La gestione dell'iperglicemia nel paziente ospedalizzato (terapia con steroidi, insufficienza renale, epatica)

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UOC ENDOCRINOLOGIA E MALATTIE METABOLICHE
ASL PESCARA

Il sottoscritto Fabrizio Febo

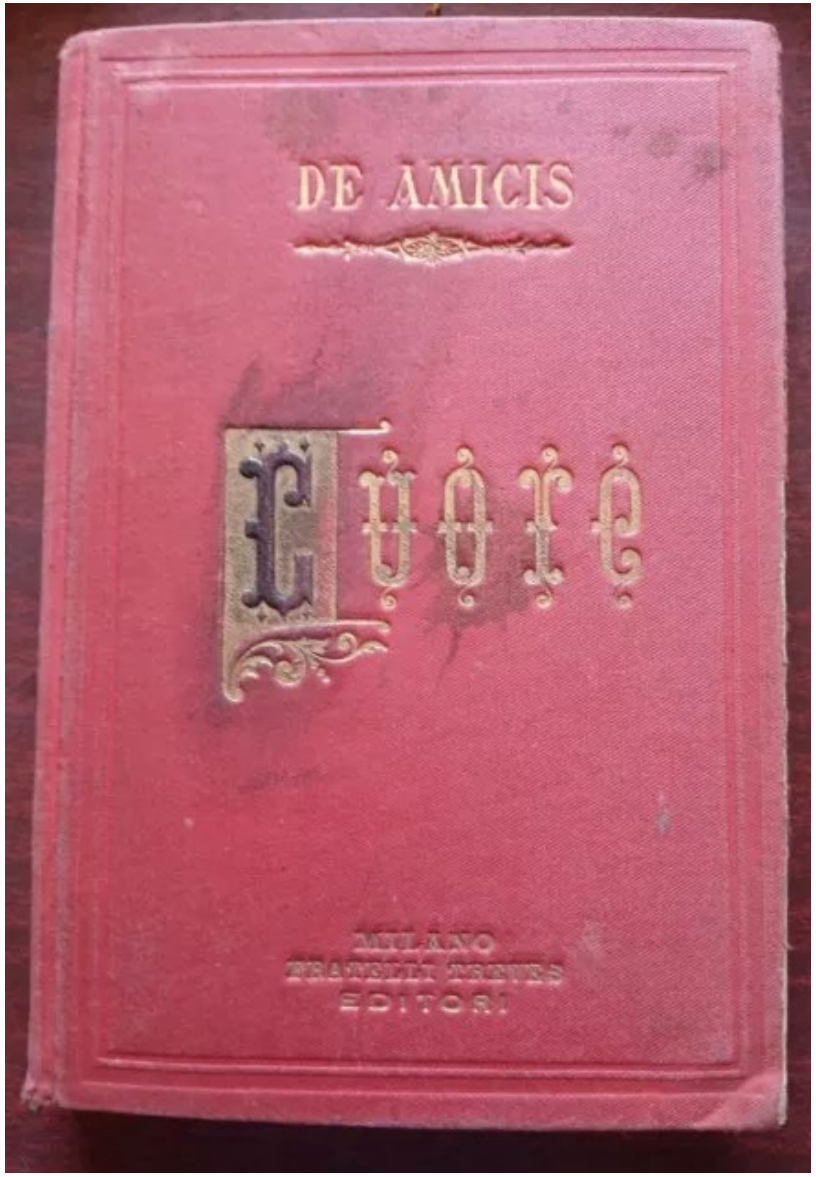
ai sensi dell'art. 76 comma 4 dell'Accordo Stato-Regioni del 2 febbraio 2017

dichiara per l'evento in oggetto:

che nell'ultimo biennio ha avuti fonti di finanziamento e rapporti con i seguenti soggetti portatori di interessi commerciali in ambito sanitario (intesi come supporti per ricerche o consulenze scientifiche):

- Nono Nordisk, Astrazeneca, Eli Lilly, Bruno, SPAFarma MSD

The Hospitalized Patient with DM2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Società Italiana
di Diabetologia

La gestione della persona con diabete ricoverata per altra patologia

a cura di Daniela Bruttomesso e Laura Sciacca

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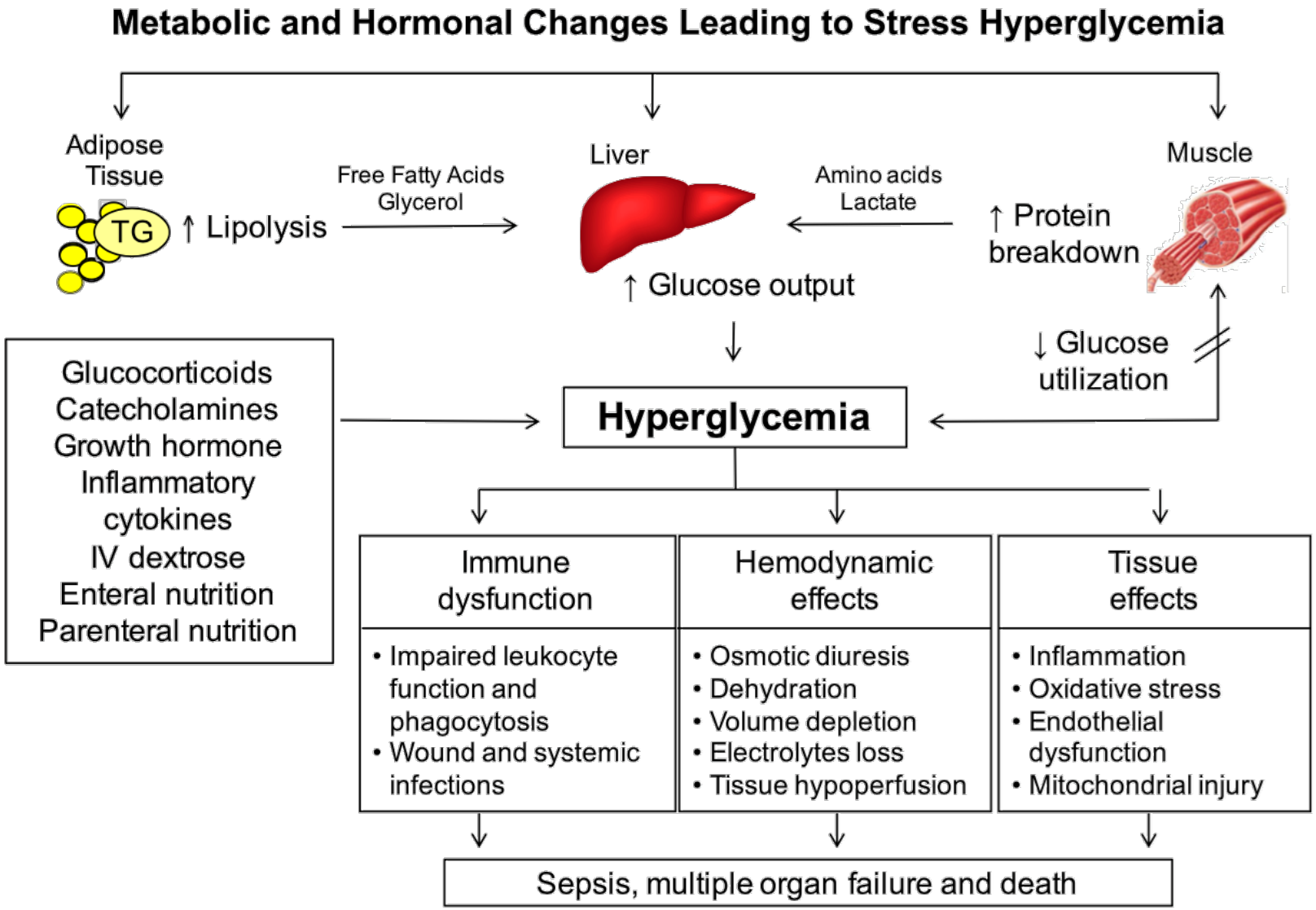
Pathophysiology of inpatient hyperglycemia



Management of Inpatient Hyperglycemia and Diabetes in Older Adults. Diabetes Care 2017;40:509–517

Hospital Care Delivery Standards

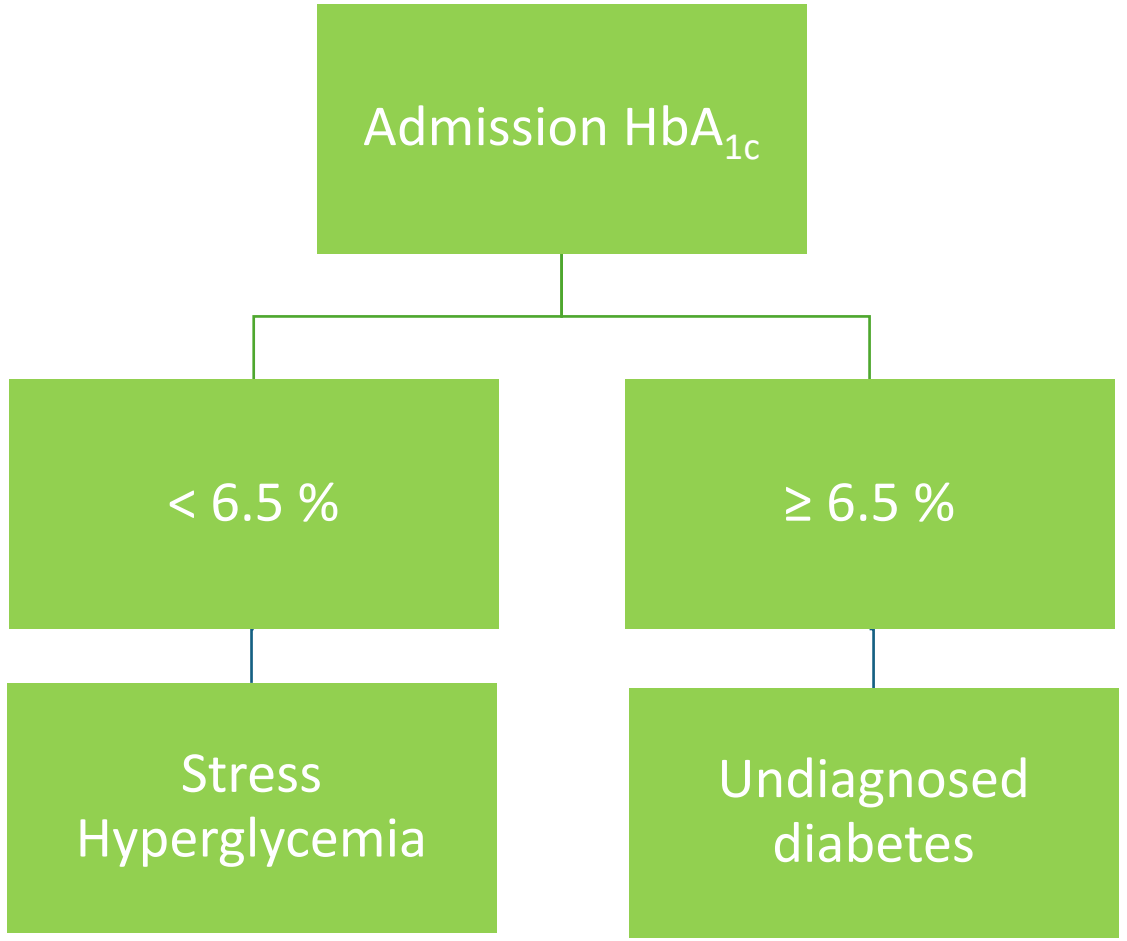
16.1 Perform an **A1C test on all patients with diabetes or hyperglycemia** (blood glucose >140 mg/dL [7.8 mmol/L]) admitted to the hospital if not performed in the prior 3 months. B

16.2 **Insulin** should be administered using validated written or computerized protocols that allow for predefined **adjustments in the insulin dosage based on glycemic fluctuations.** C

Diabetes Care December 2023, Vol.47, S1-S4.
doi:https://doi.org/10.2337/dc24-SINT

Considerations on Admission

- No history of diabetes:



Glycemic Targets in Hospitalized Patients

16.4 **Insulin** therapy should be **initiated** for treatment of persistent hyperglycemia starting at a **threshold ≥180 mg/dL** (10.0 mmol/L). Once insulin therapy is started, a target glucose range of 140–180 mg/dL (7.8– 10.0 mmol/L) is recommended for the majority of critically ill patients and noncritically ill patients. A

