

T. H. M.

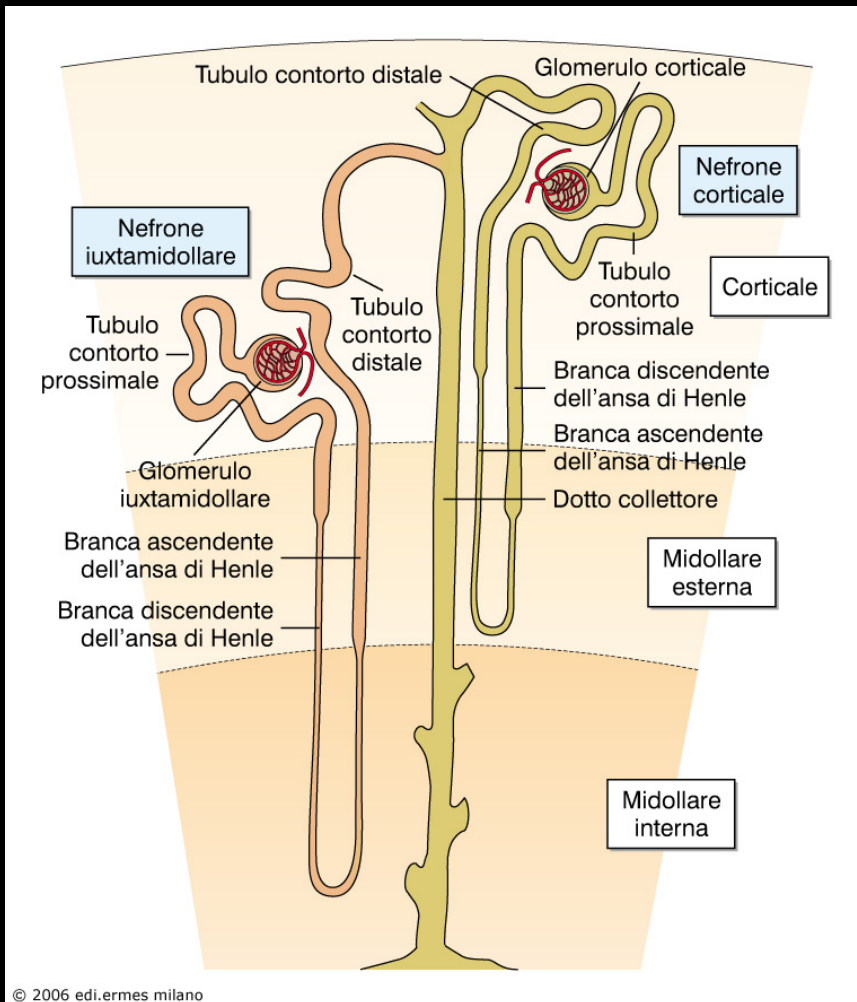
RALLENTARE

ARRESTARE

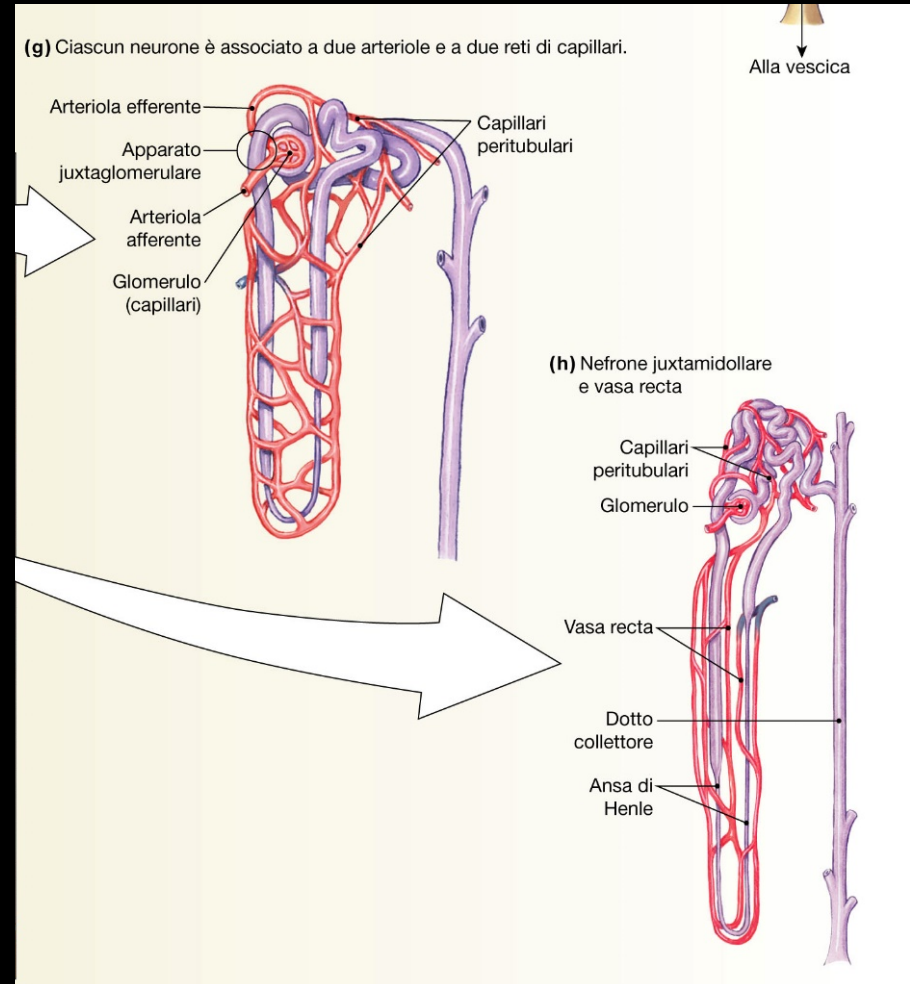
REGREDIRE

Il nefrone: unità funzionale del rene

N. nefroni nell'uomo: ≈ 1.2 milioni per rene



20% dei nefroni sono juxta-midollari



Nei *vasa recta* scorre solo l'1-2% del flusso renale totale

Differenze fra nefroni superficiali e juxta-midollari: nei nefroni juxta-midollari il glomerulo renale è più grande ed è sito più in profondità, l'ansa di Henle è più lunga, e dall'a. efferente si originano i *vasa recta*.

Nel soggetto adulto a riposo il rene riceve circa il 20-25% della portata cardiaca (massa dei reni: circa lo 0.5% della massa corporea totale).

