Angiotensin Receptor Blockers and Angiotensin-Converting Enzyme Inhibitors

modified April 2025

This resource provides two charts, *Comparison of Angiotensin Receptor Blockers* and *Comparison of Angiotensin-Converting Enzyme Inhibitors*, plus an algorithm, *Monitoring ACEIs and ARBs*. See **footnote b** for dosing in **special populations**.

--Information in charts is based on product labeling unless otherwise denoted.--

Comparison of Angiotensin Receptor Blockers (ARBS)

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on A-1 or B-1 evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Azilsartan (*Edarbi*)	**HTN**: 80 mg once daily[b] (Canada: 40 mg once daily)	80 mg once daily	None	40, 80 mg US: ~$235 (80 mg once daily) Canada: ~$42 (80 mg once daily) **With chlorthalidone** (*Edarbyclor*; not for volume-depleted patients): 40/12.5, 40/25
Candesartan (*Atacand*, generics)	**HTN**: 16 mg once daily[b] **HF**: 4 mg to 8 mg once daily[8]	**HTN**: 8 to 32 mg daily in one or two divided doses **HF**: 32 mg once daily	**HF**: Reduces HF hospitalization in patients with NYHA II-IV HF and LVEF ≤40% intolerant to ACE inhibitors (NNT = 13 patients for 2.8 years).[17] Reduces mortality (NNT = 33 patients for 3.3 years) and HF hospitalizations (NNT = 18 patients for 3.3 years) in patients with NYHA II-IV HF and LVEF ≤40% on standard therapies.[18] **Diabetic retinopathy**: reduces incidence (type 1 DM) and improves mild to moderate retinopathy (type 2 DM)[1,2]	4, 8, 16, 32 mg US: ~$100 (32 mg once daily) Canada: <$10 (32 mg once daily) **With HCT** (*Atacand HCT* [US]; *Atacand Plus* [Canada] indicated for HTN only; not for initial therapy; not for volume-depleted patients; no information on use in patients with CrCl ≤30 mL/min [Canada: contraindicated]): 16/12.5, 32/12.5, 32/25 mg

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on A-1 or B-1 evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Irbesartan (*Avapro*, generics)	**HTN**: 150 mg once daily[b] **Nephropathy (HTN, type 2 DM, elevated serum creatinine, and proteinuria)**: 300 mg once daily (Canada: 150 mg once daily)[b]	**HTN**: 150 to 300 mg once daily **Nephropathy (type 2 DM)**: 300 mg once daily (Canada: 150 to 300 mg once daily)	**Nephropathy (type 2 DM)**: Reduce risk of progression to ESRD in patients with HTN (NNT = 27 patients for 2.5 years). Reduces risk of doubling of SCr (NNT = 15 patients for 2.5 years).[21]	75, 150, 300 mg US: ~$15 (300 mg once daily) Canada: ~$41 (300 mg once daily) **With HCT** (*Avalide*; indicated for HTN only; not for volume-depleted patients; not recommended if CrCl <30 mL/min): 150/12.5, 300/12.5
Losartan (*Cozaar*, generics; *Arbli* suspension)	**HTN with or without LVH**: 50 mg once daily[b] **Nephropathy (type 2 DM, elevated serum creatinine, and proteinuria) plus HTN**: 50 mg once daily[b] **HF (off-label)**: 25 to 50 mg once daily[8,b]	**HTN**: 50 to 100 mg once daily (divide BID for better control) **HTN/LVH**: 50-100 mg once daily **Nephropathy (type 2 DM):** 50-100 mg once daily **HF (off-label)**: 50 to 150 mg once daily[8]	**HTN with LVH**: Reduces incidence of stroke in patients with HTN and LVH (NNT = 50 patients for 4.8 years) compared to atenolol.[29] **Nephropathy (type 2 DM, elevated creatinine, and proteinuria)**: reduces risk of progression to ESRD (NNT = 17 patients for 3.4 years). Reduces risk of doubling of serum creatinine (NNT = 23 patients for 3.4 years).[19] **HF**: Reduces risk of CV death or HF hospitalization;[3] mortality similar to captopril[11]	25, 50, 100 mg; 10 mg/mL suspension (*Arbli*) US: <$10 (100 mg once daily) Canada: <$10 (100 mg once daily) **With HCT** (*Hyzaar*, *Hyzaar DS* [Canada]; indicated for HTN and HTN with LVH only; not recommended (US: as initial therapy) in liver impairment; not for volume-depleted patients (US); no information on use in patients with CrCl <30 mL/min [Canada: not recommended]): 50/12.5, 100/12.5, 100/25 mg