16.5 More stringent goals, such as 110–140 mg/dL (6.1–7.8 mmol/L), may be appropriate for selected patients if they can be achieved without significant hypoglycemia. C

Diabetes Care December 2023, Vol.47, S1-S4.
doi:https://doi.org/10.2337/dc24-SINT

Glucose-lowering Treatment in Hospitalized Patients

16.6 **Basal insulin or a basal plus bolus correction** insulin regimen is the preferred treatment for noncritically ill hospitalized patients with poor oral intake or those who are taking nothing by mouth. A

16.7 An insulin regimen with basal, prandial, and correction components is the preferred treatment for noncritically ill hospitalized patients with good nutritional intake. A

16.8 ~~Use of only a sliding scale insulin regimen in the inpatient hospital setting is strongly discouraged~~. A

16.11 For people with type 2 diabetes **hospitalized with heart failure**, it is **recommended that use of a sodium–glucose cotransporter 2 inhibitor be initiated or continued during hospitalization and upon discharge**, if there are no contraindications and after recovery from the acute illness. **A**

Diabetes Care December 2023, Vol.47, S1-S4.
doi:https://doi.org/10.2337/dc24-SINT


LINO BANFI
in
L'ALLENATORE NEL PALLONE
GIGI Sammarchi
ANDREA Roncato
REGIA DI SERGIO MARTINO

5 - 5 - 5

Materiali e metodi

Criteri di inclusione:

- Pazienti di età ≥ 75 anni;
- Ricovero per riacutizzazione di scompenso cardiaco cronico

Criteri di esclusione:

- Demenza severa;
- Patologia oncologica terminale;
- Impossibilità alla VMG

PARAMETRI DEMOGRAFICI
Età
Sesso

PARAMETRI LABORATORISTICI		
AZOTEMIA	CREATININA	eGFR (C&G)

FATTORI CLINICO-ANAMNESTICI
Tipo di ICC
Frazione di eiezione (%)
Diabete mellito tipo 2
Tipo di Glifozina (Dapaglifozin, Empaglifozin)

VALUTAZIONE MULTIDIMENSIONALE GERIATRICA		
Residency status	Fragilità (criteri di Fried)	Tono dell'umore (GDS)
Social status	Stato funzionale (ADL e IADL)	Stato nutrizionale (MNA)
Numero di caregiver	Rischio di caduta (≥ 1 nei 6 mesi antecedenti)	Comorbidità (CIRS-C)
Numero di assunzioni farmacologiche		Stato cognitivo (Moca)

Crosta F. et Al unpublished

Risultati

Laboratorio

	T0	T1	P
CREATININA (M ± SD)	1,44 ± 0,41	1,36 ± 0,24	< 0,0001
AZOTEMIA (M ± SD)	90,93 ± 38,89	88,65 ± 0,24	0,03
eGFR (M ± SD)	36,61 ± 27,57	39,20 ± 29,69	0,02

VMDG

	T0	T1	P
NUMERO DI "CARGIVER" (M ± SD)	1,20 ± 0,79	1,17 ± 0,12	
NUMERO ASSUNZIONE FARMACI (M ± SD)	8,53 ± 4,35	**6,87 ± 1,14**	< 0,0001
CRITERI DI FRIED (M ± SD)	2,88 ± 1,84	2.66 ± 0,47	
ADL (FUNZ. CONSERV.) (M ± SD)	3,30 ± 0,70	**3,66 ± 0,94**	**0,01**
IADL (FUNZ. CONSERV.) (M ± SD)	2,31 ± 1,90	2,58 ± 3,82	
GDS (M ± SD)	4,38± 1,41	4,23 ± 0,16	
MNA (M ± SD)	20,16 ± 5,08	20,75 ± 1,23	
CIRS-c (M ± SD)	2,82 ± 1,49	2,82 ± 0,58	
MOCA (M ± SD)	25,69 ± 0,92	**27 ± 0,70**	**0,0145**
MPI (M ± SD)	0,53 ± 0,16	**0,49 ± 0,10**	**0,0008**

Crosta F. et Al unpublished

The Journal of Clinical Endocrinology & Metabolism, 2022, **107**, 2101–2128
https://doi.org/10.1210/clinem/dgac278
Advance access publication 12 June 2022
Clinical Practice Guideline

Management of Hyperglycemia in Hospitalized Adult Patients in Non-Critical Care Settings: An Endocrine Society Clinical Practice Guideline

Initial Therapy:
Non-insulin therapies (e.g., DPP-4 inhibitors) may be considered only in patients with well-controlled type 2 diabetes and mild hyperglycemia.

Use of DPP-4 Inhibitors:
•Recommended for patients with type 2 diabetes and mild hyperglycemia, as an adjunct to correctional insulin therapy.

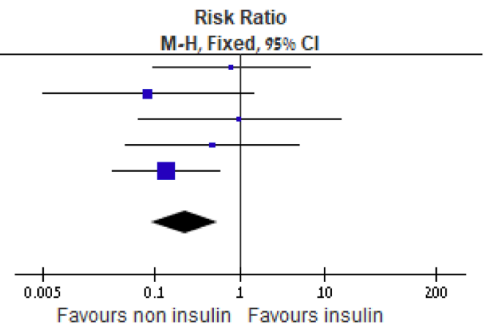
Korytkowski MT, et al. (2022). 107(8):2101–2128. doi:10.1210/clinem/dgac278

Hypoglycemic events, insulin vs non-insulin therapy.

a

Study or Subgroup	non insulin therapy Events	Total	insulin therapy Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Del Olmo-García 2020	1	5	2	8	6.1%	0.80 [0.10, 6.70]
Fayfman 2019	0	47	6	52	24.6%	0.08 [0.00, 1.47]
Garg 2017	1	33	1	33	4.0%	1.00 [0.07, 15.33]
Umpierrezc 2013	1	27	2	26	8.1%	0.48 [0.05, 4.99]
Vellanki 2019	2	128	14	122	57.1%	0.14 [0.03, 0.59]
Total (95% CI)		**240**		**241**	**100.0%**	**0.23 [0.09, 0.55]**
Total events	5		25			

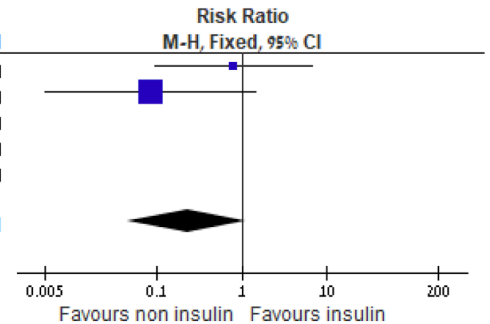
Heterogeneity: Chi² = 3.81, df = 4 (P = 0.43); I² = 0%
Test for overall effect: Z = 3.27 (P = 0.001)



b

Study or Subgroup	non insulin therapy Events	Total	insulin therapy Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Del Olmo-García 2020	1	5	2	8	19.9%	0.80 [0.10, 6.70]
Fayfman 2019	0	47	6	52	80.1%	0.08 [0.00, 1.47]
Garg 2017	1	33	1	33	0.0%	1.00 [0.07, 15.33]
Umpierrezc 2013	1	27	2	26	0.0%	0.48 [0.05, 4.99]
Vellanki 2019	2	128	14	122	0.0%	0.14 [0.03, 0.59]
Total (95% CI)		**52**		**60**	**100.0%**	**0.23 [0.05, 1.13]**
Total events	1		8			

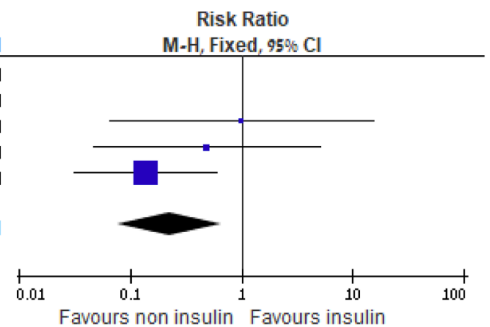
Heterogeneity: Chi² = 1.80, df = 1 (P = 0.18); I² = 45%
Test for overall effect: Z = 1.81 (P = 0.07)



c

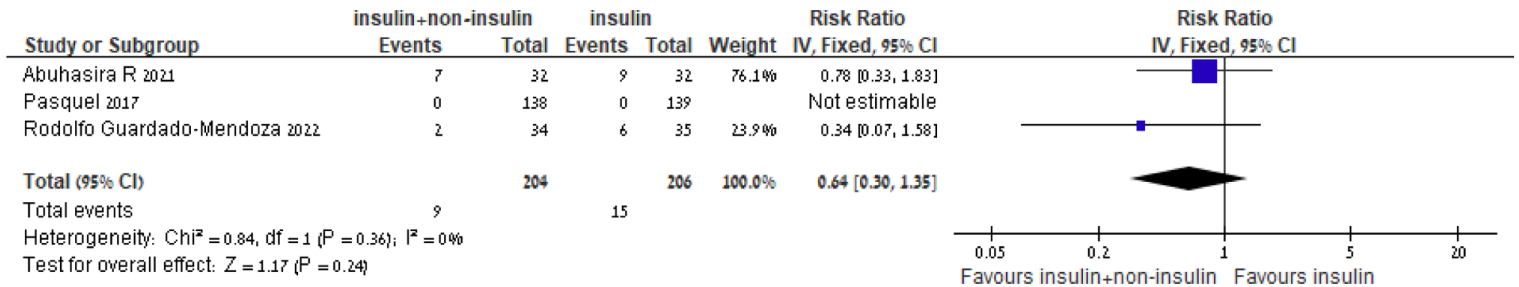
Study or Subgroup	non insulin therapy Events	Total	insulin therapy Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Del Olmo-García 2020	1	5	2	8	0.0%	0.80 [0.10, 6.70]
Fayfman 2019	0	47	6	52	0.0%	0.08 [0.00, 1.47]
Garg 2017	1	33	1	33	5.8%	1.00 [0.07, 15.33]
Umpierrezc 2013	1	27	2	26	11.7%	0.48 [0.05, 4.99]
Vellanki 2019	2	128	14	122	82.5%	0.14 [0.03, 0.59]
Total (95% CI)		**188**		**181**	**100.0%**	**0.23 [0.08, 0.66]**
Total events	4		17			

Heterogeneity: Chi² = 2.00, df = 2 (P = 0.37); I² = 0%
Test for overall effect: Z = 2.72 (P = 0.006)



European Journal of Internal Medicine 116 (2023) 106–11

30-day mortality, insulin vs insulin + non-insulin



Study or Subgroup	insulin+non-insulin Events	Total	insulin Events	Total	Weight	Risk Ratio IV, Fixed, 95% CI
Abuhasira R 2021	7	32	9	32	76.1%	0.78 [0.33, 1.83]
Pasquel 2017	0	138	0	139		Not estimable
Rodolfo Guardado-Mendoza 2022	2	34	6	35	23.9%	0.34 [0.07, 1.58]
Total (95% CI)		**204**		**206**	**100.0%**	**0.64 [0.30, 1.35]**
Total events	9		15			

Heterogeneity: $Chi^2 = 0.84$, $df = 1$ ($P = 0.36$); $I^2 = 0\%$

Test for overall effect: $Z = 1.17$ ($P = 0.24$)

European Journal of Internal Medicine 116 (2023) 106–11

Continuous Glucose Monitoring

16.9 In people with diabetes using a personal continuous glucose monitoring (CGM) device, the use of **CGM should be continued during hospitalization** if clinically appropriate, with **confirmatory point-of-care (POC) glucose measurements** for insulin dosing decisions and hypoglycemia assessment, if resources and training are available, and according to an institutional protocol. B

16.10 For people with diabetes using an automated insulin delivery (AID) system along with CGM, **the use of AID and CGM should be continued** during hospitalization if clinically appropriate, with confirmatory POC blood glucose measurements for insulin dosing decisions and hypoglycemia assessment, if resources and training are available, and according to an institutional protocol. C

Diabetes Care December 2023, Vol.47, S1-S4. doi:https://doi.org/10.2337/dc24-SINT

Table 4—Summary of performance characteristics in published reports on the use of CGM systems in hospitalized patients