→ ≈ 1200 ml/min
 ≈ 1700 litri al giorno
 ≈ 63000 litri in un anno
 ≈ 44 milioni litri in 70 anni

Il flusso plasmatico renale è circa il 55% del flusso ematico renale

Il volume del filtrato glomerulare è circa il 20% del flusso plasmatico renale (≈ 180 litri al giorno; ≈ 5 milioni litri in 70 anni)

Il volume di urina prodotta è

≈ 1 ml/min
 $\approx 1,5$ litri al giorno
 ≈ 550 litri in un anno
 ≈ 38500 litri in 70 anni

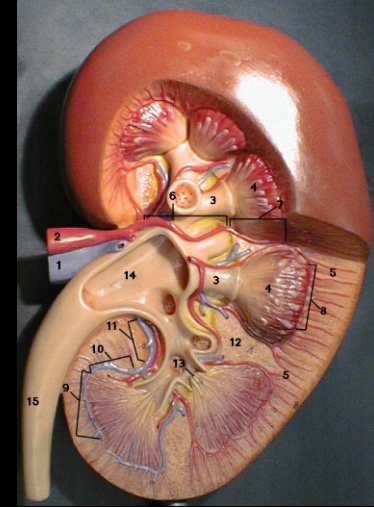


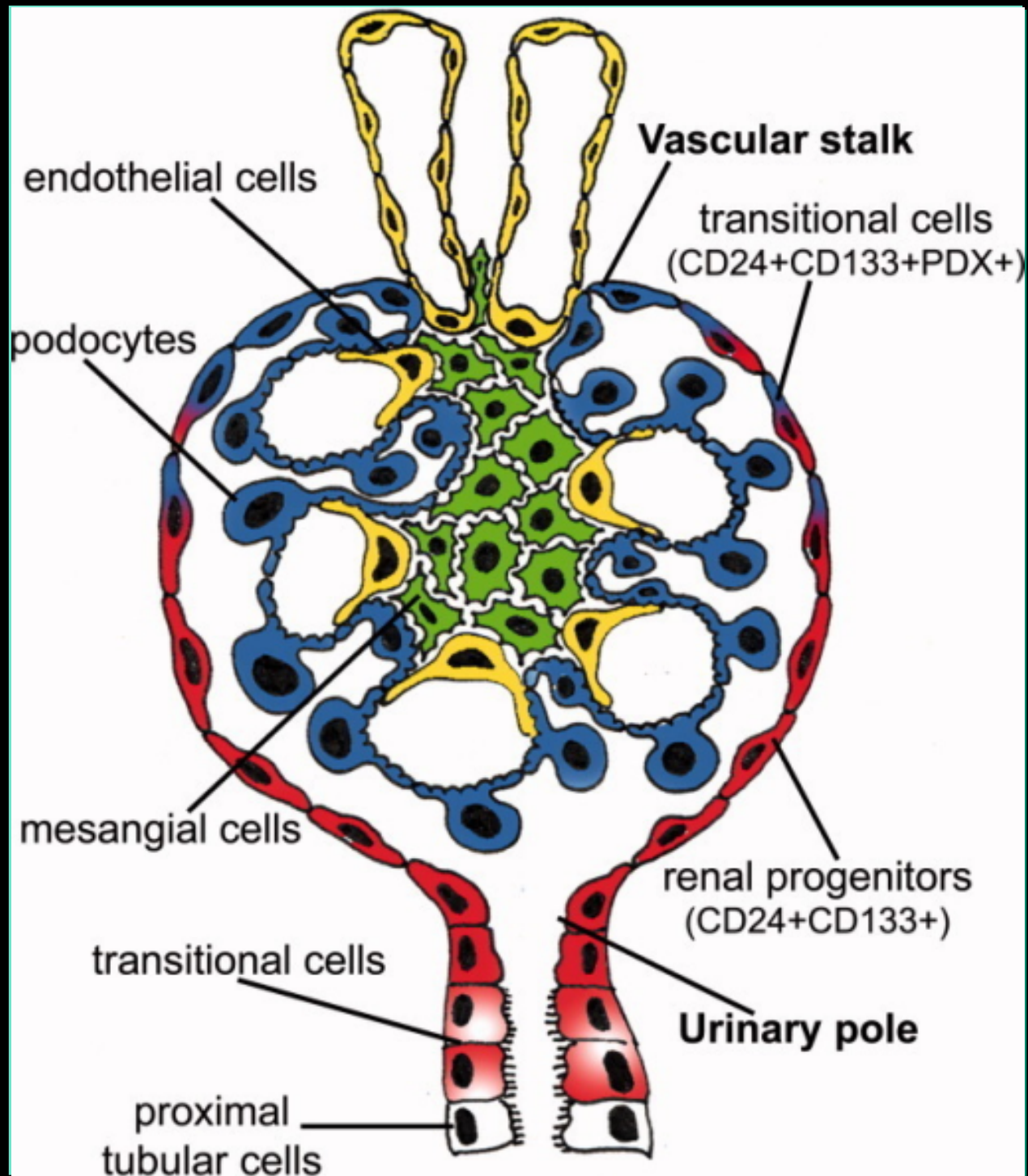
Più del 99% del liquido filtrato dai reni deve tornare nel sangue.