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on A-1 or B-1 evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Olmesartan (*Benicar* [US], *Olmetec* [Canada], generics)	**HTN**: 20 mg once daily[b]	**HTN**: 20 to 40 mg once daily[b]	None	5 (US), 20, 40 mg US: ~$12 (40 mg once daily) Canada: <$10 (40 mg once daily) **With HCT** (*Benicar HCT* [US], *Olmetec Plus* [Canada]; not for initial therapy; not for volume-depleted patients (US); no information on use in patients with CrCl ≤30 mL/min): 20/12.5, 40/12.5, 40/25 mg **With amlodipine** (*Azor*; not for initial therapy in liver impairment or age ≥75 years): 5/20, 10/20, 5/40, 10/40 mg **With HCT and amlodipine** (*Tribenzor*; not for initial therapy; avoid if CrCl ≤30 mL/min): 20/5/12.5, 40/5/12.5, 40/5/25, 40/10/12.5, 40/10/25 mg
Telmisartan (*Micardis*, generics)	Correct volume-depletion before starting. **HTN**: 40 mg once daily (Canada: 80 mg once daily)[b] **CV risk reduction (in patients unable to take ACE inhibitors)**: 80 mg once daily[b]	**HTN**: 40 to 80 mg once daily (Canada: 80 mg once daily) **CV risk reduction**: 80 mg once daily	**High CV risk**: reduces risk of CV events (MI, stroke, death) **Hemodialysis patients with HF**: added to ACEI, reduces all-cause and CV mortality, and heart failure hospitalization[5]	20, 40, 80 mg US: ~$20 (80 mg once daily) Canada: <$10 (80 mg once daily) **With HCT** (*Micardis HCT* [US], *Micardis Plus* [Canada]; indicated for HTN only; not for initial therapy; not for volume-depleted patients; not recommended if CrCl ≤30 mL/min): 40/12.5 (US), 80/12.5, 80/25 mg **With amlodipine** (*Twynsta*; not for initial therapy [US]: in patients ≥75 years of age or with liver impairment); not for volume-depleted patients): 40/5 mg, 40/10 mg, 80/5 mg, 80/10 mg

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on A-1 or B-1 evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Valsartan (*Diovan*, generics)	**HTN**: 80-160 mg once daily (Canada: 80 mg once daily) (non-volume-depleted patients) **HF (NYHA II to IV)**: 20 to 40 mg BID[8] (Canada: 40 mg BID[30]) **Post-MI with left ventricular dysfunction/failure**: 20 mg BID	**HTN**: 80 to 320 mg once daily **HF**: 160 mg BID **Post-MI**: 160 mg BID	**HTN with high CV risk**: reduces CV morbidity/mortality about as well as amlodipine[6] **HF**: reduces CHF hospitalization **Post-MI with left ventricular dysfunction/failure**: reduces CV mortality	40, 80, 160, 320 mg US: ~$25 (320 mg once daily) Canada: <$10 (320 mg once daily) **With HCT** (*Diovan HCT*; indicated for HTN only; not for initial therapy [Canada]; not for volume-depleted patients [US]: 80/12.5, 160/12.5, 160/25, 320/12.5, 320/25 mg **With amlodipine** (*Exforge* [US]; indicated for HTN only; not for volume-depleted patients; not for initial therapy in elderly or liver impairment): 5/160, 10/160, 5/320, 10/320 mg **With amlodipine and HCT** (*Exforge HCT* [US]; indicated for HTN only; not for initial therapy; not for volume-depleted patients): 5/160/12.5, 10/160/12.5, 5/160/25, 10/160/25, 10/320/25 mg