CGM system	Comparator method; sample type	Population(s) evaluated (*n*)	Accuracy (*n* paired measurements)	Reference no.
FreeStyle Libre Pro	Nova StatStrip and Roche Accu-Chek Inform II POCT meters; capillary specimens measured within 5 min	Non-ICU with type 2 diabetes (97)	EMGD 12.8 mg/dL (95% CI 8.3–17.2), Clarke EGA 98.8% in zones A and B (1,829)	18
Dexcom G6	No details provided on specific meter; POC capillary glucose	ICU (11)	MARD 12.6%, Clarke EGA 98.2% in zones A and B (493)	22
Dexcom G6	Nova StatStrip, Roche Accu-Chek Inform II, Abbott Precision Xceed Pro POCT meters; capillary specimens measured within 5 min	Non-ICU with type 1 and type 2 diabetes (218)	MARD 12.8%, Clarke EGA 98.7% in zones A and B (4,067)	20
Dexcom G6	No details on method provided; laboratory serum glucose within 5 min	Pediatric ICU, following TPIAT (25)	EMGD 14.7 mg/dL, MARD 13.4%, Clarke EGA 100% in zones A and B (183)	60
FreeStyle Libre	Blood glucose method details not provided	COVID-19 ICU (17)	Consensus EGA 97.1 in zones A and B Clarke EGA 97.7% in zones A and B	61
Dexcom G6	Roche Accu-Chek Inform II POCT meter, Beckman Coulter DxC 8000; lab glucose measurement within 5 min	COVID-19 ICU, non-ICU with type 1 diabetes or steroid-induced hyperglycemia (28)	MARD, non-ICU, 14%; MARD, ICU, 12.1%; MARD, lab, 10.9%; MARD, POCT, 13.9%; SEG, non-ICU, 98.7%; SEG, ICU, 99.7%; SEG, lab, 99.5%	52
FreeStyle Libre	GlucoDr AGM-400 POC meter, Radiometer ABL800 blood gas analyzer, Beckman Coulter AU640 Chemistry Analyzer; serum glucose measured within 15 min	Pediatric ICU (16)	EMGD, lab, 13.9 mg/dL; EMGD, blood gas, 31.6 mg/dL; EMGD, POCT, 25.2 mg/dL; MARD, lab, 19%; MARD, blood gas, 28.3%; MARD, POCT, 25.2%; SEG, lab, 95.5%; SEG, blood gas, 92%; SEG, POCT, 94.7%	62
FreeStyle Libre Pro	Vitros 5600; serum glucose measured within 15 min	Pediatric HSCT (29)	EMGD 24.4 mg/dL, MARD 20%, Clarke EGA 99% in zones A and B (893)	63

Here, accuracy is reported including the following performance measures: estimated mean glucose difference (EMGD), mean absolute relative difference (MARD), point accuracy as percentages of measurements with acceptability criteria (15%, 15 mg/dL; 20%, 20 mg/dL; 30%, 30 mg/dL), and consensus error grid analysis (EGA) showing the total percentage in clinically accurate zones. Surveillance error grid (SEG) data are summarized as a combination of the percentages of measurements for risk zones: 0 (none), 1 (slight, lower), and 2 (slight, higher). HSCT, hematopoietic stem cell transplant; lab, laboratory; TPIAT, total pancreatectomy with islet autotransplantation.

Consensus Considerations and Good Practice Points for Use of Continuous Glucose Monitoring Systems in Hospital Settings

https://doi.org/10.2337/dci24-0073

To reduce surgical risk in people with diabetes, the following approach may be considered:

- A **preoperative** risk assessment should be performed for people with diabetes who are **at high risk for ischemic heart disease** and those with **autonomic neuropathy or renal failure.**
- The A1C target for elective surgeries **should be <8%** (63.9 mmol/L) whenever possible.
- The **target** range for blood glucose in the perioperative period should be **100–180** mg/dL (5.6–10.0 mmol/L) **within 4 h of the surgery**.
- Metformin should be **held on the day of surgery**.

Diabetes Care December 2023, Vol.47, S1-S4. doi:https://doi.org/10.2337/dc24-SINT

To reduce surgical risk in people with diabetes the following approach may be considered:

- **SGLT2** inhibitors must be **discontinued 3–4 days** before surgery.
- **Hold any other oral glucose-lowering agents the morning** of surgery or procedure and **give** half of NPH dose or **75–80% doses of long-acting analog** or insulin pump basal insulin based on the type of diabetes and clinical judgment.
- **Monitor** blood glucose at least **every 2–4 h** while the individual takes nothing by mouth and dose with short- or rapid-acting insulin as needed.
- There are no data on the use and/or influence of glucagon-like peptide 1 receptor agonists or ultra-long-acting insulin analogs on glycemia in perioperative care.

Diabetes Care December 2023, Vol.47, S1-S4.
doi:https://doi.org/10.2337/dc24-SINT


DOTTORE ALLORA QUANTA INSULINA GLI FACCIAMO?
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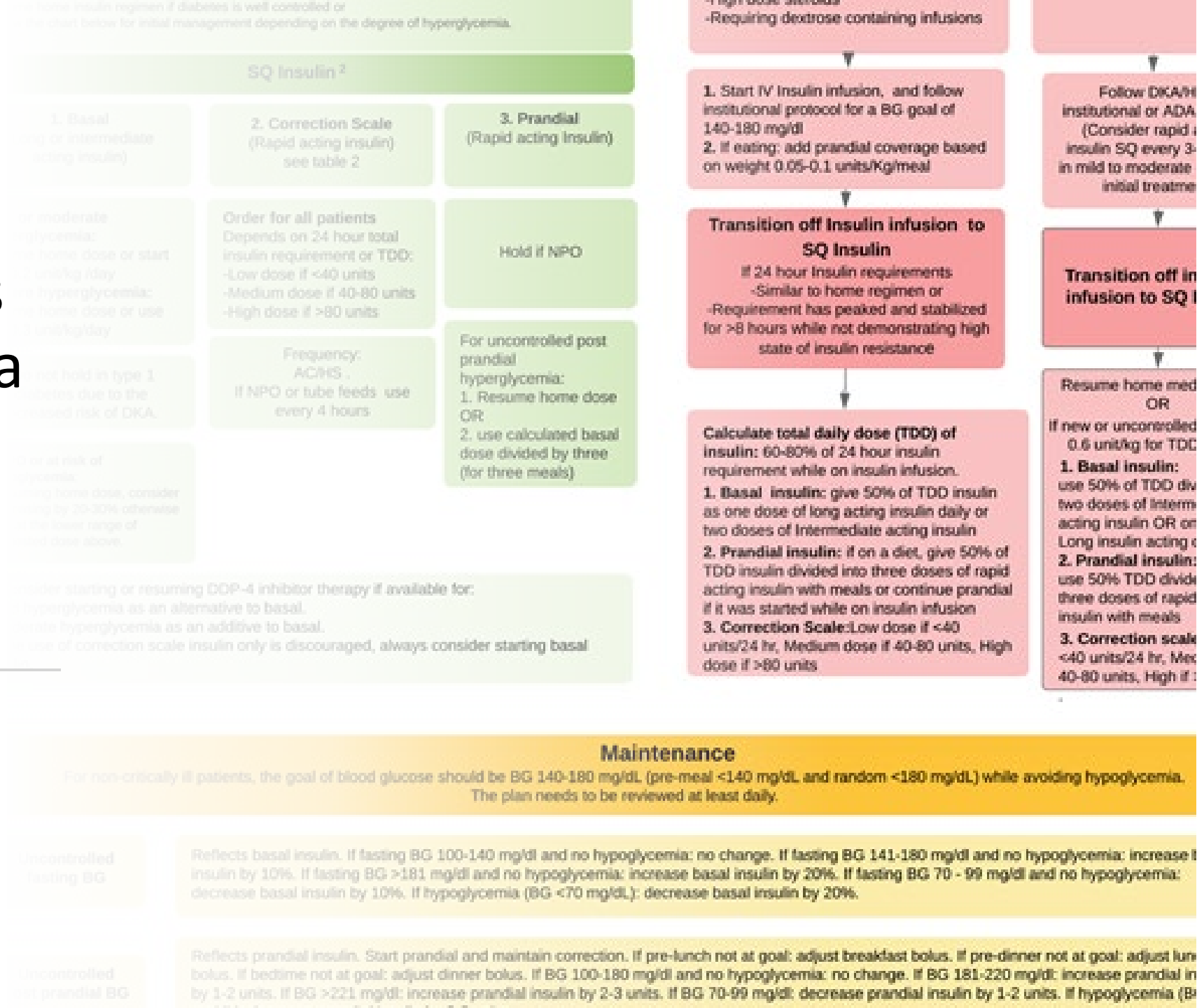
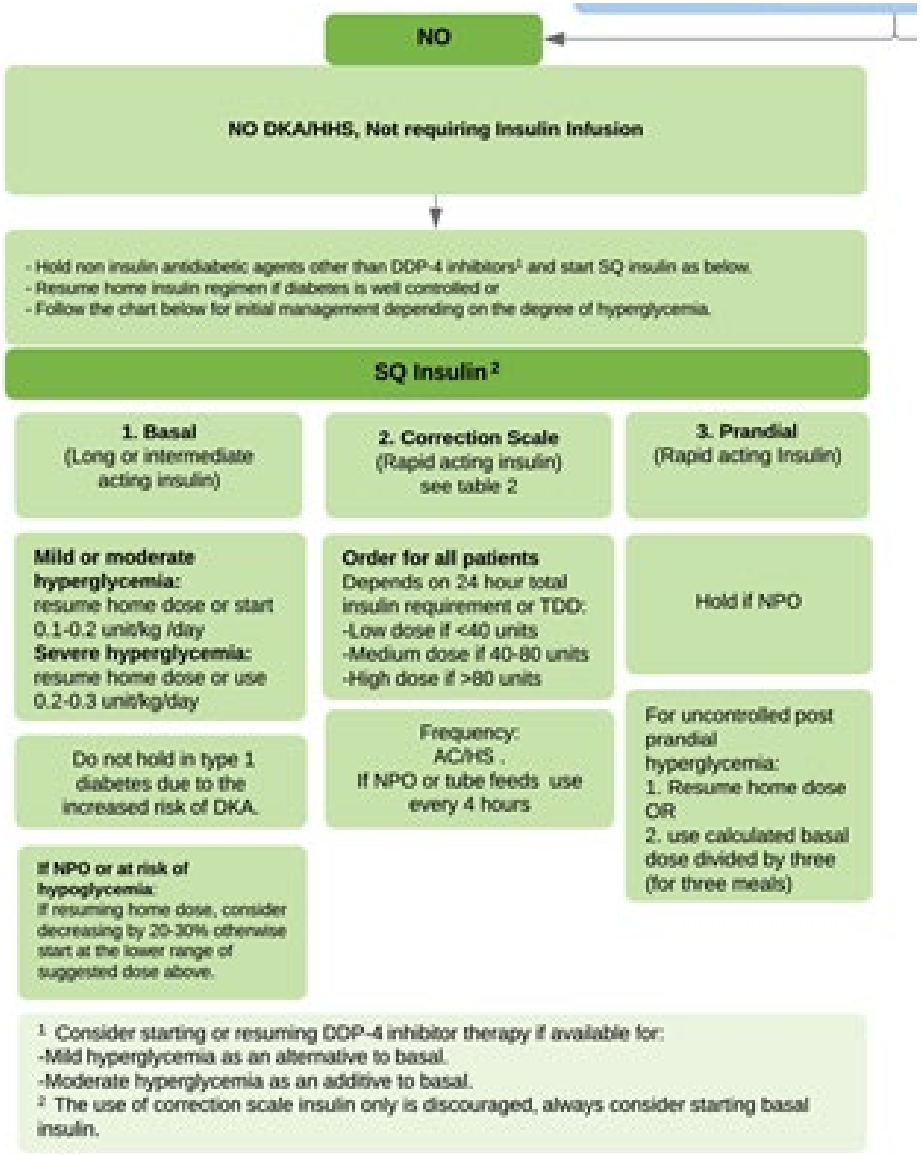
Inpatient Diabetes and Hyperglycemia Management Protocol in the COVID-19 Era





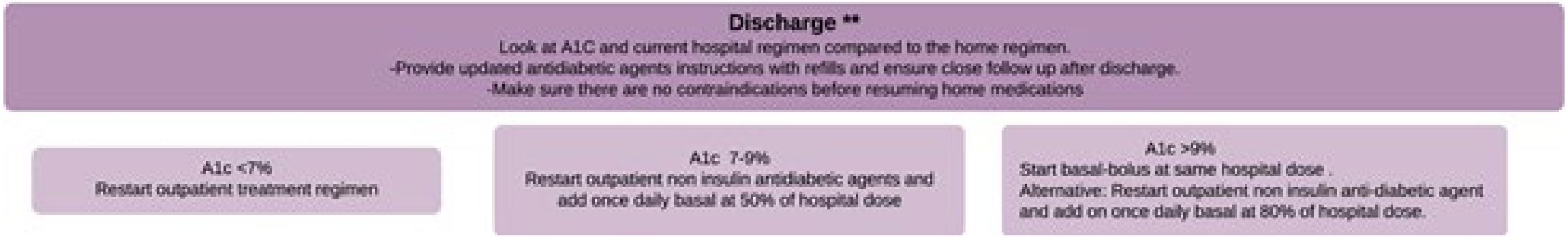
TDD for insulin	Patient group
0.4 unit/kg body weight	- Normal BMI if admission BG 140–200 mg/dl and A1c is controlled
0.5 unit/kg body weight	- Normal BMI if admission BG >200 mg/dl and/or A1c is not controlled - BMI 25–30
0.2–0.3 unit/kg body weight	Conditions with high risk of hypoglycemia: - Age >70 - Liver disease (AKI or CKD especially on HD) - Liver disease - Underweight
0.6 unit/kg body weight	Conditions associated with Insulin resistance: - BMI>30 - Glucocorticosteroids therapy.