Fisiologia del rene

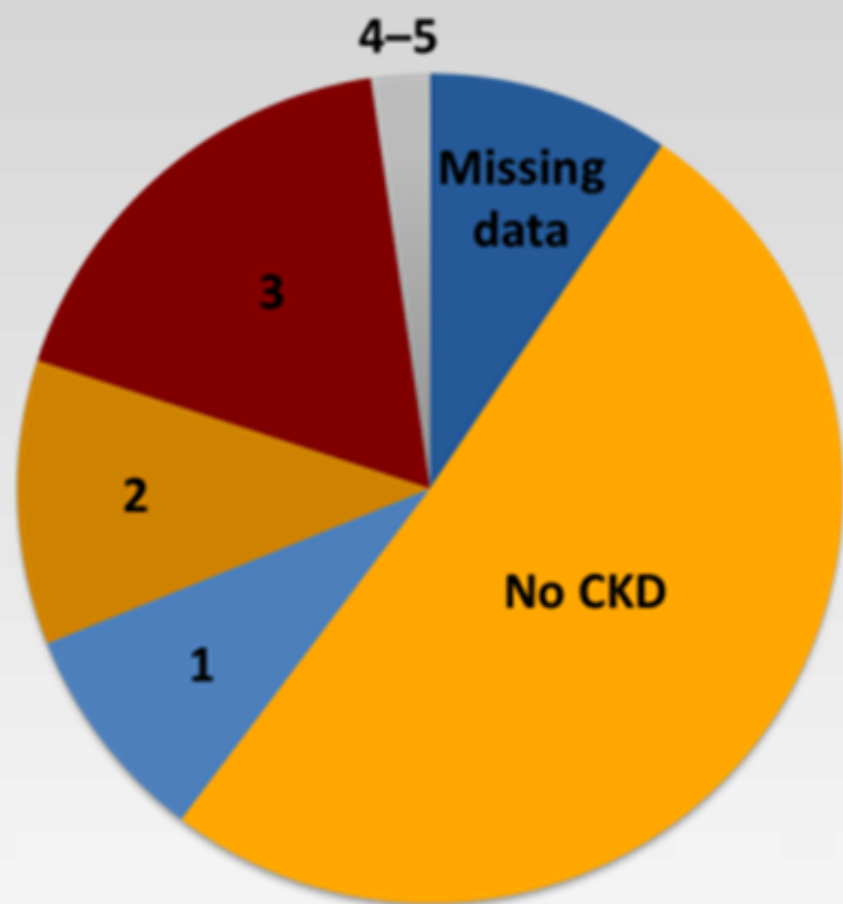
Le funzioni renali sono:

- **Mantenimento del bilancio idrico**
- **Regolazione dell'osmolarità del liquido extra-cellulare**
- **Mantenimento del bilancio elettrolitico**
- **Mantenimento dell'equilibrio acido-base**
- **Funzione emuntoria o escrezione di prodotti di scarto e di sostanze estranee**
- **Produzione e degradazione di ormoni e citochine**
- **Gluconeogenesi**