US product information used in preparation of this chart: *Edarbi* (April 2023), *Edarbyclor* (April 2023), *Atacand* (June 2020), *Atacand HCT* (May 2020), *Avapro* (September 2021), *Avalide* (July 2023), *Cozaar* (October 2021), Arbli (March 2025), *Hyzaar* (March 2023), *Benicar* (February 2022), *Benicar HCT* (February 2022), *Azor* (February 2022), *Tribenzor* (February 2022), *Micardis* (December 2022), *Micardis HCT* (December 2022), telmisartan/amlodipine (May 2019), *Diovan* (April 2021), *Diovan HCT* (August 2020), *Exforge* (April 2021), *Exforge HCT* (February 2021).
Canadian product monographs used in preparation of this chart: *Edarbi* (July 2021), *Edarbychlor* (July 2021), *Atacand* (February 2016), *Atacand Plus* (March 2023), *Avapro* (November 2022), *Avalide* (January 2023), *Cozaar* (July 2022), *Hyzaar* (November 2022), *Olmetec* (April 2021), *Olmetec* Plus (April 2021), *Micardis* (October 2022), *Micardis Plus* (October 2022), *Twynsta* (October 2022), *Diovan* (March 2023), *Diovan HCT* (February 2023).

a. US cost is wholesale average cost (WAC). Pricing by Elsevier, accessed October 2023.

b. Dosing of **ARBs** in **special populations.**

Azilsartan:

- **volume-depleted** patients: initial 40 mg once daily (US).

Candesartan:

- **volume-depleted** patients: consider a lower initial dose.
- **kidney impairment** (moderate to severe, or dialysis): consider 4 mg once daily initially for HTN (Canada).
- **liver impairment**: moderate liver impairment, 8 mg once daily initially for HTN (US); **severe liver impairment**, consider 4 mg once daily initially for HTN (Canada).

Irbesartan:

- **volume-depleted** patients: initial 75 mg once daily.
- **hemodialysis**: initial 75 mg once daily.

Losartan:

- **volume-depleted** patients: initial 25 mg once daily.
- **liver impairment** (mild to moderate): initial 25 mg once daily.

Olmesartan:

- **volume-depleted** patients: consider a lower initial starting dose.
- **kidney impairment** (mild to moderate): max dose 20 mg once daily (Canada). Not recommended in severe kidney impairment (Canada).
- **liver impairment** (moderate): a lower initial dose is recommended, and the max dose is 20 mg once daily (Canada).

Telmisartan:

- **liver impairment**: initial 40 mg once daily (Canada).

--Continue to the next section for the *Comparison of Angiotensin-Converting Enzyme Inhibitors* chart.—

Comparison of Angiotensin-Converting Emzyme Inhibitors (ACEIs)

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on Level A evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Benazepril (*Lotensin* [US], generics)	**HTN**: 10 mg once daily[b]	40 mg once daily (Canada: 20 mg once daily)(divide BID for better control) Limited experience with 80 mg/day[b] Canada: max dose 40 mg/day	**HTN with high CV risk**: benazepril/amlodipine reduces CV morbidity/mortality better than benazepril/HCT.[7]	5, 10, 20, 40 mg (US) US: <$12 (40 mg once daily) Canada: ~$42 (20 mg once daily) **With amlodipine** (*Lotrel* [US]; not for initial therapy; not for volume-depleted patients): 5/10, 5/20. 10/20. 10/40 mg **With HCT** (*Lotensin* HCT [US]; not for initial therapy; not for volume-depleted patients; no data in CrCl <30 mL/min.)**:** 10/12.5, 20/12.5, 20/25 mg
Captopril Take one hour before meals.	**HTN**: 25 mg BID to TID[b] **HF**: 6.25 mg TID[8] **Post-MI with LVEF ≤40%** (US): 6.25 mg x 1, then 12.5 mg TID **Nephropathy** (Type 1 DM, proteinuria, and retinopathy)(US): 25 mg TID[b]	**HTN**: 25 to 50 mg BID to TID (max 450 mg/day, divided) **HF**: 50 mg TID[8] **Post-MI**: 50 mg TID **Nephropathy**: 25 mg TID	**HF**: similar to losartan for improving survival and reducing risk of resuscitated arrest or sudden death.[11] **Post-MI**: improves survival and reduces CV morbidity/mortality in patients with LVD.[10] Reduces mortality (NNT = 63 for 4 weeks) and risk of HF (NNT = 59 for 4 weeks) after anterior wall infarct.[20] **Nephropathy**: reduces risk of doubling of SCr in type 1 DM patients with macroalbuminuria (NNT = 11 patients over 3 years)[9]	12.5, 25, 50, 100 mg US: ~$125 (50 mg TID) Canada: ~$55 (50 mg TID) **With HCT** (US): 25/15, 25/25, 50/15, 50/25 mg.

