on safety and efficacy, we can optimize patient benefit from use of these filters.

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**Financial Disclosure:** None reported.

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## RESEARCH LETTER

### Cigarette Smoking Cessation and Total and Cause-Specific Mortality: A 22-Year Follow-up Study Among US Male Physicians

Since the 1950s, studies have linked cigarette smoking to total and cause-specific mortality. Few studies have comprehensively presented patterns of total and cause-specific mortality reduction