Incidence of Renal Disease in People with T2DM



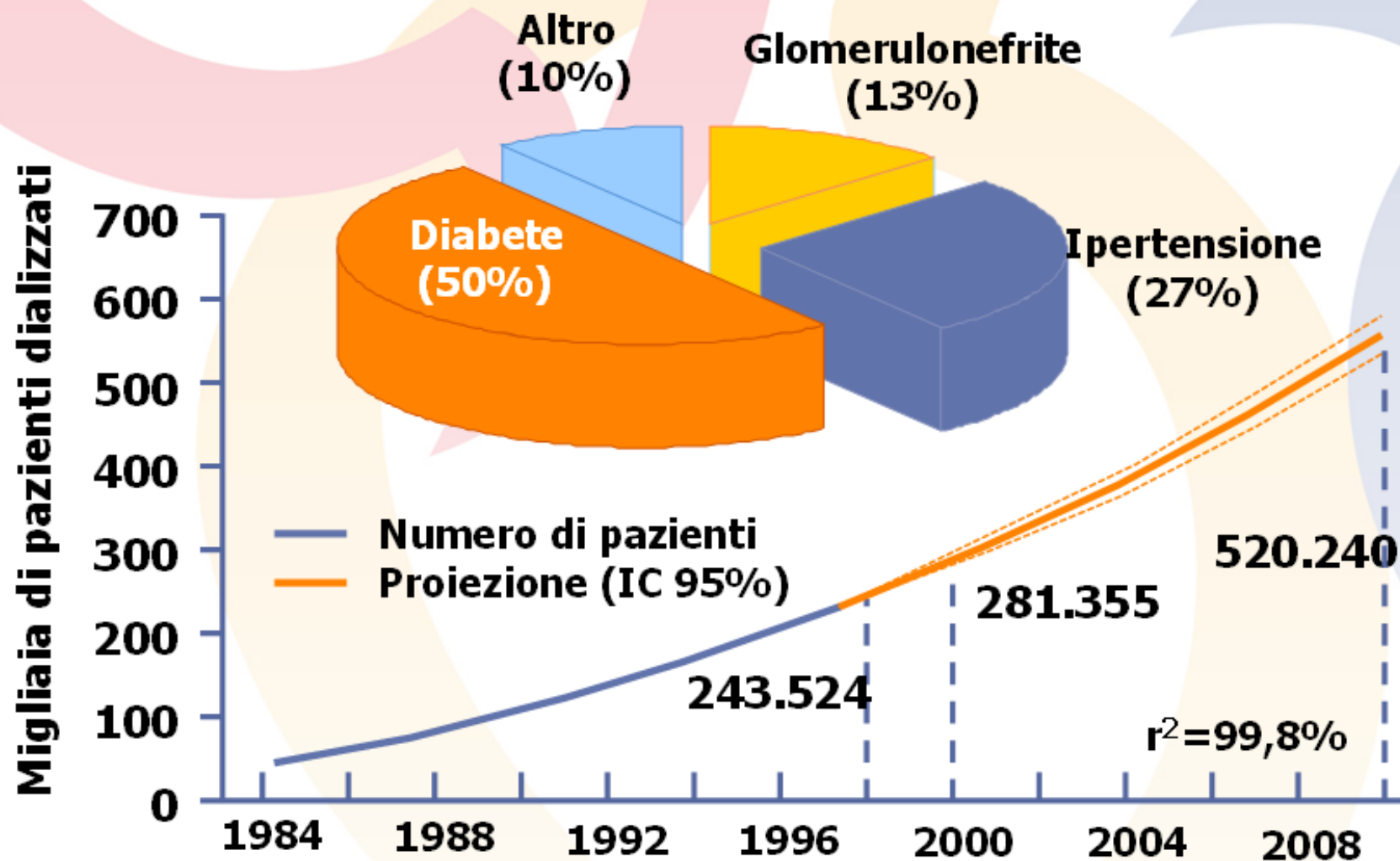
CKD Stage	eGFR (mL/min)	% of T2DM Patients*
Missing data	–	9.5%
No CKD	≥90	50.8%
1	≥90	8.6%
2	60-89	11.1%
3	30-59	17.7%
4-5	<29	2.3%

*Based on data from 1462 patients aged ≥20 years with T2DM who participated in the Fourth National Health and Nutrition Examination Survey in the years 1999 through 2004

