

Joslin Diabetes Center and Joslin Clinic
Guideline for Detection and Management of Diabetes in Pregnancy
 9/14/05

The Joslin Guideline for Detection and Management of Diabetes in Pregnancy is designed to assist internal medicine specialists, endocrinologists and obstetricians in individualizing the care of and setting goals for women with pre-existing diabetes who are pregnant or planning pregnancy. It is also a guide for managing women who are at risk for or who develop Gestational Diabetes Mellitus (GDM). This Guideline is not intended to replace sound medical judgment or clinical decision-making. Clinical judgment determines the need for adaptation in all patient care situations; more or less stringent interventions may be necessary.

The objectives of the Joslin Clinical Diabetes Guidelines are to support clinical practice and to influence clinical behaviors in order to improve clinical outcomes and assure that patient expectations are reasonable and informed. Guidelines are developed and approved through the Clinical Oversight Committee that reports to the Chief Medical Officer of the Joslin Clinic, Joslin Diabetes Center. The Clinical Guidelines are established after careful review of current evidence, medical literature and sound clinical practice. This Guideline will be reviewed periodically and modified as clinical practice evolves and medical evidence suggests.

SCREENING FOR GESTATIONAL DIABETES MELLITUS

See *Screening Strategy to Detect GDM* Algorithm

PRECONCEPTION CARE

Pre-existing type 1 or type 2 diabetes

	Plasma*
Glucose Goals Prior to Conception	<ul style="list-style-type: none"> • Fasting and pre-meal blood glucose: 80-110 mg/dl • 1 hour postprandial blood glucose: 100-155 mg/dl • A1C < 7%; normal, if possible • Avoid severe hypoglycemia
Counseling	<ul style="list-style-type: none"> • Educate women of childbearing age about importance of near normal blood glucose control prior to conception • Refer to a maternal fetal-medicine and/or endocrinologist/diabetes specialist for counseling, assessment of maternal and fetal risk and guidance in achieving management goals • Assess diabetes self-management, including meal plan, insulin care and use, activity program, medication schedule, self-management of blood glucose (SMBG), treatment for hypo- and hyperglycemia, and sick day management, using diabetes educators (DE) as appropriate. Review maternal and fetal health issues. • Begin a multivitamin with 400 mcgs folic acid to supplement average daily intake of 400 mcgs for a total daily intake of 600 mcg to 1 mg to decrease the risk of neural tube defects. Patients with a prior pregnancy affected with a neural tube defect should take folic acid 4 mgs daily. Check a B12 level in patients consuming more than 1 mg folic acid, as high dose folic acid may mask B12 deficiency. • Strongly advise smoking and alcohol cessation
Medical Assessment	<ul style="list-style-type: none"> • Medical and obstetrical history: including comprehensive review of diabetes history and management • Eye evaluation: dilated comprehensive eye exam and pregnancy clearance by an ophthalmologist; should also include discussing risk of development and/or progression of diabetic retinopathy during pregnancy • Renal evaluation: spot urine microalbumin and serum creatinine; protein/creatinine ratio if spot urine microalbumin >300 mcg/mg • Thyroid evaluation: TSH level • GYN evaluation: pelvic exam, Pap smear up to date • Cardiac evaluation: if ≥ 35 years of age with one or more additional risk factors (hypertension, smoking, family history of CAD, hypercholesterolemia, microalbuminuria or nephropathy) - recommend one or more of the following: EKG, echocardiogram, exercise tolerance test
Diabetes Medications	<ul style="list-style-type: none"> • Discontinue oral antidiabetic therapy; start insulin. An exception is metformin, which may be continued during the first trimester in patients with PCOS or type 2 diabetes, and anovulatory infertility. At the first prenatal visit the patient should begin increasing doses of insulin as necessary to control blood glucose while metformin is tapered off or discontinued. Metformin should not be used beyond the first trimester or in lieu of insulin until randomized controlled studies evaluating safety and efficacy have been completed. • If newly diagnosed with gestational diabetes, patient should be started on insulin, not metformin, if medication is required. • The rapid acting insulin analogs lispro and aspart lower postprandial blood glucose and decrease the risk of nocturnal hypoglycemia and may be useful therapeutic agents. Patients on lispro and aspart prior to conception may continue them during pregnancy. Patients on regular insulin may be switched to lispro or aspart if 1-hour postprandial blood glucose levels are above target and the patient is also experiencing pre-meal or nocturnal hypoglycemia. • Glargine, a long-acting insulin analog, is not recommended in women who are planning a pregnancy or who are currently pregnant. There is no information on its safety in pregnancy. A specific concern in the pregnant population is related to the 6 to 8 fold increased IGF-1 receptor affinity and mitogenic potency compared with human insulin. • There is no information on the safety of using the two new insulin analogs, glulisine and detemir, in pregnancy. We cannot recommend their use at this time. • Insulin may be delivered either through multiple daily injections (MDI) or an insulin pump.

