
بسم الله الرحمن الرحيم

What does pulmonary renal stand for?

Dr M.Mirenayat
Assistant Professor Pulmonology
Shahid Beheshti University
NRITLD

- The term Pulmonary Renal Syndrome refers to the combination of diffuse alveolar hemorrhage and rapidly progressive glomerulonephritis(RPGN).
  It is usually a **systemic vasculitis** that can led through a vast vasculitic process to life-threatening injury to the involved organs lung and kidney.

The underlying cause of a pulmonary-renal syndrome is usually a systemic vasculitis of the **small pulmonary** and **renal vessels**. These vasculitides have a heterogeneous pathogenesis, there are three different pathophysiological mechanisms of injury**:**

1. mediated by anti-neutrophil-cytoplasmic antibodies (**ANCA**),

2. immune-complex mediated vasculitis of small vessels or

3. by antibodies against the glomerular basement membrane (Goodpasture Syndrome)

As with any systemic vasculitis the diagnosis of pulmonary-renal syndrome is made in three steps:

1. **Adequate evaluation and networking** of existing and past patient's symptoms.

2. **Establishing the diagnosis** by laboratory, technical and biopsy examinations.

3. Differential diagnosis of vasculitis.

Symptoms and Signs

Symptoms and signs typically include:

Dyspnea

Cough

Fever

Hemoptysis: When hemoptysis is present, one must exclude infection, left heart failure, severe mitral stenosis, pulmonary embolism and drug exposure (PTU and Cocaine) as possible etiologies so thorough history is extremely important.

Peripheral edema

Hematuria

Patients may also have other signs of glomerulonephritis. Pulmonary and renal manifestations can occur weeks to months apart.

CXR and Chest CT show **diffuse bilateral infiltrates** often impossible to differentiate form infection or acute pulmonary edema.

Causes of Pulmonary-Renal Syndrome

Table 1 Causes of pulmonary-renal syndromes.

ANCA-positive vasculitis
- Granulomatosis with polyangiitis (Wegener's)
- Microscopic Polyangiitis
- Churg–Strauss syndrome

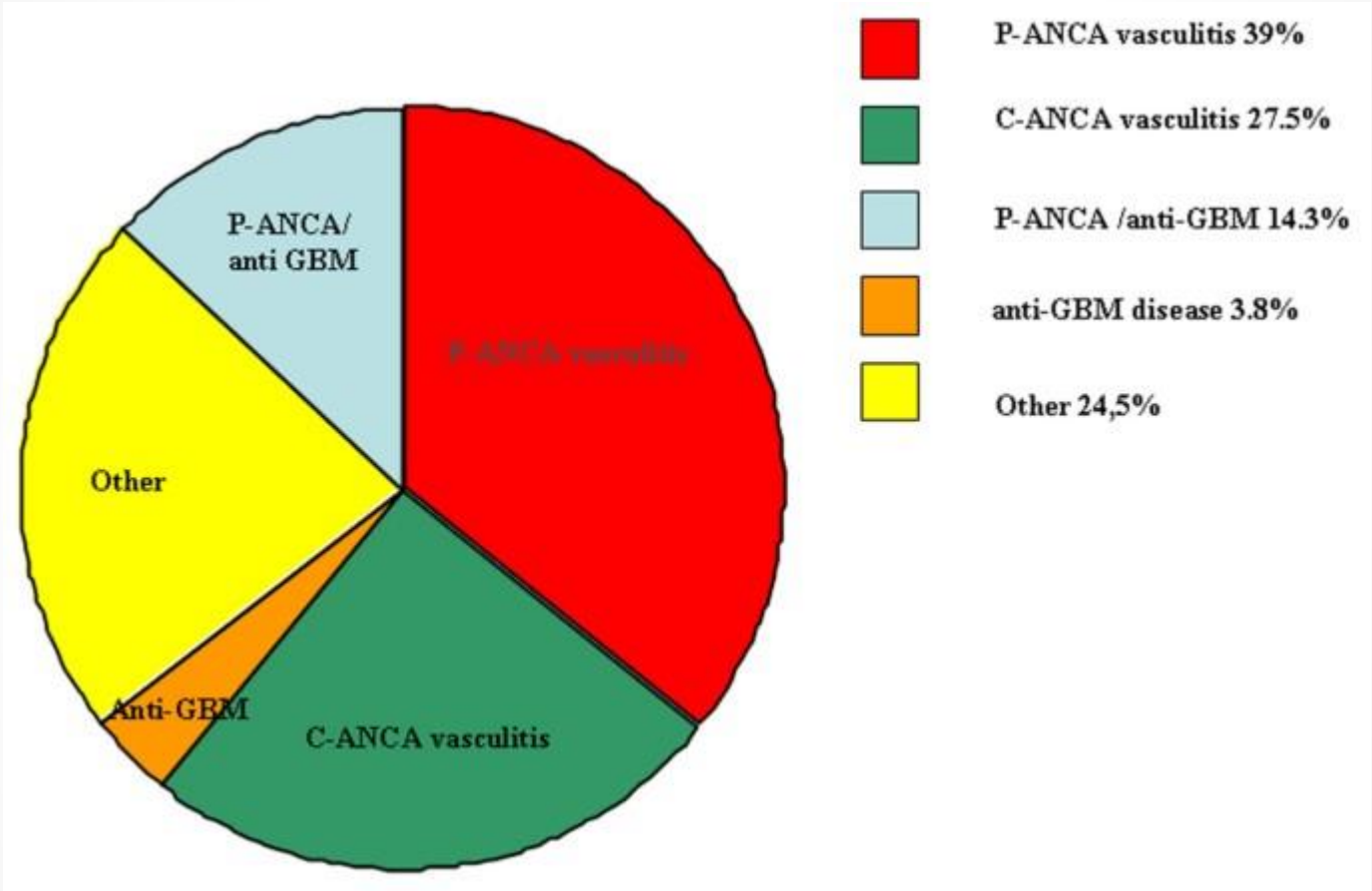
Anti-glomerular basement membrane antibodies (Anti-GBM) – Goodpasture's syndrome