Inpatient Diabetes and Hyperglycemia Management Protocol in the COVID-19 Era

Transition from the Hospital Setting to the Ambulatory Setting

16.12 There should be a structured discharge plan tailored to the individual patient with diabetes. B

Diabetes Care December 2023, Vol.47, S1-S4. doi:https://doi.org/10.2337/dc24-SINT



Inpatient Diabetes and Hyperglycemia Management Protocol in the COVID-19 Era

It is recommended that the following areas of knowledge be reviewed and addressed prior to hospital discharge:

- **Identification of the health care provider** who will provide diabetes care after discharge.
- Level of **understanding** related to the diabetes diagnosis, self-monitoring of blood glucose, home blood glucose goals, and when to call the provider.
- Definition, recognition, treatment, and **prevention of hyperglycemia and hypoglycemia**.
- Information on making **healthy food choices** at home and referral to an outpatient RD/RDN to guide individualization of meal plan, if needed.
- If relevant, **when and how** to take blood glucose–lowering medications, including insulin administration.
- **Sick-day management**.
- Proper use and disposal of **needles and syringes**.

Diabetes Care December 2023, Vol.47, S1-S4.
doi:https://doi.org/10.2337/dc24-SINT

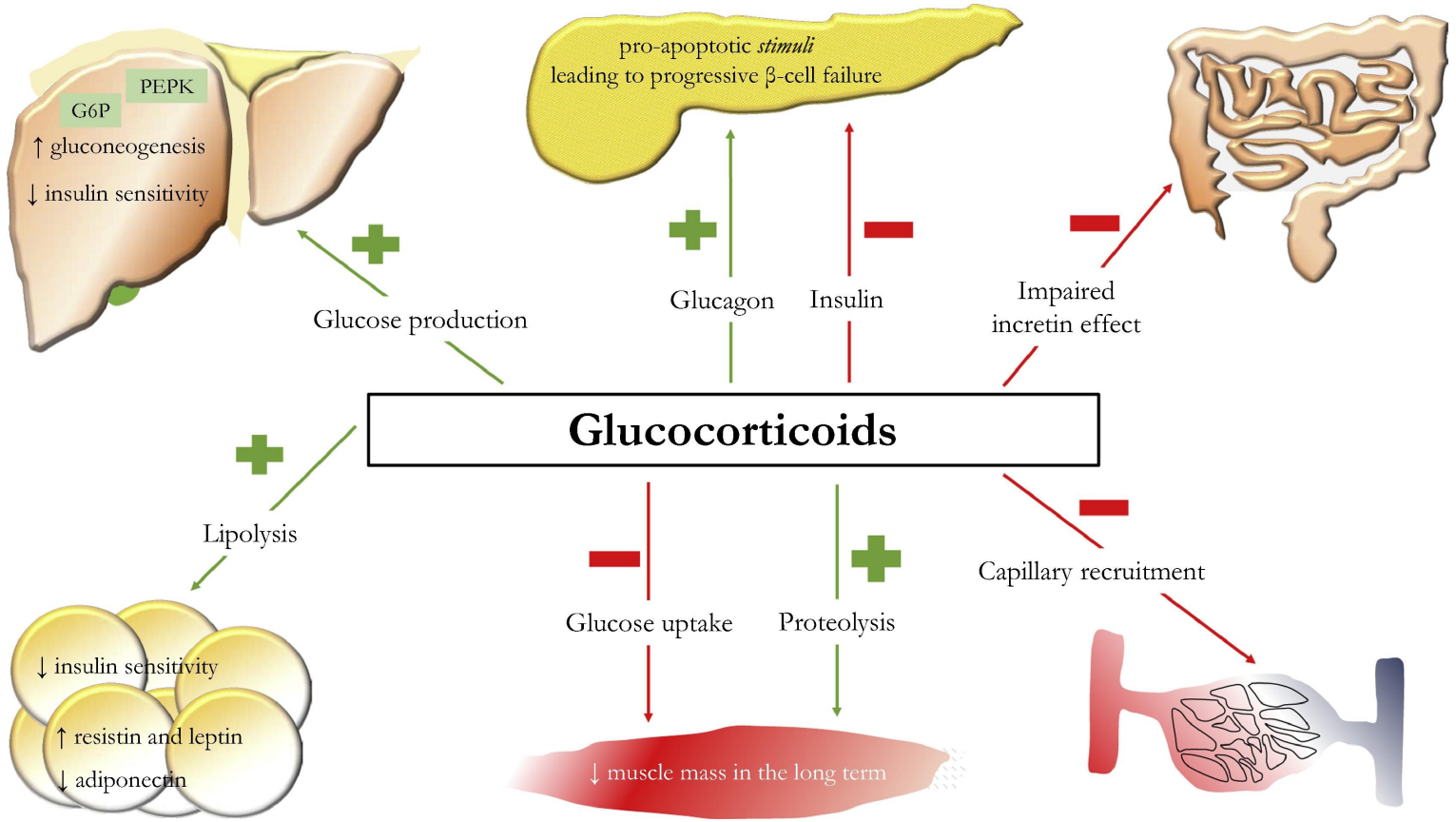

COME TI SENTI QUANDO SEI DI GUARDIA
E IN TERAPIA TROVI SCRITTA INSULINA ACTRAPID

Iperglicemia da steroide

Drug Induced Diabetes Mellitus	Mechanism	Incidence of Hyperglycemia/Diabetes (%)	Reversibility
Androgen Deprivation therapy	Insulin resistance	20–30%	Yes
Somatostatin Analogues	Inhibition of insulin secretion	30%	Yes
Glucocorticoids	Decreased insulin secretion and increased gluconeogenesis	65%	Yes
mTOR inhibitors/Immunosuppressive Agents	Decreased insulin secretion and action	10–50%	Yes
Tyrosine Kinase Inhibitors	Insulin resistance	20–36%	Yes
Diuretics	Decreased insulin secretion and sensitivity	11%	Yes
Statins	Decreased insulin secretion and action	9–12%	Yes
Antipsychotics	Decreased insulin secretion and action due to antagonism at peripheral Muscarinic receptors.	22% [22]	Yes
Anti Retroviral therapy	Lipodystropy, insulin resistance and mitochondrial dysfunction	0.5%	No
Interferon α	Immunological beta cell destruction	0.34%	No

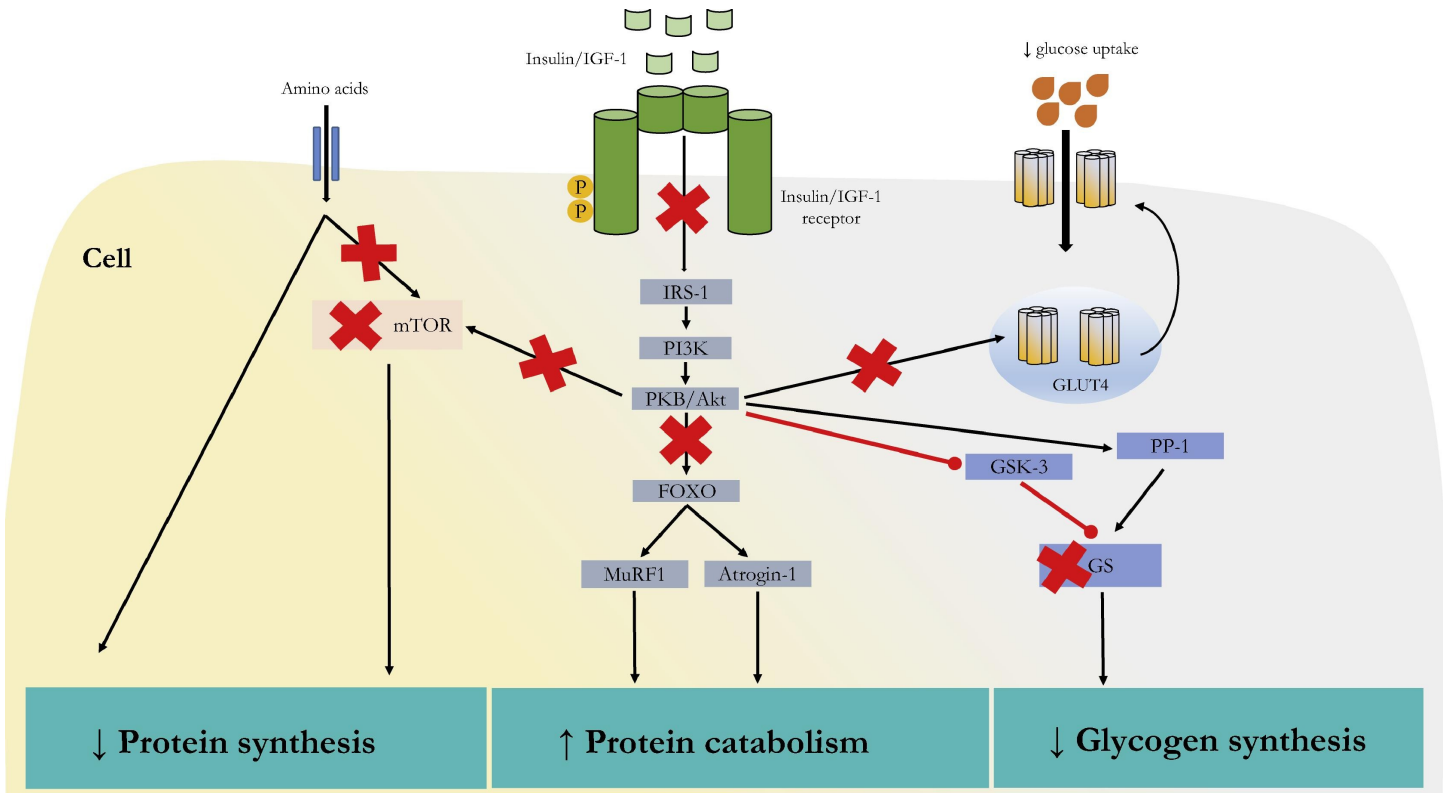
Drugs and hyperglycemia: A practical guide Jain, Vandana et al. Maturitas, 2017

Mechanisms of glucocorticoid-induced hyperglycemia



Bonaventura, Aldo et al. 2023 Diabetes Research and Clinical Practice

Molecular pathways of glucocorticoid effects on glycemic and protein metabolism.



Bonaventura, Aldo et al. 2023 Diabetes Research and Clinical Practice

Risk factors for steroid-induced diabetes mellitus

Dosage and type of the drug
Duration of treatment
Posology (e.g. continuous vs. bolus treatment)
Age ≥65 years old
Male sex
BMI* >25 kg/m^2
African American ethnic group
eGFR° <40 mL/min/1.73 m^2
HbA1c$ ≥6.0%
History of gestational diabetes
Family history of diabetes mellitus
Concomitant use of mycophenolate mofetil and calcineurin inhibitors
Previous history of IFG§ and/or IGT¶

*BMI: body mass index. °eGFR: estimated glomerular filtration rate. $ HbA1c: glycated hemoglobin. § IFG: impaired fasting glucose. ¶ IGT: impaired glucose tolerance.