Other Medications	<ul style="list-style-type: none"> Hypertension and/or microalbuminuria management: ACE-inhibitors must be stopped either before pregnancy or early in the first trimester due to risk of fetal injury or demise with 2nd or 3rd trimester use. ARBs should be stopped before conception because safety data for 1st trimester use is limited. The non-dihydropyridine calcium channel blocker diltiazem in extended release forms may be a useful substitute for ACE-I's and ARB's. Hypercholesterolemia – stop all cholesterol-lowering agents before conception, including statins
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DIABETES MANAGEMENT DURING PREGNANCY

Self Monitoring of Blood Glucose	<p><u>Pre-existing diabetes and GDM</u></p> <ul style="list-style-type: none"> 4 times/day: before breakfast and 1 hour post-meal Pre-meal monitoring may also be necessary in many patients Pre-meal/1 hour post-meal monitoring necessary for patients with pre-existing diabetes Nocturnal monitoring (~3 AM) may be necessary on intermittent basis Fasting urine ketones 														
Treatment Goals	<p><u>Pre-existing Diabetes</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;"></td> <td style="text-align: right;">Plasma*</td> </tr> <tr> <td>• Fasting and pre-meal glucose</td> <td style="text-align: right;">60-99 mg/dl</td> </tr> <tr> <td>• 1-hour post-meal or peak post-prandial glucose</td> <td style="text-align: right;">100-129 mg/dl</td> </tr> <tr> <td>• Urine ketones</td> <td style="text-align: right;">negative</td> </tr> </table> <ul style="list-style-type: none"> Normalization of hemoglobin A1C Use standard hypoglycemia treatment for blood glucose less than 60 mg/dl (15 g carb – recheck in 15 minutes; repeat with 15 g carb if blood glucose is still below 60 mg/dl) Avoidance of severe hypoglycemia (episode in which patient experiences coma, seizure or suspected seizure, or impairment sufficient to require the assistance of another person). Blood glucose goals must be relaxed for patients with hypoglycemia unawareness or recurrent hypoglycemia. <hr style="border-top: 1px dashed black;"/> <p><u>Gestational Diabetes</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;"></td> <td style="text-align: right;">Plasma*</td> </tr> <tr> <td>• Fasting blood glucose</td> <td style="text-align: right;"><100 mg/dl</td> </tr> <tr> <td>• 1-hour post meals</td> <td style="text-align: right;"><130 mg/dl</td> </tr> </table> <ul style="list-style-type: none"> Initiate insulin therapy if above levels are not maintained; once insulin is initiated, pre-existing diabetes blood glucose targets apply (see above) Use standard hypoglycemia treatment for blood glucose less than 60 mg/dl (15 g carb – recheck in 15 minutes; repeat with 15 g carb if blood glucose is still below 60 mg/dl) 		Plasma*	• Fasting and pre-meal glucose	60-99 mg/dl	• 1-hour post-meal or peak post-prandial glucose	100-129 mg/dl	• Urine ketones	negative		Plasma*	• Fasting blood glucose	<100 mg/dl	• 1-hour post meals	<130 mg/dl
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Diabetes Monitoring and Visits	<p><u>Pre-existing Diabetes</u></p> <ul style="list-style-type: none"> Medical visits (endocrinologist preferred) every 1-4 weeks, with additional phone contact as needed, depending on level of self- management skills and stability of blood glucose control. At each visit, review SMBG and urine ketone results, measure blood pressure, urine protein and ketones by dipstick A1C level every 4-8 weeks Education using a diabetes educator (DE), preferably a Certified Diabetes Educator (CDE), as needed; medical nutrition therapy (MNT) by registered dietitian (RD) Ophthalmology exam early in first trimester; follow-up depending on findings of this exam <p><u>Gestational Diabetes</u></p> <ul style="list-style-type: none"> Medical visits (endocrinologist preferred) every 1-4 weeks, with additional phone contact as needed, depending on level of self- management skills and stability of blood glucose control. At each visit, review SMBG and urine ketone results, measure blood pressure, urine protein and ketones by dipstick. Education using DE (preferably a CDE) as needed for review of SMBG to increase adherence; MNT by RD 														
Diabetes Medications	<ul style="list-style-type: none"> The only diabetes medication currently used throughout pregnancy is insulin (see Preconception Care). 														
Hypertension Management	<ul style="list-style-type: none"> Maintaining blood pressure in non-pregnant patients \leq 130/80 decreases end organ damage. Target blood pressure is 110-129 systolic and 65-79 diastolic in women with chronic hypertension during pregnancy. Antihypertensives are initiated in pregnant patients with known or suspected chronic hypertension if blood pressure is \geq 130/80 three times during pregnancy. Pre-eclampsia needs special treatment; therefore, these guidelines and treatment strategies do not apply to pre-eclampsia when other treatment options are preferred, or to gestational hypertension when high blood pressure exposure is limited. Antihypertensives that are used during pregnancy are: <ul style="list-style-type: none"> ➢ Alpha methyldopa (category B) ➢ Beta-blockers (acebutolol, sotalol – category B; betaxolol, bisoprolol, labetalol, levatol, metoprolol, nadolol, timolol – category C; atenolol – category D – should not be used) ➢ Calcium channel blockers (all category C) (The nondihydropyridone calcium channel blocker diltiazem in extended release form may be preferred in patients with microalbuminuria or nephropathy.) ➢ Hydralazine (category C) 														