Autoimmune connective tissue disease
- Systemic lupus erythematosus
- Polymyositis
- Scleroderma

ANCA-negative vasculitis
- Henoch Schonlein Purpura
- Mixed cryoglobulinaemia
- IgA nephropathy
- Behcet's disease

Drug-induced vasculitis – Hydralazine
- Propylthiouracil
- D-penicillamine

Idiopathic pulmonary-renal syndrome

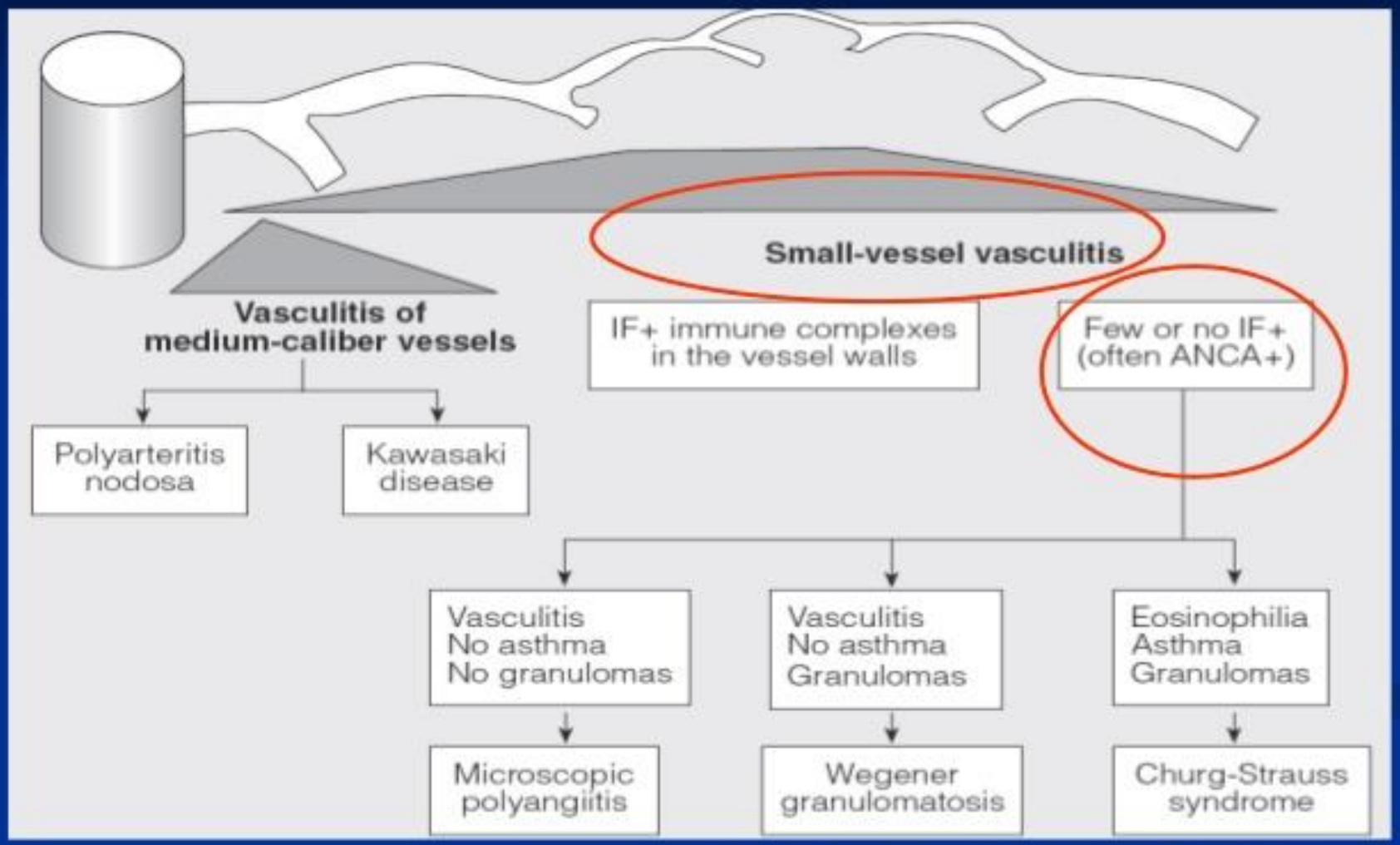

P-ANCA vasculitis 39%
C-ANCA vasculitis 27.5%
P-ANCA /anti-GBM 14.3%
anti-GBM disease 3.8%
Other 24,5%
P-ANCA/
anti GBM
Other