Bonaventura, Aldo et al. 2023 Diabetes Research and Clinical Practice

Half-life of different glucocorticoids

Drug	Half-life (h)
Short-**acting**	
Cortisone	8–12
Hydrocortisone	
Intermediate-**acting**	
Prednisolone	12–16
Prednisone	
Methylprednisolone	
Deflazacort	12–24
Fludrocortisone	
Triamcinolone	
Long-**acting**	
Betamethasone	20–36
Dexamethasone	

Diabet Med . 2018 Aug;35(8):1011-1017. doi: 10.1111/dme.13675

Bonaventura, Aldo et al. 2023 Diabetes Research and Clinical Practice

Insulin Management Protocols for Steroid Use

Basal-Bolus Regimen:**Starting Dose**: 0.3–0.6 U/kg/day, adjusted per patient needs.

Prandial Insulin: Tailor to meals and peak steroid effect, e.g., higher doses in the afternoon for intermediate steroids.

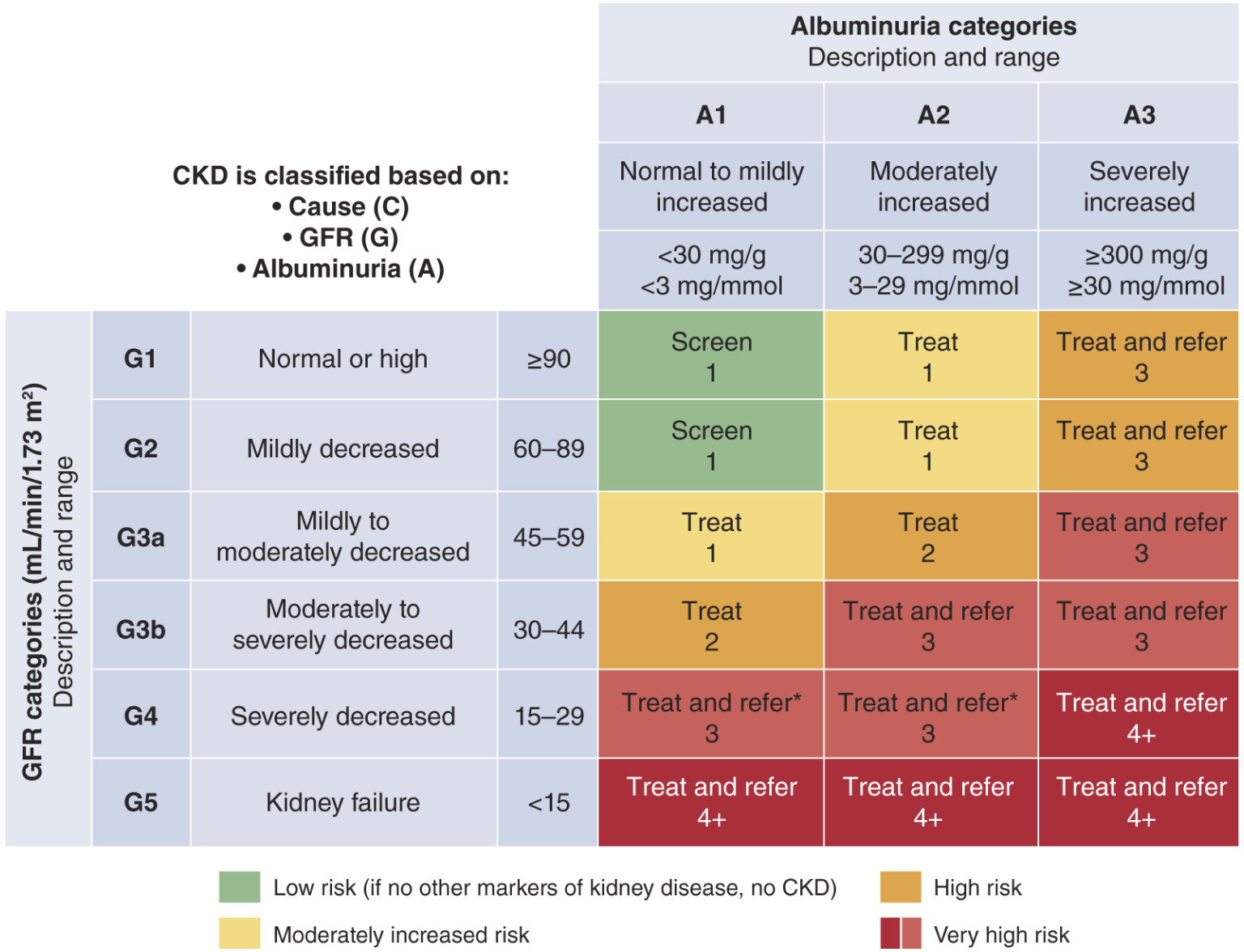
Alternative Approaches:**Basal Insulin Alone**: For high-dose steroids, administer in the morning to cover peaks.

Weight-Based Adjustments: Modify prandial doses based on patient weight and BG readings.

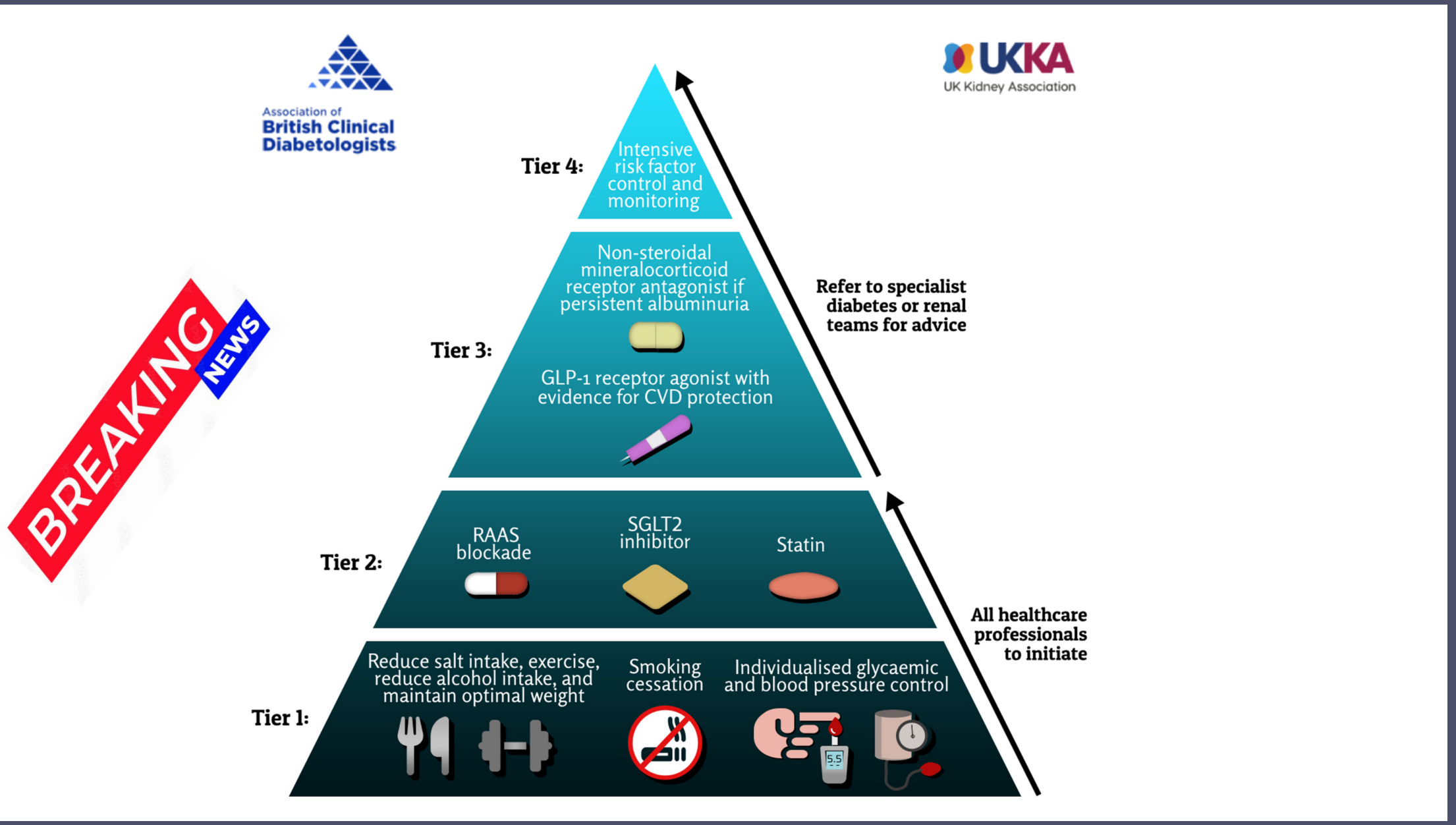
Monitoring and Adjustments:**Frequent BG Monitoring**: Essential within the first 48 hours of steroid initiation.

Post-Discharge: Create a structured plan for outpatient follow-up, especially for patients on high-dose or long-term steroids.


Iperglicemia nella
insufficienza renale



Diabetes Care 2024;47(Supplement_1):S219–S230



DasguptaAn overview of the joint Association of British Clinical Diabetologists and UK Kidney Association (ABCD-UKKA) guidelines. *Diabet Med*. Oct 2024;

https://doi.org/10.1016/j.dsx.2021.05.007

Factors resulting in high HbA1c

Mechanism	
1. Iron deficiency anemia	Iron deficiency leads to increased HbA1c, which is reversed by iron replacement therapy [52].
2. High urea	Exposure to high urea concentrations promotes the formation of carbamylated haemoglobin, which cannot be distinguished from glycated haemoglobin in some assays (e.g., electric charge-based assays). In contrast, analytically specific methods such as boronate-agarose affinity chromatography and thiobarbituric acid methods provide a more reliable measurement of HbA1c in dialysis patients [61,64,65].
3. Metabolic Acidosis	Acidosis has been involved in carbamylation; hence it influences HbA1c levels, but its impact on the estimation of HbA1c is unknown [52].

Factors resulting in low HbA1c

Mechanism	
1. Anemia	Might cause an increased red blood cell turnover and therefore may lead to underestimation of HbA1c
2. Malnutrition	
3. Blood transfusions	A cause of HbA1c underestimation.
4. Splenic dysfunction	A frequent finding in dialysis patients leading to increase the removal of RBCs from the circulation
5. Shortened erythrocyte life span or hemolysis	Erythrocyte fragility due to uraemia, Erythrocyte lysis due to the dialysis procedure itself, Chronic blood loss due to residual blood left in the dialyzers, repeated vascular access punctures, occasional blood leaks, phlebotomy for routine testing and clotted dialyzers may all lead to reduced red cells lifespan. This decreases the time available for glycosylation of haemoglobin chains and underestimation during long-term blood glucose monitoring.
6. Erythropoietin	Stimulating agents in dialysis patients also falsely lower HbA1c levels by accelerating erythropoiesis in the preceding two months and increase the proportion of young circulating erythrocytes that have a limited time for haemoglobin glycosylation.