*Laboratory methods measure plasma glucose. Most glucose monitors approved for home provide readings equivalent to plasma values. Plasma glucose values are 10-15% higher than whole blood glucose values. It is important for people with diabetes to know whether their meters and strips record whole blood or plasma results.

POST-PARTUM CARE

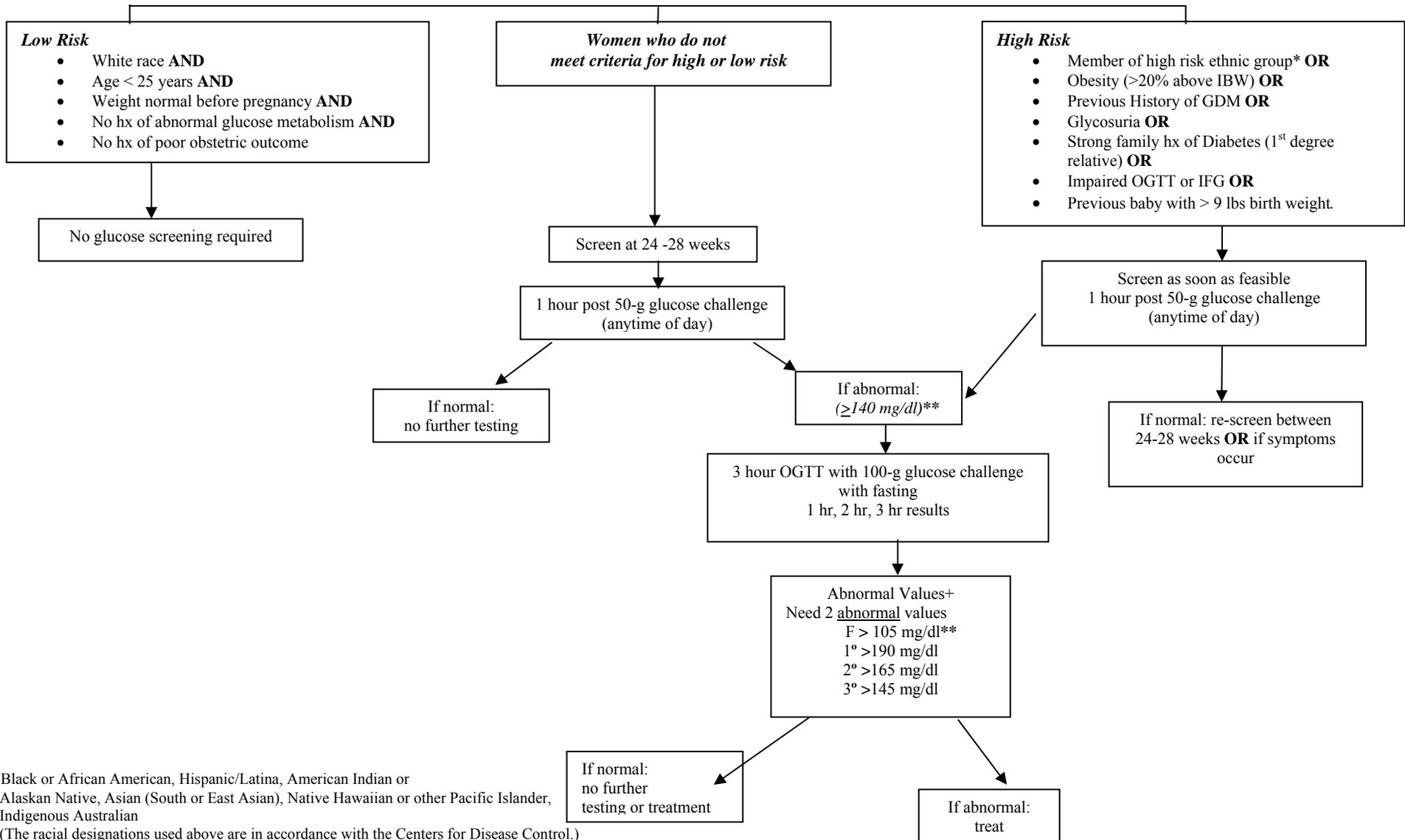
- Breastfeeding is encouraged in patients with pre-existing or gestational diabetes
- Enalapril and captopril may be used to treat hypertension and albuminuria in nursing mothers of full-term infants
- Follow-up ophthalmology exam 6-8 weeks post-partum
- For women who develop GDM:
 - A 2-hour 75 g OGTT should be checked at 6 weeks because diabetes may persist (of note: 30-40% of women with GDM will develop overt type 2 diabetes in the next 10-20 years)
 - Counseling for prevention of type 2 diabetes
- Discuss family planning/contraceptive issues. Depo-Provera and progestin-only oral contraceptives are contraindicated in patients who have had gestational diabetes, as they can accelerate the development of type 2 diabetes. In patients with pre-existing diabetes, Depo-Provera may worsen glycemic control.