Medication	**Initial Dose for approved Indications in Adults (also see footnote b)**	**Usual or Target Maintenance Dose (Adults)**	**Clinical Benefit (Based on Level A evidence in adults)**	**How Supplied/Cost of 30-day supply (generic, if available)[a]**
Enalapril (*Vasotec*, generics)	**HTN**: 5 mg once daily[b] **HF**: 2.5 mg BID[8,b] (Canada: 1.25 to 2.5 mg BID[30]) **LVEF ≤35% (asymptomatic)**: 2.5 mg BID (Canada: 2.5 mg once daily)	**HTN**: 10 to 40 mg once daily (divide BID for better control) **HF**: 10 to 20 mg BID[8] (Canada: 10 mg BID, or 20 mg BID for NYHA IV[30]) **LVEF ≤35% (asymptomatic)**: 10 mg BID (Canada: 5 to 20 mg once daily or divided)	**HF**: reduces mortality and heart failure hospitalizations (NNT = 11 patients for 3.4 years) in patients with NYHA II and III HF.[14] Reduces mortality in patients with NYHA IV (NNT = 7 patients for 6 months).[16] **LVEF ≤35% (asymptomatic)**: Reduce development of overt HF (NNT = 11 patients for 3 years) and death from HF and HF hospitalization (NNT = 26 patients for 3 years).[15]	2.5 (US), 5, 10, 20 mg US: ~$37 (20 mg BID) Canada: ~$21 (20 mg BID) **With HCT** (*Vaseretic*; indicated for HTN only; not for initial therapy; not recommended if CrCl ≤30 mL/min): 10/25 mg
Fosinopril	**HTN**: 10 mg once daily **HF**: 5 to 10 mg once daily[8]	**HTN**: 20 to 40 mg once daily (divide BID for better control).[b] Some patients may benefit from 80 mg/day (US). **HF**: 40 mg once daily[8]	**HTN:** reduces major vascular events in patients with type 2 diabetes and hypertension (NNT = 15 patients for about 2.5 years) compared to amlodipine (secondary outcomes).[24] **HF:** reduces symptoms and HF hospitalization	10, 20, 40 mg (US) US: ~$11 (40 mg once daily) Canada: ~$17 (40 mg once daily) **With HCT** (US; indicated for HTN only; not for volume-depleted patients; not recommended if CrCl ≤30 mL/min): 10/12.5, 20/12.5 mg

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on Level A evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Lisinopril (*Zestril*, generics; *Qbrelis* oral solution)	**HTN**: 10 mg once daily[b] **HF**: 2.5 to 5 mg once daily[8,b] **Post-MI**: 5 mg within 24 hours of MI, then 5 mg after 24 hours, then 10 mg once daily[b]	**HTN:** 20 to 40 mg once daily. (Canada: 10 to 40 mg once daily)(80 mg has been used, but may not provide additional BP reduction).[b] **HF**: 20 to 40 mg once daily[8] (Canada: 20 to 35 mg once daily[30]) **Post-MI**: 10 mg once daily	**HTN:** reduces fatal/nonfatal MI in patients with hypertension plus one other CV risk factor as well as chlorthalidone or amlodipine.[13] **HF:** improves symptoms and NYHA classification **Post-MI**: reduce mortality post-MI in patients with DM (NNT = 27 patients for 6 weeks)[22]	2.5, 5, 10, 20, 30, 40 mg; 1 mg/mL oral solution (*Qbrelis*) US: <$10 (40 mg once daily) Canada: <$10 (20 mg once daily) **With HCT** (*Zestoretic*: indicated for HTN only; not recommended if CrCl ≤30 mL/min): 10/12.5. 20/12.5. 20/25 mg
Moexipril (US)	**HTN**: 7.5 mg once daily **CrCl ≤40 mL/min**: 3.75 mg once daily	**HTN**: 30 mg once daily (divide BID for better control) **CrCl ≤40 mL/min**: max daily dose 15 mg.	None	7.5, 15 mg US: ~$90 (30 mg once daily)
Perindopril (*Coversyl* [Canada], generics) Long duration of action.[30]	**HTN**: 4 mg once daily[b] **Stable CAD**: 4 mg once daily (>70 years of age: 2 mg once daily)[b] **HF (off-label)**: 2 mg once daily[8] (Canada: 2 to 4 mg once daily[30])	**HTN**: 4 to 8 mg once daily (divide BID for better control)(US: max 16 mg/day)[b] **Stable CAD**: 8 mg once daily[b] **HF (off-label)**: 8 to 16 mg once daily[8] (Canada: 4 to 8 mg once daily[30])	**Stable CAD**: reduces CV death, cardiac arrest, and **MI** in patients with stable CAD (NNT = 50 patients for 4.2 years)[23] **HF**: reduces symptoms and HF hospitalization[31]	2, 4, 8 mg US: ~$20 (8 mg once daily) Canada: <$10 (8 mg once daily) **With indapamide** (*Coversyl Plus*, *Coversyl Plus HD*, *Coversyl Plus LD* [Canada]: indicated for HTN only; not for initial therapy; contraindicated if eGFR <30 mL/min/1.73 m^2; *Coversyl Plus HD* is contraindicated if eGFR <60 mL/min/1.73 m^2): 2/0.625, 4/1.25, 8/2.5 mg