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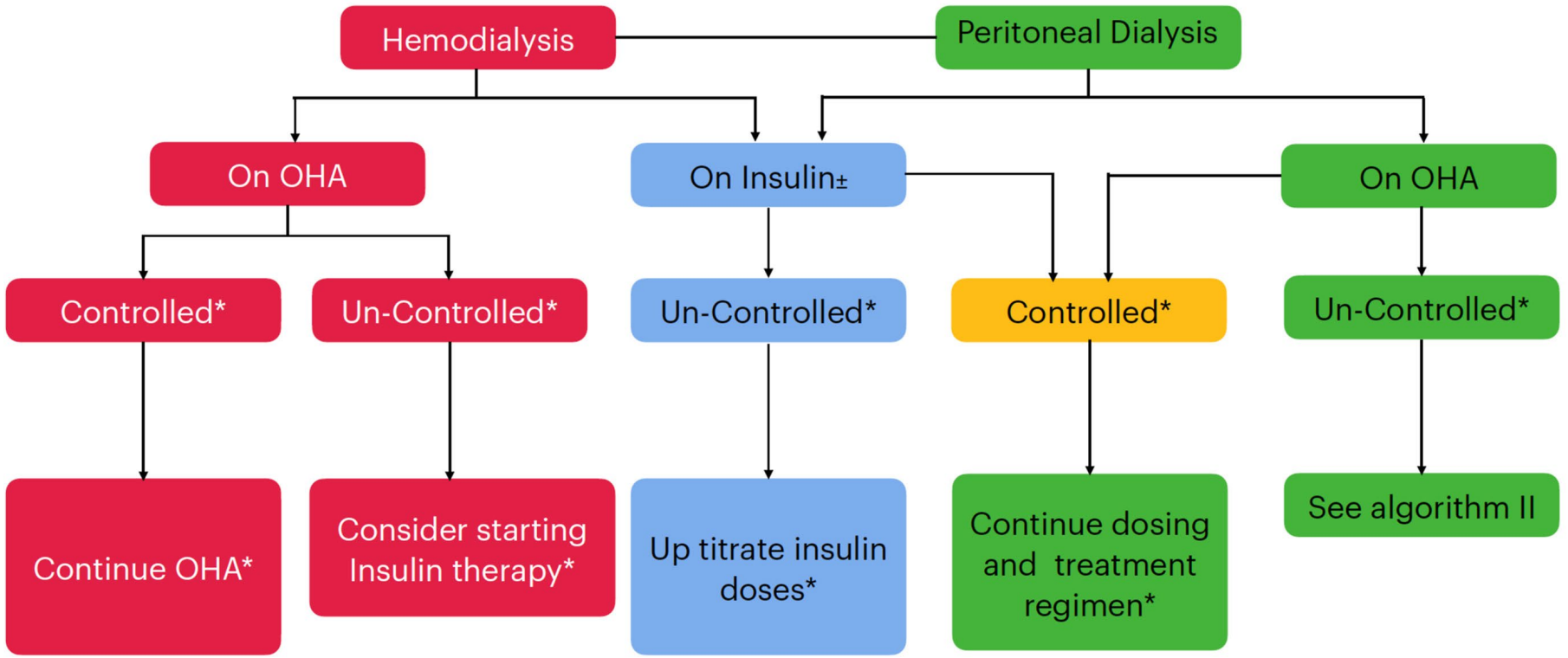
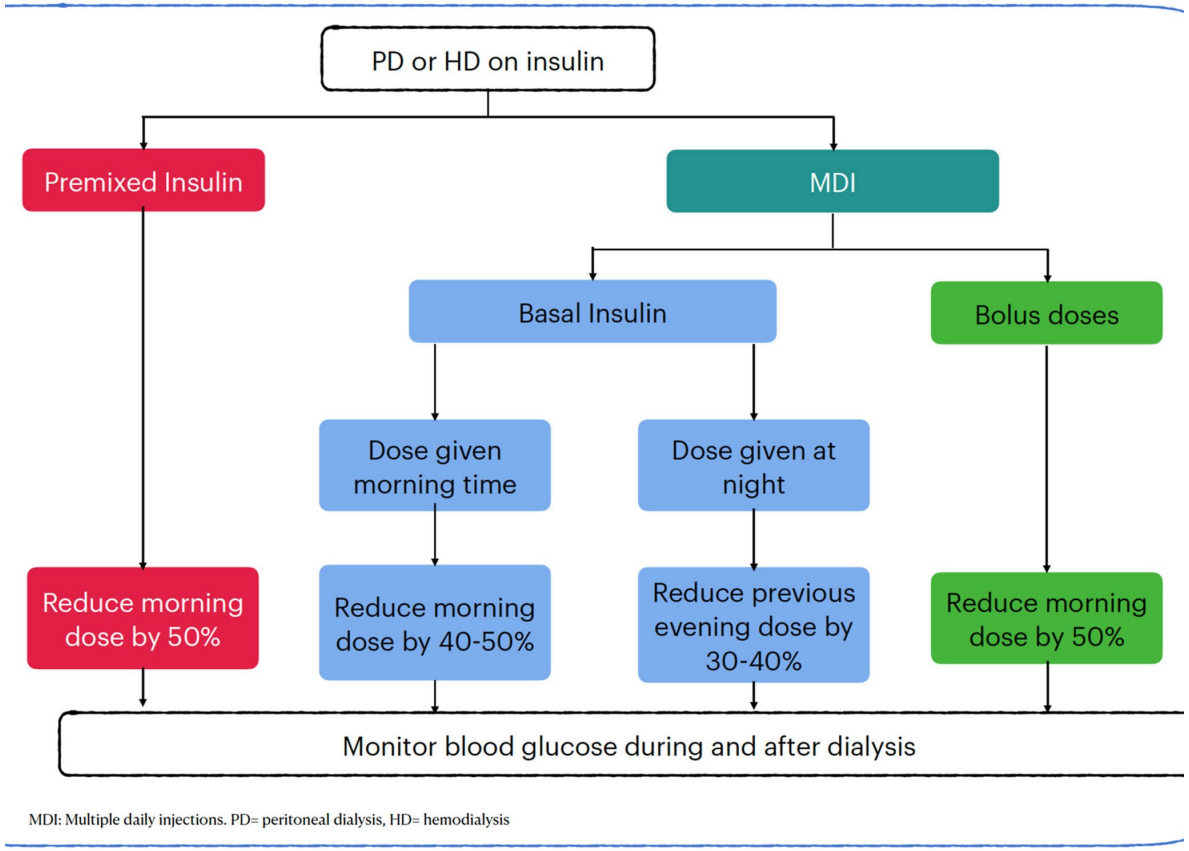
Diabetes management upon starting dialysis



± Reduce the pre-dialysis dose by 30-50% based on glycemic targets and risk of hypoglycemia
* monitoring glycemic control by HbA1c and SMBG (Self Monitoring of Blood Glucose)
OHA= Oral hypoglycemic agents

Insulin adjustment before dialysis.



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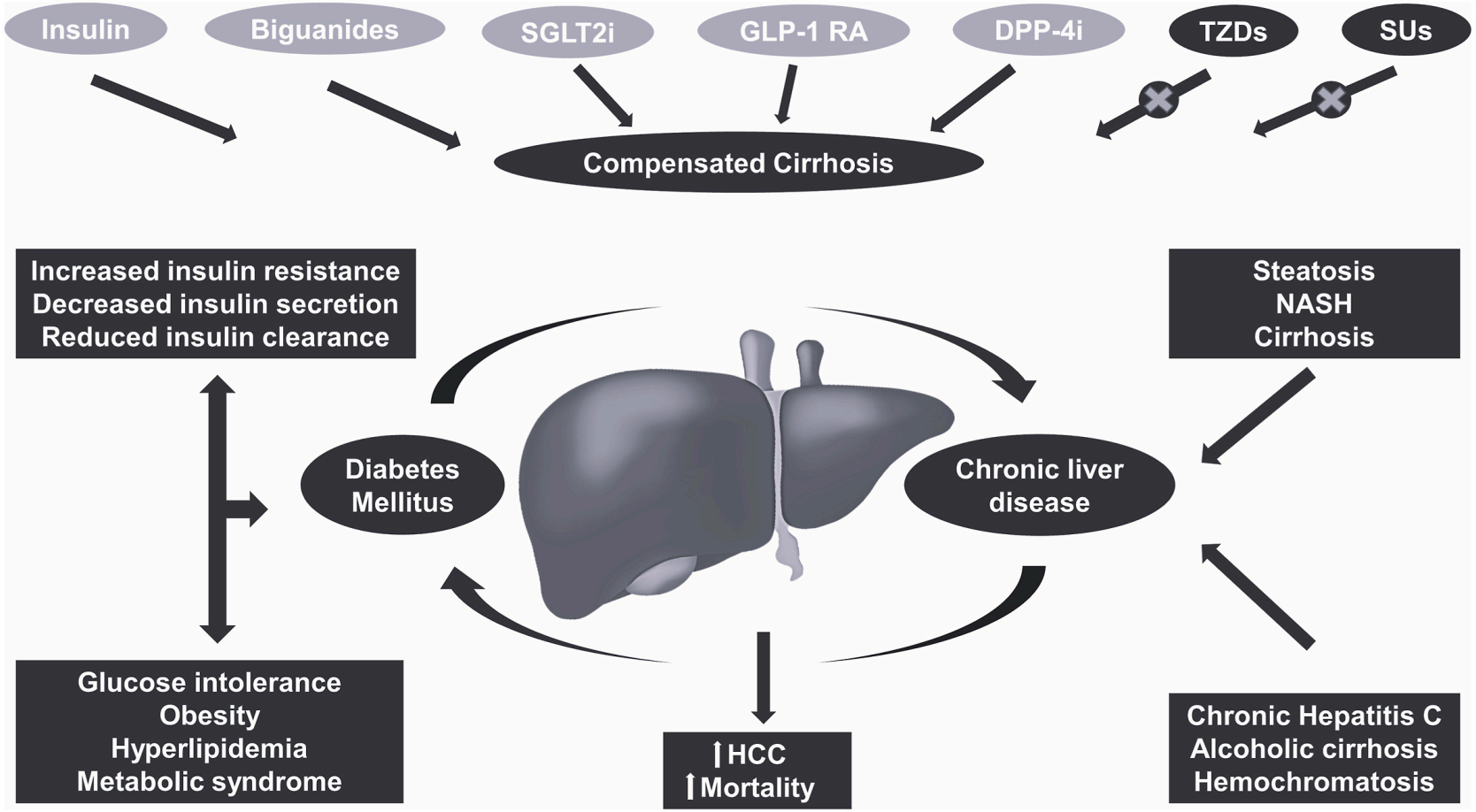
Iperglicemia nella
malattia epatica

The two-way relationship between type 2 diabetes and chronic liver disease



Diabetes & Metabolic Syndrome Volume 18, Issue 1, 2024, 102935

Diabetes & Metabolic Syndrome Volume 18, Issue 1, 2024, 102935

Summary of available treatment options for the management of type 2 diabetes in patients with compensated cirrhosis

Drug Class	Mechanism of action	Efficacy	Clinical usefulness in compensated cirrhosis	Potential risks	Hypoglycemia	Weight effect	GI side-effects
Biguanides	They increase insulin sensitivity and reduce hepatic gluconeogenesis	High	High	MALA, acute renal dysfunction	No	Neutral or loss	Frequent
Thiazolinediones	Insulin sensitization via PPAR-γ agonist effect	High	Limited data	Weight gain, fluid retention, osteoporosis	No	Gain	Neutral
Alpha-glucosidase Inhibitors	They decrease carbohydrate absorption in the gut	Intermediate	High	High withdrawal rates, hyperammonemia	No	Neutral	Frequent
Sulphonylureas and meglitinides	Stimulation of insulin release from pancreatic islet cells	High	Low	Concerns about CVD and HCC risk	Yes	Gain	Neutral
SGLT2i	They inhibit SGLT2 expressed in the early portion of the proximal renal tube	Intermediate	Potentially high	DKA, genitourinary tract mycotic infections	No	Loss	Neutral
GLP-1 RA	They increase insulin sensitivity, suppress glucagon production, delay gastric emptying, and reduce appetite	High	Potentially high	Dehydration	No	Loss	Frequent
DPP-4i	They inhibit DPP-4, thus raising endogenous GLP-1	Intermediate	Intermediate	Hepatic decompensation, variceal bleeding	No	Neutral	Rare
Insulin	Replacement of insulin deficiency	Highest	High	Carefully adjust dosing, increase in all-cause mortality	Yes		