MEDICAL NUTRITION THERAPY (MNT)

Recommendations are the same for pre-existing diabetes and GDM except where noted.

Counseling and Education	<ul style="list-style-type: none"> • All pregnant women should receive MNT counseling by a registered dietitian (RD), (CDE preferred) • All pregnant women should receive SMBG training by a DE (CDE preferred) • Daily food records and SMBG records are required to assess effectiveness of MNT • Carbohydrate counting skills are taught for either a consistent carb intake or a personalized insulin to carb ratio so patient can adjust insulin based on carb intake • At least 3 encounters with a CDE are recommended: Visit 1 (60 – 90 min individual or group visit with RD) for assessment, meal planning. This could include SMBG instruction if RD has received appropriate training. Visit 2 (30 – 45 min) with RD or RN 1 week after initial visit to assess and modify plan Visit 3 (15 – 45 min) with RD or RN in 1 – 3 weeks to assess and modify plan, as needed. • Additional visits every 2 – 3 weeks with RD or RN prn until delivery and one visit 6 – 8 weeks after delivery 								
Calories	IOM BMI range (kg/m²) Underweight (<19.8) Normal weight (19.8-26.0) Overweight (26.1-29.0) Obese (>29.0) Twins ^Δ Triplets ^Δ	WHO BMI range (kg/m²) (<18.5) (18.5-24.9) (25.0-29.9) (≥ 30.0)	Kcal/kg pre-preg. weight^ο Recommended weight gain (lbs) 36-40 28-40 30 25-35 24 15-25 not <1800 kcal ≥ 15 35-45 45-55 Recommendations for kcal/kg and recommended weight gain apply only to the IOM BMI criteria; the WHO BMI classification is included for comparison purposes only. ^ο An additional 150 – 300 kcal/day in 2 nd and 3 rd trimesters ^Δ 150 kcal/day above singleton pregnancy or amount that is consistent with targeted weight gain						
Distribution of Calories	<ul style="list-style-type: none"> • Individualize based on usual intake, preferences and medication regimen • 6 – 8 small meals/snacks. More frequent meals decrease postprandial hyperglycemia 								
Carbohydrate	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%; text-align:center;">GDM</th> <th style="width:50%; text-align:center;">Pre-Existing Diabetes</th> </tr> </thead> <tbody> <tr> <td style="text-align:center;">40 – 45% total calories* 15 – 30 grams* + 15 – 30 grams carb</td> <td style="text-align:center;">45 – 55% total calories Individualized as per usual intake and BG levels 15 – 30 grams carb</td> </tr> <tr> <td style="text-align:center;">Fiber 25 – 35 grams</td> <td style="text-align:center;">25 – 35 grams</td> </tr> </tbody> </table> <p>*Pregnant women should consume a minimum of 175 g carb per day +May be increased if insulin is added</p>			GDM	Pre-Existing Diabetes	40 – 45% total calories* 15 – 30 grams* + 15 – 30 grams carb	45 – 55% total calories Individualized as per usual intake and BG levels 15 – 30 grams carb	Fiber 25 – 35 grams	25 – 35 grams
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Protein	<ul style="list-style-type: none"> • 0.8 grams protein/kg DBW plus an additional 25 grams/day • 20 – 25% of total calories is usual 								