Anti-GBM
C-ANCA vasculitis

Pathophysiology

As already stated the pulmonary-renal syndrome is usually caused by a systemic small vessels vasculitis, these can be categorized:

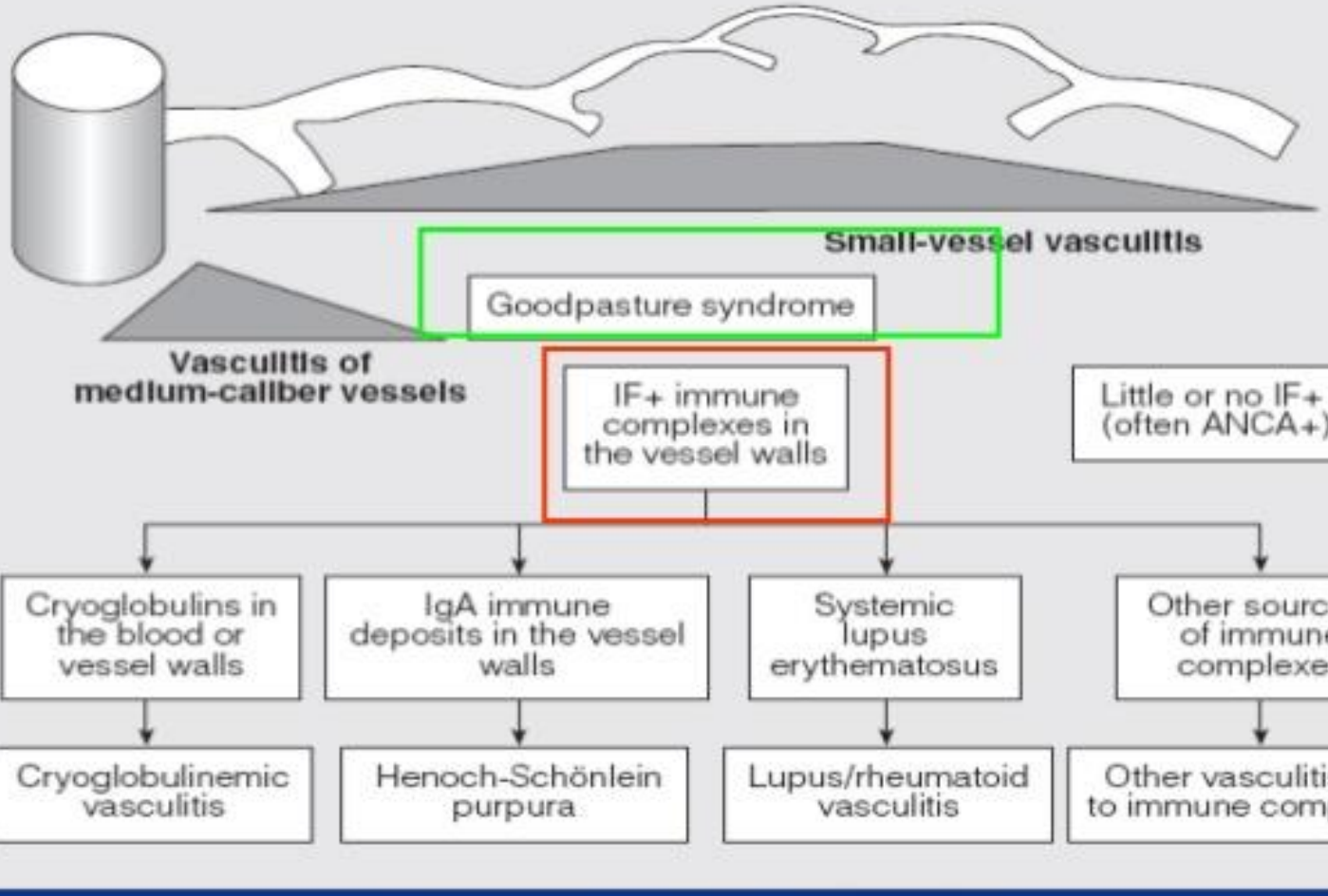
- **morphological criteria** (size of the infesting vessels, presence or absence of granulomas),
- **etiological criteria** (idiopathic or secondary forms) and
- **immunological criteria** (ANCA-associated vasculitis, immune-complex vasculitis or caused by anti-basement antibodies)