Medication	**Initial Dose for approved Indications in Adults (also see footnote b)**	**Usual or Target Maintenance Dose (Adults)**	**Clinical Benefit (Based on Level A evidence in adults)**	**How Supplied/Cost of 30-day supply (generic, if available)[a]**
Quinapril (*Accupril*, generics)	**HTN**: 10 to 20 mg once daily[b] **HF**: 5 mg BID[8,b]	**HTN**: 20 to 80 mg once daily (Canada: 20 to 40 mg once daily)(divide BID for better control) **HF**: 20 mg BID[8]	**HF**: improves symptoms and NYHA classification	5 (US), 10, 20, 40 mg US: ~$10 (40 mg once daily) Canada: ~$15 (40 mg once daily) **With HCT** (*Accuretic*; indicated for HTN only; not for initial therapy; not for volume-depleted patients [US]; not recommended if CrCl ≤30 mL/min): 10/12.5, 20/12.5, 20/25 mg
Ramipril (*Altace*, generics) Long duration of action.[30]	**HTN**: 2.5 mg once daily[b] **High CV risk**: 2.5 mg once daily **HF post-MI**: 1.25 to 2.5 mg BID[b] **HF (off-label)**: 1.25 to 2.5 mg once daily.[8] (Canada: 1.25 to 2.5 mg BID[30])[b]	**HTN**: 2.5 to 20 mg once daily (Canada: 2.5 to 10 mg once daily, max 20 mg once daily)(divide BID for better control)[b] **High CV risk**: 10 mg once daily **HF post-MI**: 5 mg BID[8,b] **HF (off-label)**: 10 mg once daily[8] (Canada: 5 mg BID[30])[b]	**High CV risk:** Reduce **mortality** (NNT = 45 patients for 5 years), **MI** (NNT = 42 patients for 5 years), and **stroke** (NNT = 67 patients for 5 years) in patients at high risk for cardiovascular events without LVD or heart failure. (~75% of study subjects had CAD).[26] **HF post-MI**: Reduce mortality in post-MI patients with heart failure (AIRE, NNT = 17 patients for 1.25 years).[27] **Nephropathy**: Reduce rate of **decline of GFR** in patients with non-diabetic kidney disease, as well as the risk of **doubling of serum creatinine** or **ESRD** (NNT = 4 patients for 1.3 years).[25]	1.25, 2.5, 5, 10 mg US: ~$10 (10 mg once daily) Canada: <$5 (10 mg once daily) **With HCT** (*Altace HCT* [Canada] indicated for HTN only; not for initial therapy; contraindicated if CrCl ≤30 mL/min): 2.5/12.5, 5/12.5, 5/25, 10/12.5, 10/25 mg

Medication	Initial Dose for approved Indications in Adults (also see footnote b)	Usual or Target Maintenance Dose (Adults)	Clinical Benefit (Based on Level A evidence in adults)	How Supplied/Cost of 30-day supply (generic, if available)[a]
Trandolapril (*Mavik* [Canada], generics)	**HTN**: 1 mg once daily **Post-MI with left ventricular dysfunction/failure**: 1 mg once daily.[8] **HF (off-label)**: 1 mg once daily[8] (Canada: 1 to 2 mg once daily[30])	**HTN**: 2 to 4 mg once daily (Canada: 1 to 2 mg once daily)(divide BID for better control)(little experience with doses >8 mg) **Post-MI with left ventricular dysfunction/failure**: 4 mg once daily. **HF (off-label)**: 4 mg once daily[8,30]	**Post-MI with left ventricular dysfunction/failure:** Reduces **mortality** (NNT = 14 patients for 2-4 years) and increases time to **progression to severe heart failure** in post-MI patients with left ventricular systolic dysfunction (NNT = 14 patients for 2-4 years).[28]	0.5 (Canada), 1, 2, 4 mg US: ~$14 (4 mg once daily) Canada: <$10 (4 mg once daily)