Fat	<ul style="list-style-type: none"> • <u>Pre-existing diabetes</u>: 30 – 35% total calories, with <10% total calories from saturated fat • <u>GDM</u>: < 40% total calories with <10% total calories from saturated fat • Encourage use of monounsaturated and polyunsaturated fats instead of saturated fats 								
Nutritive and Non-nutritive Sweeteners	<ul style="list-style-type: none"> • Sugar alcohols (sorbitol, mannitol, xylitol, maltitol) are safe for use in pregnancy, but may have a laxative effect if too much is consumed. Foods containing these sweeteners still contain carbohydrate and must be counted in the meal plan. • Non-nutritive sweeteners considered safe during pregnancy: aspartame, acesulfame potassium (ace-K) and sucralose • Because saccharin crosses the placenta and is cleared slowly by the fetus, it is not recommended during pregnancy 								
Vitamin/Mineral Supplements	Prenatal multivitamin and mineral supplement including: <ul style="list-style-type: none"> • Iron (27 mg/day) • Folic acid 400 mcgs to supplement average daily dietary intake of 400 mcgs for a total daily intake of 600 mcgs to 1 mg daily to decrease risk of neural tube defects (begin 400 mcg prior to conception) • Additional calcium supplementation may be needed to meet daily requirement of 1000 mg per day (1300 mg per day if under age 19). Begin prior to conception. 								
Physical Activity	<ul style="list-style-type: none"> • Regular physical activity is recommended after clearance by provider • Benefits include reducing insulin resistance, postprandial hyperglycemia and excessive weight gain • Hypoglycemia is more likely with prolonged exercise (>60 minutes) • Encourage activity after meals to reduce postprandial hyperglycemia 								

Gestational Diabetes Mellitus
 Screening Strategy to Detect GDM
 Risk assessment should be done at first prenatal visit



*Black or African American, Hispanic/Latina, American Indian or Alaskan Native, Asian (South or East Asian), Native Hawaiian or other Pacific Islander, Indigenous Australian
 (The racial designations used above are in accordance with the Centers for Disease Control.)
 **Plasma values

+Joslin uses the National Diabetes Data Group criteria because at the present time there are no data that supports improved neonatal outcomes with the Carpenter and Coustan criteria.

Glossary:

ACE Inhibitor: angiotensin converting enzyme inhibitor	GDM: gestational diabetes mellitus	PRN: as needed
ARBs: angiotensin receptor blockers	IBW: ideal body weight	RD: registered dietitian
BMI: body mass index	IFG: impaired fasting glucose	RDA: recommended daily allowance
CAD: coronary artery disease	IOM: Institute of Medicine	SMBG: self-monitoring of blood glucose
CDE: Certified Diabetes Educator	MDI: multiple daily injections	TSH: thyroid stimulating hormone
DBW: desirable body weight	MNT: Medical Nutrition Therapy	WHO: World Health Organization
DE: diabetes educator; nurse or dietitian with advanced education in diabetes management	OGTT: oral glucose tolerance test	

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Pregnancy Guideline Task Force

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Approved by Joslin Clinical Oversight Committee on 9/14/05

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