Classification Based On Vessels Size



Arch Bronconeumol. 2008;44(8):428-36

Immune Complex Deposition



Arch Bronconeumol. 2008;44(8):428-36

Differential Diagnosis of the Pulmonary-Renal Syndrome

Clinical presentation					
	ANCA- Vasculitis				
	WP	MP	CSS	GP	SLE
Vasculitic general symptoms	+	+	+	_	+
Granulomatous inflammation	+	_	+	_	_
Eye involvement	+	+	+	_	+
Recurrent asthma bronchiale	_	_	+	_	_
Pulmonary-renal syndrome possible	+	+	+	+	+
Skin (purpura, necrosis)	+	+	+	_	+
Gastrointestinal symptoms	+	+	+	_	+

Laboratory workup

	WP	MP	CSS	GP	SLE
ANCA Pr3-antibody	% ۷۰	%۳۰	%۱۰	<%۳۰	_
ANCA MPO-antibody	% ۲۰	%۶۰	%۶۰	_	_
Eosinophilia	_	_	+	_	_
Reduced complement levels	_	_	_	_	+
Anti-ds-DNA	_	_	_	_	+
Anti-GBM-Ab	_	_	_	%۹۵	_

Histology/Immunohistology

	WP	MP	CSS	GP	SLE
Leucocytoclastic vasculiti	+	+	+	–	+
Granulomatous inflammation	+	–	+	–	–
Eosinophil granulomatous inflammation	–	–	+	–	–

Kidney Biopsy

	WP	MP	CSS	GP	SLE
Light microscopy	necrotising intra- and extracapillary proliferative GN			necrotising intra and extracapillary proliferative GN	Lupus-nephritis
Immunohistology	pauci-immune GN without immune-complex deposits			linear IgG-deposits in the glomerular basement membrane	granular deposits of IgG, IgM, IgA and complement factors

Diagnosis

- Pulmonary-renal syndrome is suspected in patients with hemoptysis *not* obviously attributable to other causes (eg, pneumonia, carcinoma, bronchiectasis), particularly when hemoptysis is accompanied by diffuse parenchymal infiltrates and findings suggesting renal disease.
- Initial testing includes urinalysis for evidence of hematuria and red cell casts (suggesting glomerulonephritis), serum creatinine for renal function assessment, and CBC for evidence of anemia. Chest x-ray is done if not yet obtained.

- Serum antibody testing may help distinguish some causes, as in the following:
- Antiglomerular basement membrane antibodies: Goodpasture syndrome
- Antibodies to double-stranded DNA and reduced serum complement levels: Systemic lupus erythematosus
- Antineutrophil cytoplasmic antibodies (ANCA) to proteinase-3 (PR3-ANCA or cytoplasmic ANCA [c-ANCA]): Granulomatosis with polyangiitis
- ACNA to myeloperoxidase (MPO-ANCA, or perinuclear ANCA [p-ANCA]): Microscopic polyangiitis

Definitive diagnosis requires **lung biopsy** with findings of small-vessel vasculitis or **renal biopsy** with findings of glomerulonephritis with or without antibody deposition.

Pulmonary function tests and bronchoalveolar lavage are not diagnostic but can be used to help confirm diffuse alveolar hemorrhage in patients with **glomerulonephritis** and **pulmonary infiltrates** but without hemoptysis. Lavage fluid that remains hemorrhagic after sequential sampling establishes diffuse alveolar hemorrhage, especially when hematocrit is falling.

Key Points

- The most suggestive clue to pulmonary-renal syndrome is often that patients have both unexplained pulmonary and renal symptoms, even when such symptoms occur at different times.
- Do routine laboratory tests (including urinalysis and chest x-ray) as well as autoantibody testing.
- Confirm the diagnosis when necessary with lung or kidney biopsy.
- Treat underlying autoimmune disorders.

Treatment

- Corticosteroids
- Sometimes cyclophosphamide
- Plasma exchange

THANK YOU
for your
ATTENTION!