CKD = chronic kidney disease; eGFR = estimated glomerular filtration rate

Il diabete è la causa più comune di insufficienza renale terminale

Diagnosi principale nei pazienti che vanno incontro a dialisi

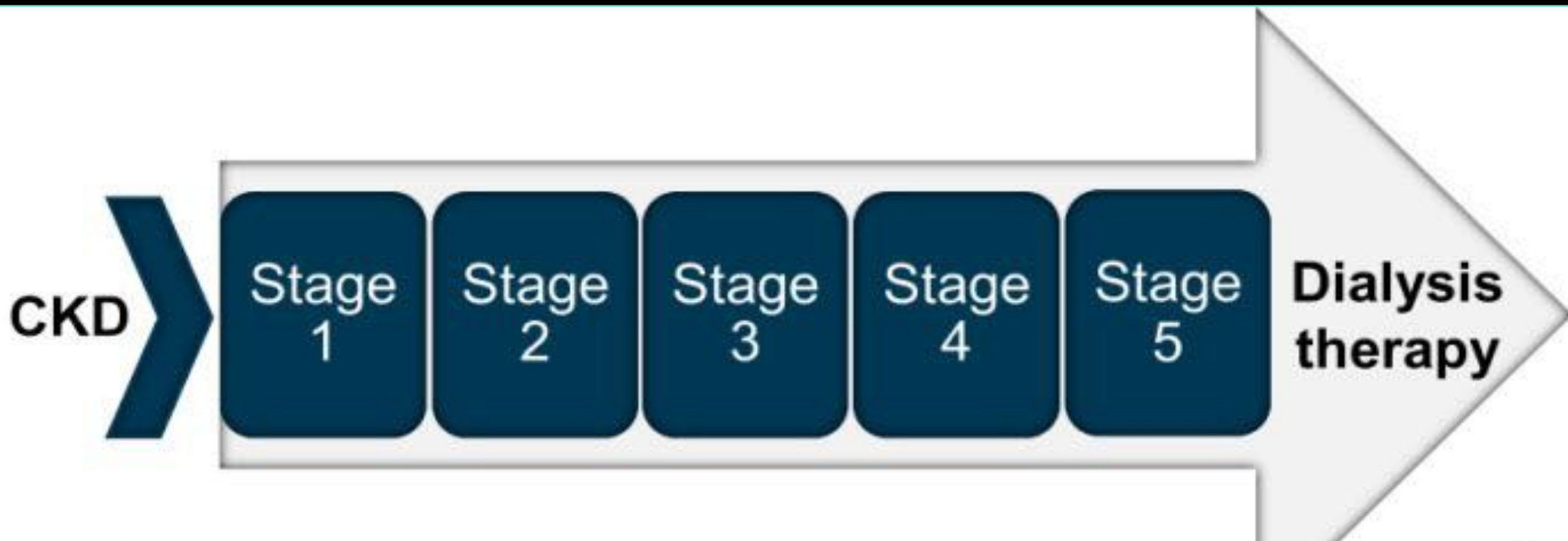


Excess Mortality among Persons with Type 2 Diabetes

>400.000 pts from Swedish National Diabetes Register followed for a mean of 4.6 yrs

The *excess risks* of all-cause and cardiovascular death *increased* with younger age, worse glycemic control, and *greater severity of renal complications*...