Abbreviations: ACEI = angiotensin-converting enzyme inhibitor; ARBs = angiotensin receptor blockers; BID = twice daily; BP = blood pressure; CAD = coronary artery disease; HF = heart failure; CrCl = creatinine clearance; CV = cardiovascular; DM = diabetes mellitus; eGFR = estimated glomerular filtration rate; ESRD = end stage renal disease; HCT = hydrochlorothiazide; HTN = hypertension; LVEF = left ventricular ejection fraction; LVH = left ventricular hypertrophy; MI = myocardial infarction; NNT = number needed to treat; NYHA = New York Heart Association Class; SCr = serum creatinine; RCT = randomized controlled trial; TID = three times daily

US product information used in preparation of this chart: *Lotensin* (January 2019), *Lotrel* (April 2021), *Lotensin HCT* (October 2020), captopril (Solco Healthcare, April 2023), captopril and hydrochlorothiazide (Rising, December 2022), *Vasotec* (December 2020), *Vaseretic* (September 2020), fosinopril (Chartwell Rx, May 2023), fosinopril and hydrochlorothiazide (Aurobindo, January 2022), *Zestril* (March 2020), *Qbrelis* (April 2023), *Zestoretic* (July 2021), moexipril (Glenmark, December 2015), perindopril (Aurobindo, January 2023), quinapril (Lupin, September 2020), quinapril and hydrochlorothiazide (Aurobindo, May 2022), *Altace* (June 2017), trandolapril (Aurobindo, February 2022).
Canadian product monographs used in preparation of this chart: benazepril (AA Pharma, December 2019), captopril (Teva, February 2021), *Vasotec* (June 2021), *Vaseretic* (November 2022), fosinopril (Sanis Health, December 2016), *Zestril* (July 2021), *Zestoretic* (March 2022), *Coversyl* (October 2022), *Coversyl Plus* (October 2022), *Accupril* (December 2022), *Accuretic* (December 2022), *Altace* (January 2021), *Altace HCT* (January 2023), *Mavik* (September 2019)

a. US cost is wholesale average cost (WAC). Pricing by Elsevier, accessed October 2023.
b. **Dosing of ACEI in special populations**: SCr 1 mg/dL = 90 umol/L

Benazepril:

- **kidney impairment** (eGFR <30 mL/min/1.73 m^2; Canada: CrCl <30 mL/min): initial 5 mg once daily. Max dose 40 mg/day if eGFR <30 mL/min/1.73 m^2.
- with a **diuretic**: initial 5 mg once daily.

Captopril

- kidney impairment: CrCl 10 to 50 mL/min, reduce total daily dose by 75% and divide BID; CrCl <10 mL/min., reduce dose by 50% and give once daily.[36] Hemodialysis, administer the daily dose after dialysis on dialysis days.[36]
- with a **diuretic**: start with doses of 6.25 to 12.5 mg (US)

Enalapril

- **geriatrics** (>65 years of age): initial 2.5 mg once daily (HTN)(Canada)
- **kidney impairment**: CrCl ≤30 mL/min, initial 2.5 mg once daily (HTN); SCr >1.6 mg/dL, initial 2.5 mg once daily (HF). Hemodialysis, based non-dialysis-days dose per clinical response, but give 2.5 mg on dialysis days, after dialysis.
- with a **diuretic**: initial 2.5 mg once daily (HTN)
- **hyponatremia** (sodium <130 mEq/L): initial 2.5 mg once daily (HF)

Fosinopril:

- **kidney impairment:** dose adjustment is not needed in hypertensive patients with kidney impairment, so consider cautious dosing in patients with kidney impairment switched from fosinopril to another ACE inhibitor. Lisinopril may provide better BP control than fosinopril at the same dose.[12]

Lisinopril:

- **Kidney impairment**: CrCl 10 to 30 mL/min, initial 2.5 mg (HF, post-MI) or 5 mg (HTN) once daily (US). Canada: initial 2.5 to 5 mg once daily (HTN). CrCl <10 mL/min or hemodialysis, initial 2.5 mg once daily. Max daily dose 40 mg once daily.
- With a **diuretic (HTN)**: 5 mg once daily.