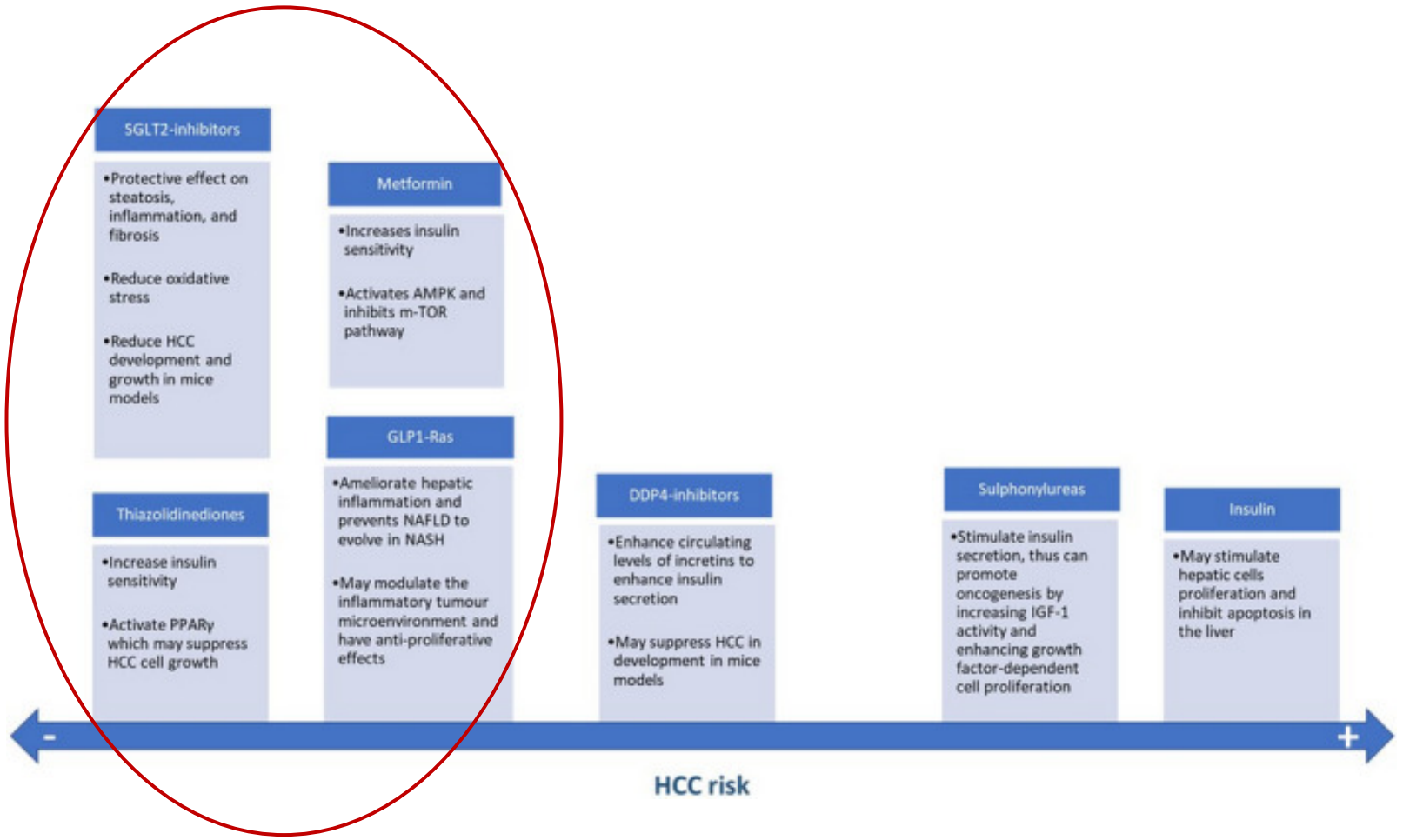
SGLT2i: sodium-glucose cotransporter 2 inhibitors; GLP-1: glucagon-like peptide-1; GLP-1 RA: glucagon-like peptide-1 receptor agonists; DPP-4: dipeptidyl peptidase-4; DPP-4i: dipeptidyl peptidase-4 inhibitors; MALA: metformin-associated lactic acidosis; HCC: hepatocellular carcinoma; CVD: cardiovascular disease; GI: gastrointestinal; DKA: diabetic ketoacidosis; PPAR-γ, peroxisome proliferator–activated receptor-γ.

BREAKING NEWS

company announcement

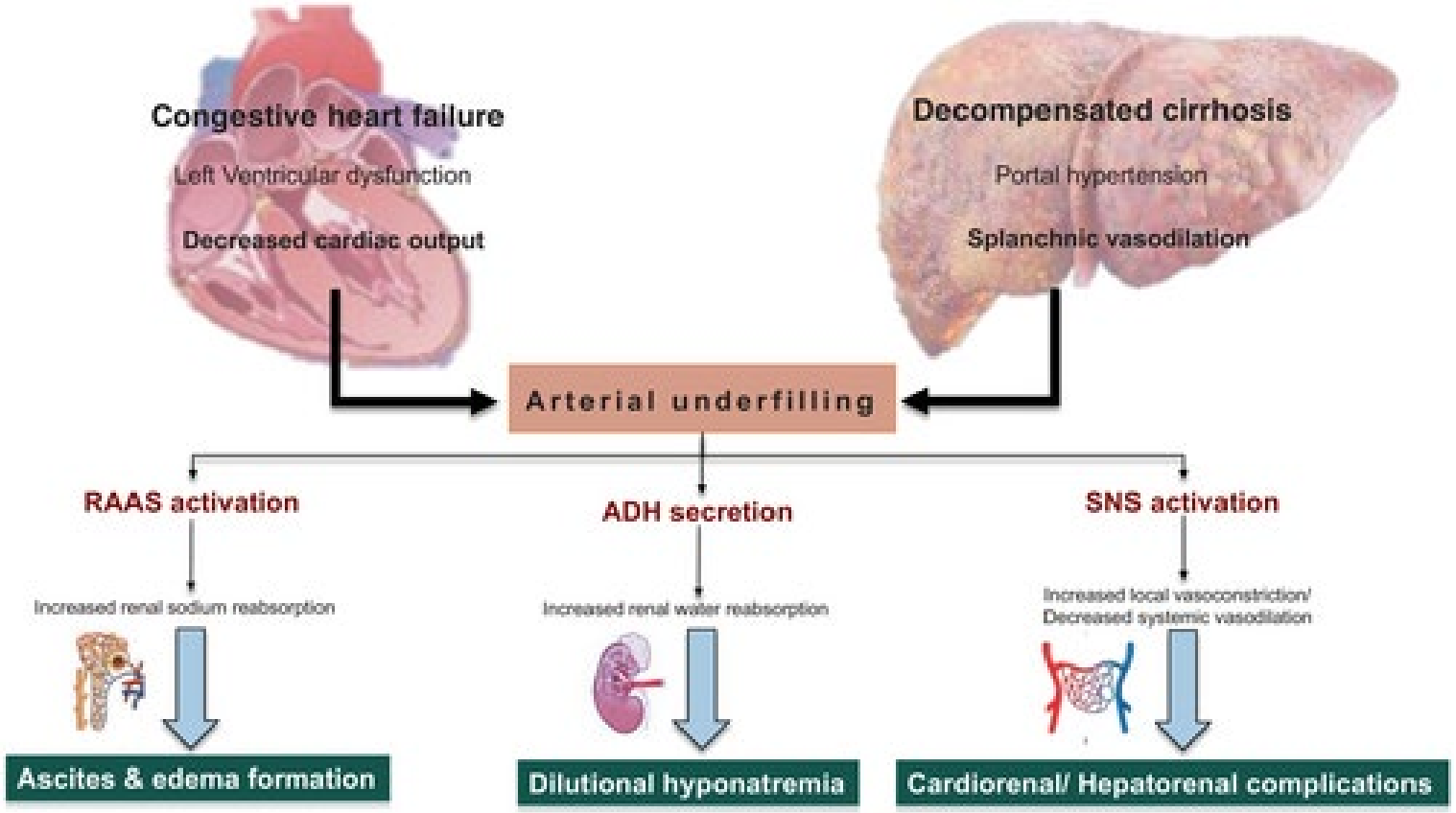
Semaglutide 2.4 mg demonstrates superior improvement in both liver fibrosis and MASH resolution in the ESSENCE trial

Diabetes medications and risk of HCC

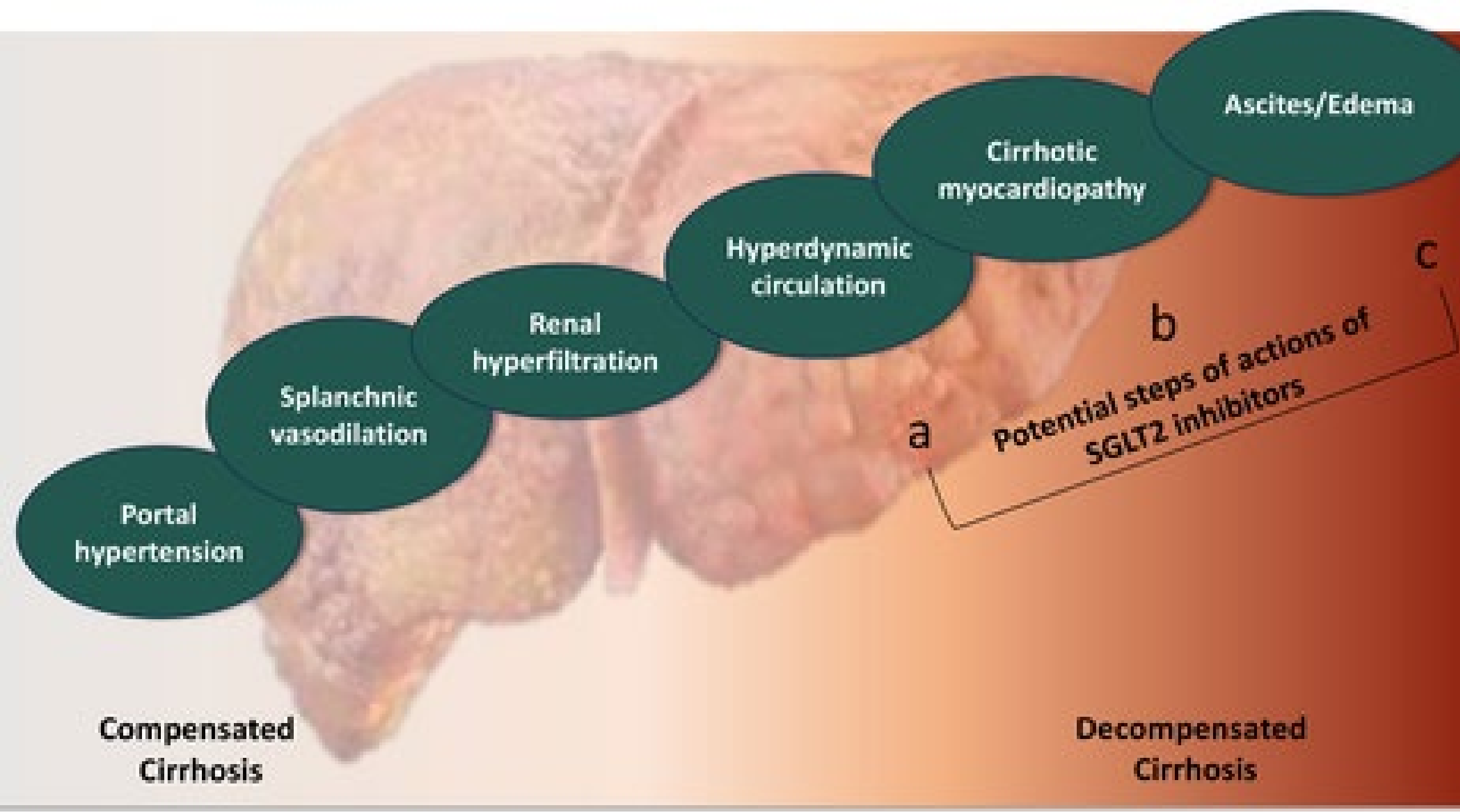


Hepatology . 2022 Dec;76(6):1880-1897. doi: 10.1002/hep.32439.