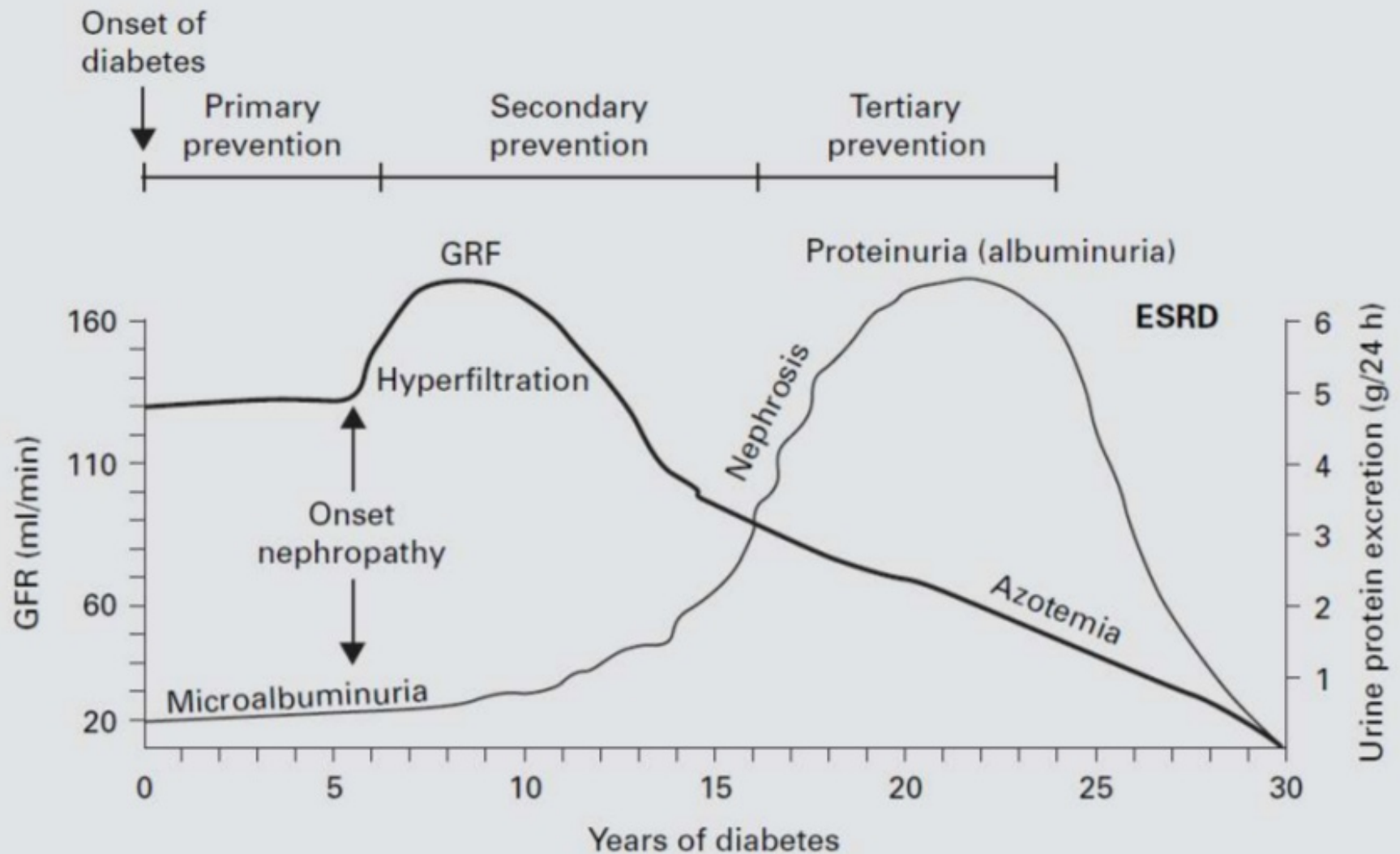
Variable	Death from Any Cause				Death from Cardiovascular Causes			
	<55 Yr	55–64 Yr	65–74 Yr	≥75 Yr	<55 Yr	55–64 Yr	65–74 Yr	≥75 Yr
Reference	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Normoalbuminuria	1.87 (1.70–2.04)	1.27 (1.22–1.32)	0.96 (0.94–0.99)	0.83 (0.82–0.84)	2.19 (1.82–2.62)	1.43 (1.33–1.55)	0.95 (0.91–1.00)	0.79 (0.78–0.81)
Microalbuminuria	2.61 (2.19–3.10)	1.88 (1.75–2.02)	1.44 (1.38–1.50)	1.04 (1.02–1.07)	4.26 (3.19–5.70)	2.38 (2.11–2.69)	1.55 (1.44–1.66)	1.01 (0.97–1.04)
Macroalbuminuria	3.78 (3.03–4.71)	2.88 (2.65–3.13)	2.14 (2.04–2.24)	1.40 (1.37–1.44)	5.58 (3.79–8.20)	3.81 (3.33–4.35)	2.62 (2.44–2.81)	1.37 (1.32–1.42)
Stage 5 chronic kidney disease	14.63 (9.53–22.48)	7.19 (5.75–8.98)	5.97 (5.29–6.73)	3.31 (3.02–3.62)	30.03 (16.08–56.10)	9.22 (6.40–13.29)	5.45 (4.43–6.70)	2.45 (2.11–2.86)
Reference	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
>90 ml/min	2.07 (1.90–2.26)	1.47 (1.41–1.54)	1.17 (1.13–1.21)	0.88 (0.86–0.91)	2.47 (2.08–2.94)	1.56 (1.43–1.69)	1.02 (0.96–1.09)	0.72 (0.69–0.76)
>60–90 ml/min	1.92 (1.69–2.17)	1.30 (1.24–1.36)	0.96 (0.93–0.99)	0.81 (0.80–0.82)	2.59 (2.05–3.27)	1.60 (1.47–1.74)	1.04 (1.00–1.10)	0.77 (0.75–0.78)
>45–60 ml/min	3.84 (2.68–5.50)	2.60 (2.35–2.88)	1.48 (1.41–1.55)	1.02 (1.00–1.04)	5.56 (2.98–10.38)	3.83 (3.29–4.45)	1.75 (1.63–1.89)	1.02 (1.00–1.05)
>30–45 ml/min	5.52 (3.05–9.97)	4.00 (3.44–4.64)	2.42 (2.26–2.58)	1.37 (1.34–1.41)	8.59 (3.21–22.97)	4.72 (3.69–6.04)	2.94 (2.68–3.24)	1.39 (1.35–1.44)
15–30 ml/min	18.79 (11.50–30.72)	6.98 (5.75–8.48)	4.21 (3.84–4.62)	2.21 (2.12–2.30)	35.03 (16.63–73.79)	8.96 (6.59–12.19)	4.58 (3.97–5.28)	2.13 (2.01–2.25)
Stage 5 chronic kidney disease	14.70 (9.57–22.59)	7.23 (5.79–9.04)	6.09 (5.40–6.87)	3.33 (3.04–3.64)	30.26 (16.20–56.52)	9.30 (6.45–13.40)	5.57 (4.53–6.86)	2.48 (2.13–2.89)