Perindopril

- **Kidney impairment:** CrCl 30 to <60 mL/min, initial 2 mg once daily. Max dose 8 mg/day. CrCl <30 mL/min, not recommended (US). CrCl 15 to <30 mL/min, 2 mg every-other-day (Canada). Hemodialysis: 2 mg on dialysis days, after dialysis (Canada).

Quinapril

- **Geriatrics**: initial 10 mg once daily (HTN)
- **Kidney impairment**: CrCl 30 to 60 mL/min, initial 5 mg once daily. CrCl 10 to 29 mL/min, initial 2.5 mg once daily.[36] CrCl<10 mL/min, insufficient data for dosage recommendation.
- With a **diuretic**: initial 5 mg once daily (HTN)

Ramipril

- Canada

- **Kidney impairment (HTN)**: CrCl 10 to <40 mL/min/1.73 m^2 [SCr >2.5 mg/dL]): initial 1.25 mg once daily, max daily dose 5 mg. CrCl <10 mL/min/1.73 m^2, initial 1.25 mg once daily, max daily dose 2.5 mg.
- **Kidney impairment (HF post-MI)**: CrCl 20 to 50 mL/min/1.73 m^2, initial 1.25 mg once daily, max dose 1.25 mg BID.
- High CV risk: follow dosing for special populations as for other indications
- **Liver impairment**: max daily dose 2.5 mg
- With a **diuretic**: initial 1.25 mg
- **High CV risk**: follow dosing for special populations as for other indications.

- US
  - **Kidney impairment**: CrCl <40 mL/min, initial 1.25 mg once daily, max daily dose 5 mg (HTN, post-MI). In general, one-quarter (25%) of the usual dose of ramipril is expected to produce full therapeutic levels.
  - With a **diuretic, volume depletion**, or suspected **renal artery stenosis**: initial 1.25 mg once daily
  - Suspected **renal artery stenosis**: initial 1.25 mg once daily