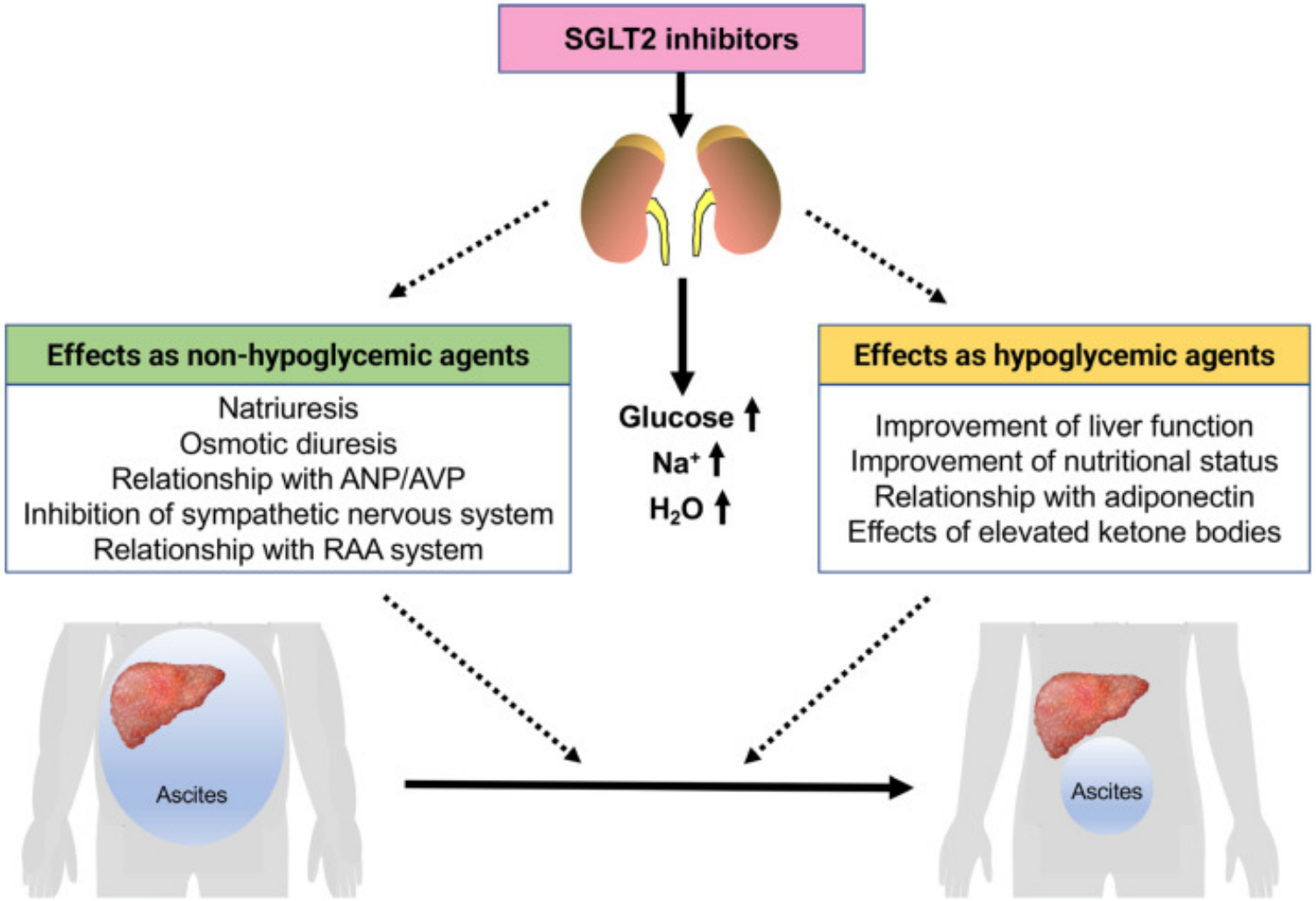
Common pathophysiological mechanisms of congestive heart failure and decompensated cirrhosis.



Siafarikas C, *Liver Int*. 2024; 44: 884-893. doi:10.1111/liv.15851

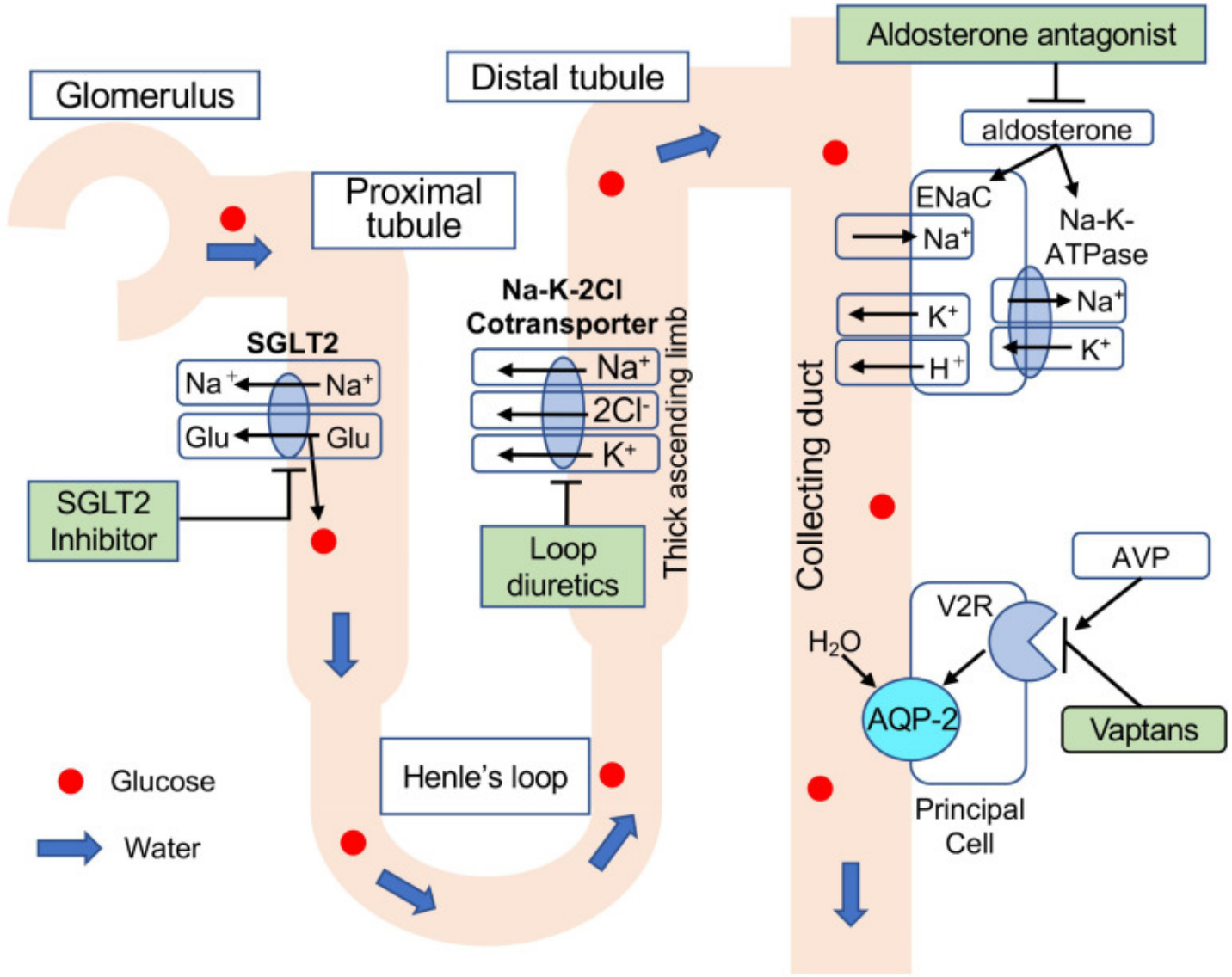

Portal hypertension
Splanchnic vasodilation
Renal hyperfiltration
Hyperdynamic circulation
Cirrhotic myocardiopathy
Ascites/Edema
a
b
c
Potential steps of actions of SGLT2 inhibitors
Compensated Cirrhosis
Decompensated Cirrhosis

Mechanism of the effects of SGLT2 inhibitors on liver cirrhosis patients with refractory ascites.



J Clin Med . 2023 Mar 14;12(6):2253. doi: 10.3390/jcm12062253

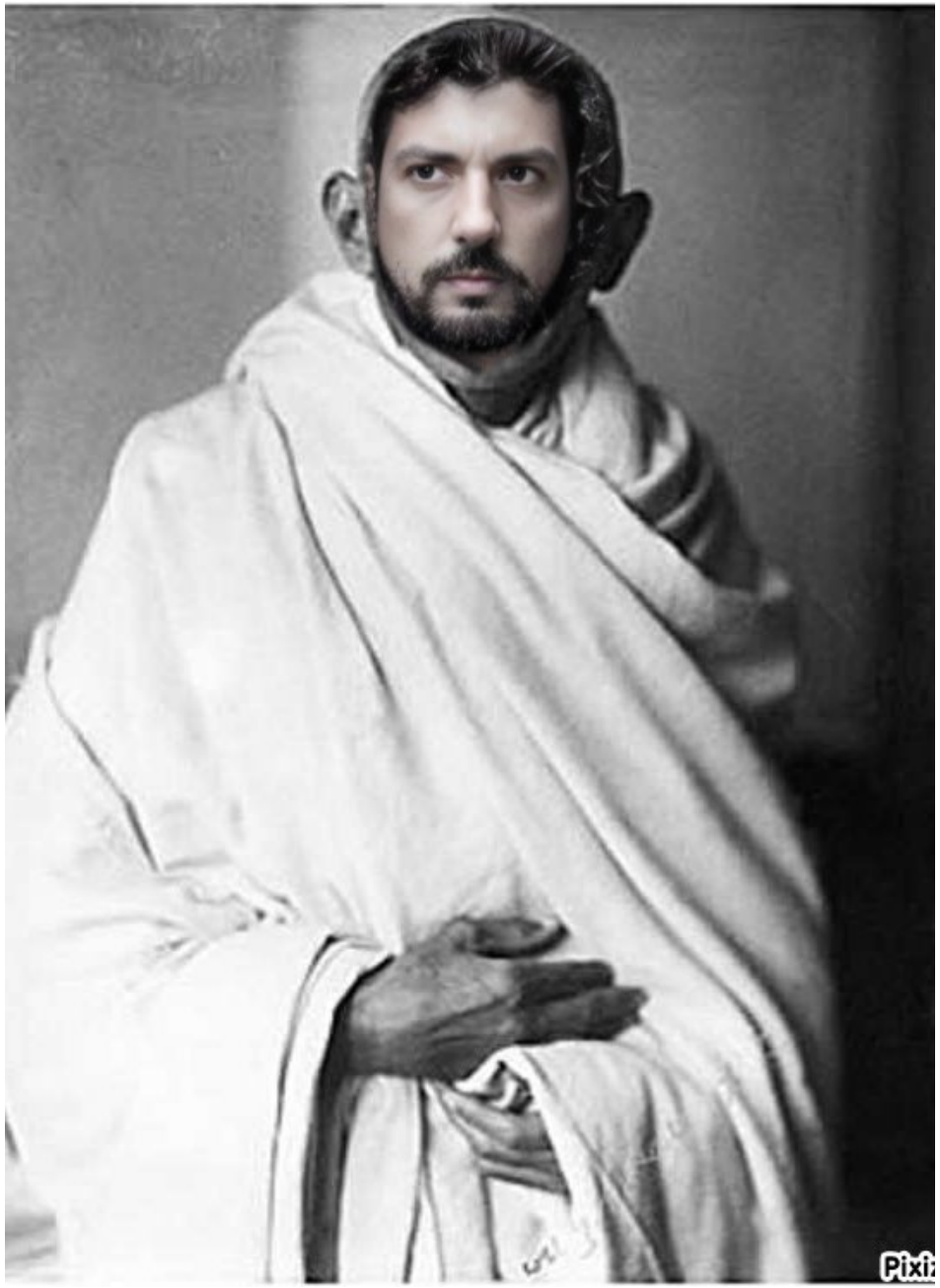
SGLT2 Inhibitors as Diuretics



J Clin Med . 2023 Mar 14;12(6):2253. doi: 10.3390/jcm12062253

Conclusioni

- **Gestione Personalizzata**: L'iperglicemia nei pazienti ospedalizzati con insufficienza epatica, renale o in terapia con steroidi richiede un trattamento specifico che tenga conto delle condizioni cliniche particolari.**Superare l'Approccio Insulinocentrico**:L'insulina rimane un pilastro essenziale, ma il suo utilizzo deve essere bilanciato per evitare ipoglicemia, soprattutto in pazienti con condizioni critiche.
- **L’integrazione di nuovi farmaci** (SGLT2 inibitori, GLP-1 agonisti, DPP-4 inibitori) può migliorare la sicurezza e l'aderenza del paziente.
- **Insufficienza Renale**: Necessita di frequenti aggiustamenti delle dosi insuliniche e monitoraggio attento per evitare ipoglicemia.
- **Insufficienza Epatica**: Richiede un approccio cauto con monitoraggio stretto per gestire l’accumulo farmacologico.
- **Terapia con Steroidi**: Strategia insulinica adattata con regime basal-bolus per gestire le variazioni glicemiche.
- **TAKE HOME MESSAGE**: L’uso di terapie non insuliniche, integrate in un piano personalizzato e sicuro, migliora gli outcome clinici nei pazienti ospedalizzati con comorbidità complesse.



"Educhiamoci, impegnamoci e lavoriamo insieme per un futuro cardiometabolicamente sano."

- Mahatma Gandhi

Download all references