Traditional risk factors: aging, hypertension, diabetes, obesity, dyslipidemia, smoking

Renal disease/uremia-related risk factors: uremic toxins, endothelial dysfunction, chronic inflammation, oxidative stress, sympathetic activation, volume overload, anemia, vascular calcification, CKD-MBD

Natural history of DN



Diabetes

Diagnosis



Hyperfiltration



Clinical Latency



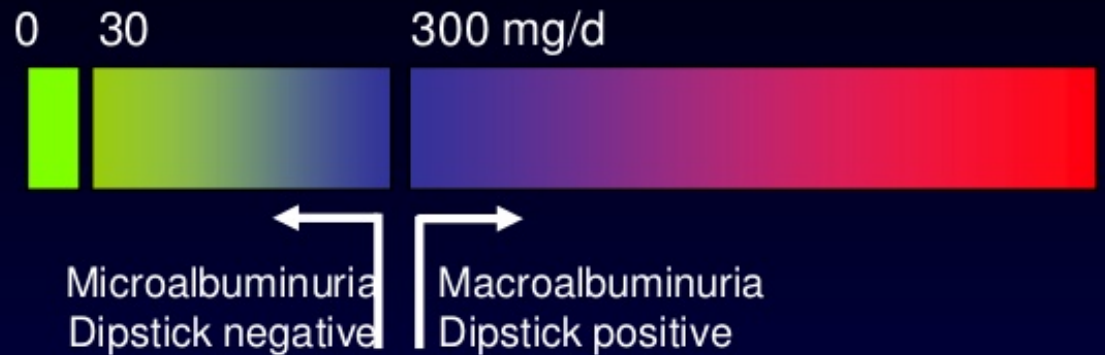
Microalbuminuria



Macroalbuminuria



Renal failure



New Terminology

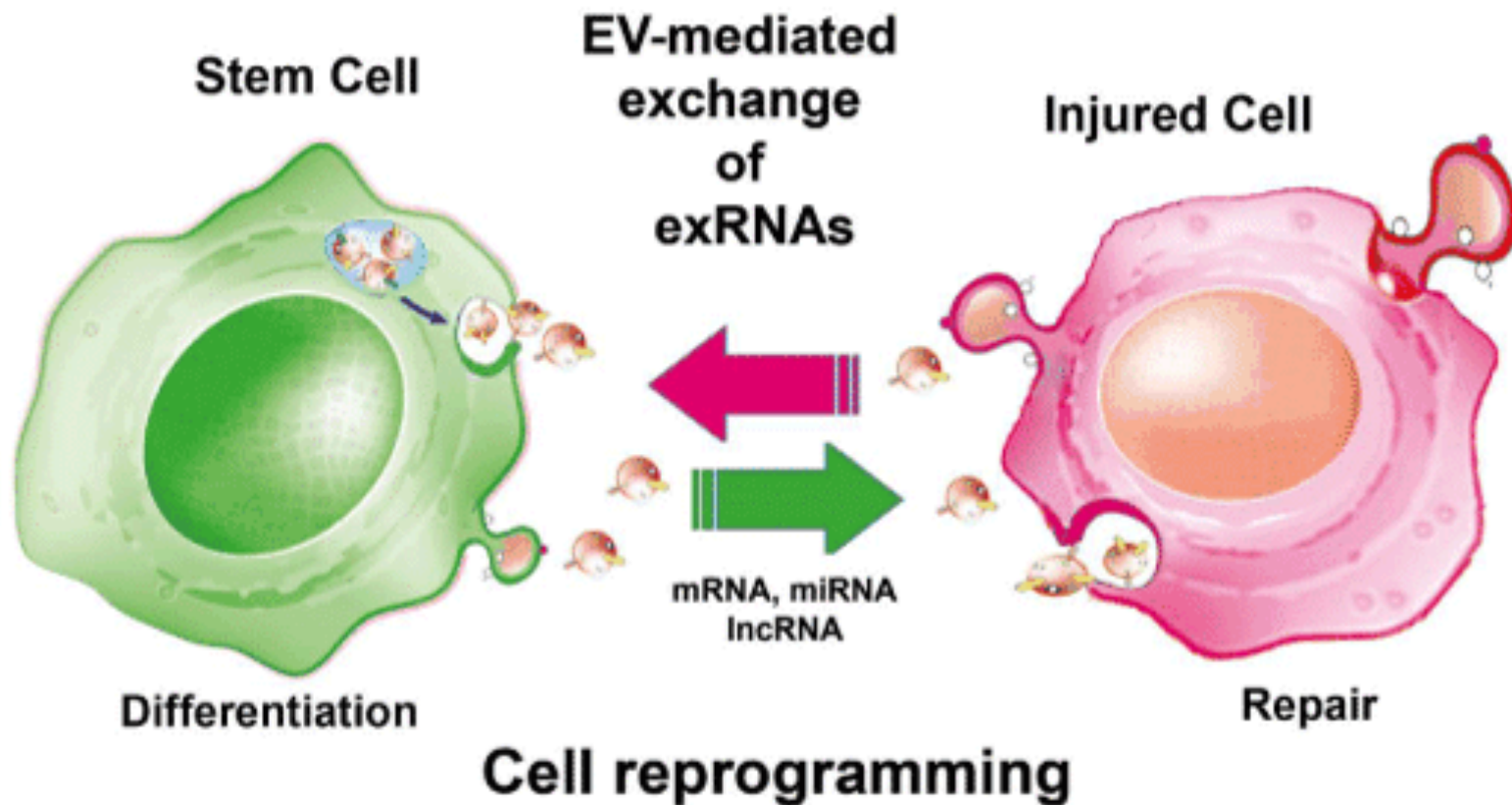
Micro-albuminuria = High Albuminuria

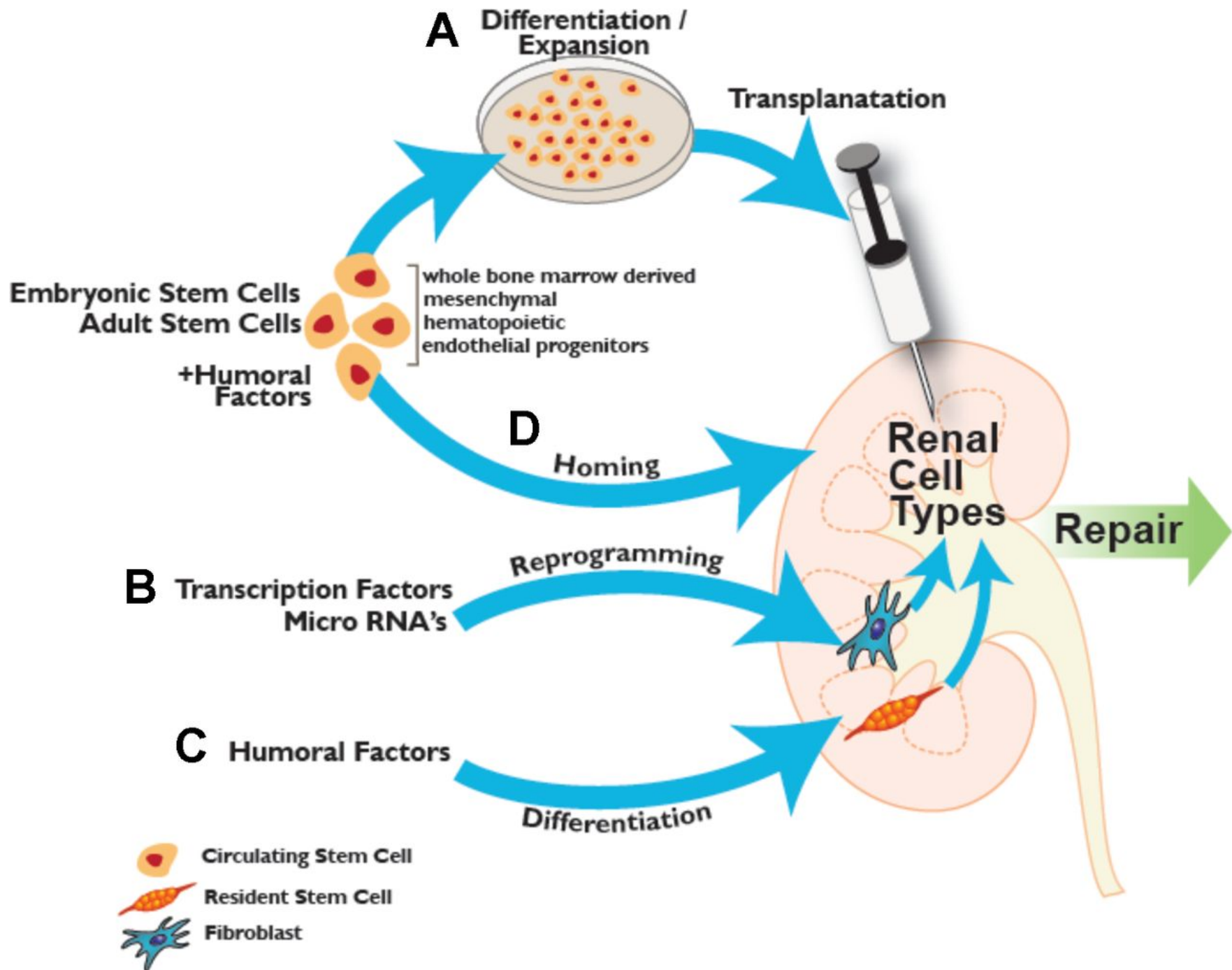
Macroalbuminurais = Very high
Albuminuria

ARRESTARE

REGREDIRE

Stem Cell Treatment For Kidney Disorder





ARRESTARE

**Grazie per la
partecipazione e
l'attenzione !**