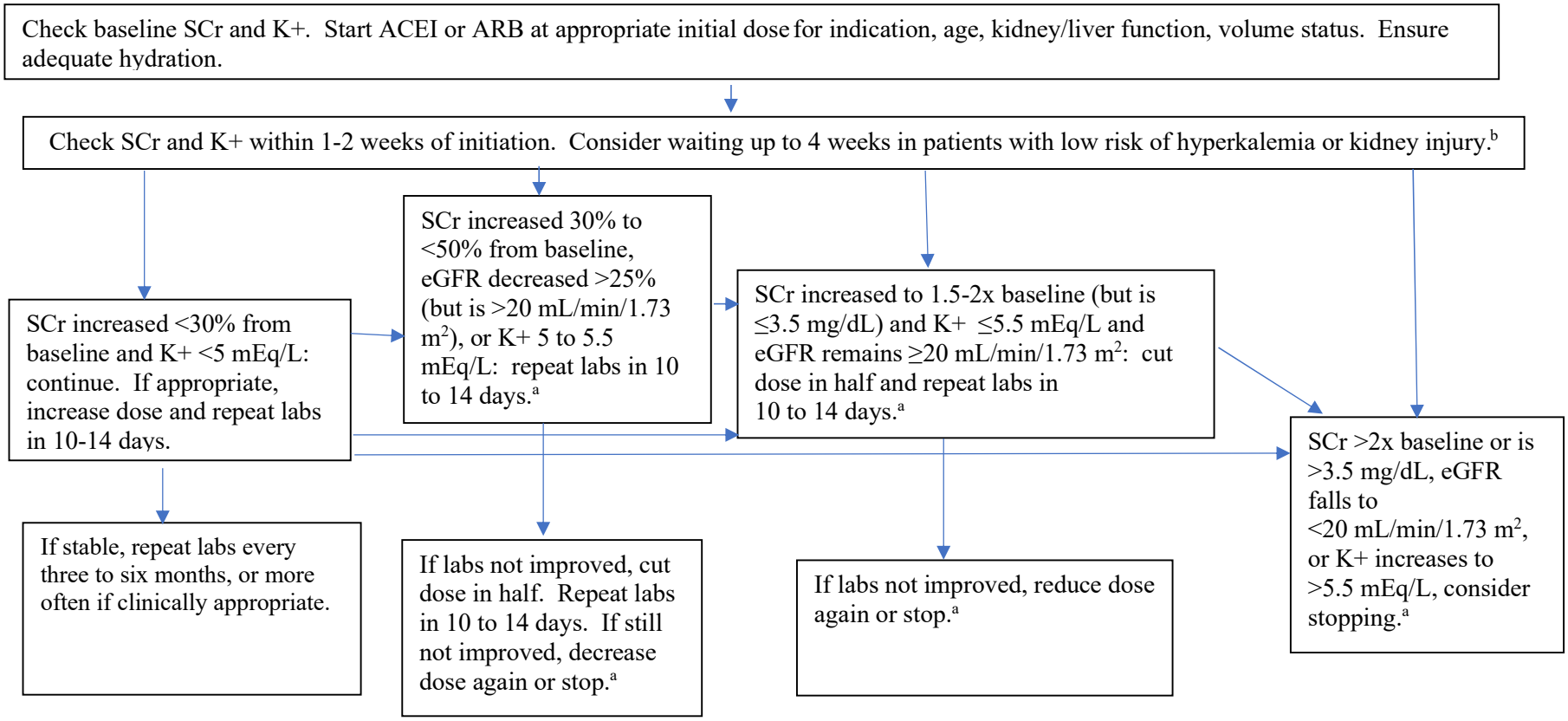
Trandolapril

- **Black patients**: 2 mg once daily (US)
- **Kidney impairment:** CrCl <30 mL/min (Canada: <30 mL/min/1.73 m^2), initial 0.5 mg once daily (Canada: max 1 mg once daily). CrCl <10 mL/min/1.73 m^2, max dose is 0.5 mg once daily (Canada).
- **Liver impairment (US: cirrhosis)**: 0.5 mg once daily
- With a **diuretic**: initial 0.5 mg once daily

--Continue to the next section for the *Monitoring ACEIs and ARBs* algorithm.—

Monitoring ACEIs and ARBs

—Algorithm based on references 4, 8, 30, 32-36 below. K+ = serum potassium; SCr = serum creatinine; SCr 1 mg/dL = 90 umol/L; K+ 5.5 mEq/L = 5.5 mmol/L.—



a. Ensure hydration; reassess diuretic use.[36] Consider stopping NSAIDs.[36] Provide dietary advice (e.g., moderate potassium intake, avoid salt substitutes).[35,36] For high K+ plus HTN or volume overload, consider a loop diuretic or thiazide, with or without oral sodium bicarbonate in patients with chronic kidney disease and metabolic acidosis.[36] If SCr increased >30% or eGFR decreased>25%, consider bilateral renal artery stenosis.[35] Consider rechallenge in 2-4 weeks.[33] Consider switching to trandolapril or fosinopril in the event of high K+.[4]

b. Risk factor examples: heart failure, impaired kidney function, high or borderline-high K+, history of hyperkalemia, history of kidney function deterioration on an ACEI or ARB, use of medications associated with hyperkalemia (e.g., spironolactone, eplerenone, trimethoprim, K+-sparing diuretics, NSAIDs, cyclosporine, digoxin), advanced age, low body mass index.[35,36]

Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.

Levels of Evidence

In accordance with our goal of providing Evidence-Based information, we are citing the **LEVEL OF EVIDENCE** for the clinical recommendations we publish.

Level	Definition	Study Quality
A	Good-quality patient-oriented evidence.*	1. High-quality randomized controlled trial (RCT) 2. Systematic review (SR)/Meta-analysis of RCTs with consistent findings 3. All-or-none study
B	Inconsistent or limited-quality patient-oriented evidence.*	1. Lower-quality RCT 2. SR/Meta-analysis with low-quality clinical trials or of studies with inconsistent findings 3. Cohort study 4. Case control study
C	Consensus; usual practice; expert opinion; disease-oriented evidence (e.g., physiologic or surrogate endpoints); case series for studies of diagnosis, treatment, prevention, or screening.	

***Outcomes that matter to patients** (e.g., morbidity, mortality, symptom improvement, quality of life).

[Adapted from Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. Am Fam Physician. 2004 Feb 1;69(3):548-56.
https://www.aafp.org/pubs/afp/issues/2004/0201/p548.html.]

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Cite this document as follows: **Clinical Resource,** ***Angiotensin Receptor Blockers and Angiotensin-Converting Enzyme Inhibitors. Pharmacist's Letter/Pharmacy Technician's Letter/Prescriber Insights.*** **November 2023. [391103]**