

4.3 – DIABETES MELLITUS

4.3.1 – INTRODUCTION

The educated and motivated law enforcement officer (LEO) with well-managed diabetes mellitus can be capable of safe and effective job performance.¹ However, diabetes mellitus may place LEOs at risk for sudden incapacitation, thus jeopardizing their ability to perform critical job functions. (These job functions include those listed in Sections 3.2, 3.3.3, 3.5.1, 3.5.2, 3.6, and 3.7, and discussed in Appendix A.)

Therefore, an individualized assessment of the LEO's diabetes should be performed using the following evaluative criteria to determine whether the individual's condition permits safe and effective job performance. Such evaluation must include the following key elements, which are discussed in detail below:

- history of blood glucose control;
- knowledge of diabetes and its management;
- current stability of blood glucose;
- risk for significant hypoglycemia or hyperglycemia; and
- presence of diabetic complications.

4.3.2 – OVERVIEW OF MEDICAL EVALUATION

The treating endocrinologist or other physician knowledgeable regarding diabetes management should provide a narrative report certifying whether the LEO has or has not met the criteria set out in Sections 4.3.2.1 through 4.3.5.4 below. In addition, the physician should include supporting data (see Appendix B for the Physician Evaluation Form).

4.3.2.1 The LEO is under the care of an endocrinologist or other physician knowledgeable regarding diabetes management. Outpatient and in-patient medical record(s) for the last three years or since date of diagnosis (whichever is shorter) should be reviewed by the treating physician and provided to the police physician.

4.3.2.2 If the LEO has type 1 diabetes, the individual has been on a basal/bolus regimen^a or an insulin pump using analogue insulins for the six (6) months prior to evaluation.²

4.3.2.3 If the LEO has type 2 diabetes on insulin, the individual has been on a stable medication regimen^b for the three (3) months prior to evaluation.³ If on oral agents alone, the LEO has been on a stable medication regimen for the month prior to evaluation.^c

^a A basal/bolus insulin regimen consists of the use of a basal insulin (Glargine, NPH) in a once or twice daily regimen to provide between-meal insulin, combined with the use of a short acting insulin (Regular, Lispro, Aspart, or Glulisine) at mealtimes. Insulin pumps are small (beeper sized) battery powered devices that deliver small amounts of short-acting insulin in a constant infusion to meet basal insulin requirements. The wearer selects an additional mealtime bolus to be infused at the time of meals. For more information on pumps, visit the manufacturer's web sites – www.Minimed.com; www.cozmore.com; www.animascorp.com; www.disetronic.com.

^b A stable insulin regimen is defined as maintaining the same types of insulin (long acting, intermediate acting, short or rapid acting). Changes in insulin dose are part of the appropriate self-management of diabetes and do not disqualify an applicant or incumbent under this section.

^c Changes in dose within the evaluation period will be allowed, but addition of a new class of medications or insulin should result in a new period of observation:

- one month for addition of a sulfonylurea or metformin;
- two months for the addition of a thiazolidinedione to insulin or a sulfonylurea; or
- three months for the addition of insulin.

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4.3.2.4 If the LEO uses an insulin pump, documentation is needed as follows:

- proper understanding and education in the use of the insulin pump;
- start date for the use of the pump;
- history of insulin site infections^d;
- history of pump cessation and pump malfunction;
- backup plan for pump malfunction including use of injectable insulin; and
- frequency of infusion set changes.

4.3.2.5 The LEO has been educated in diabetes and its management and thoroughly informed of and understands the procedures that must be followed to monitor and manage his/her diabetes and what procedures should be followed if complications arise.³

4.3.3 – QUANTITATIVE GLUCOSE MONITORING

4.3.3.1 The LEO has documentation of ongoing self-monitoring of blood glucose.

4.3.3.2 This must be done with a glucose meter that stores every reading, records date and time of reading and from which data can be downloaded. (Most meters now have this capability.)

4.3.3.3 Monitoring logs must be available covering the time period (1, 3, or 6 months) as described in Sections 4.3.2.2 and 4.3.2.3. The frequency of glucose monitoring must follow a schedule acceptable to the police physician in consultation with the treating physician.

Testing schedules are individual. What follows is a common pattern, but individual patterns may differ.

THERAPEUTIC REGIMEN	GLUCOSE TESTING SCHEDULE
Diet alone	Once or twice a week
Metformin, Thiazolidinediones, or Alpha Glucosidase inhibitors alone or in combination	Once or twice a week
Sulfonylureas, meglitinides, nateglinide – alone or in combination with the above group	Twice a day – AM and at supper; with any suspected hypoglycemic episodes
Insulin – one shot in combination with orals	Twice a day – AM and at supper; with any suspected hypoglycemic episodes. 2 to 3 times AM once a week
Insulin – two or more shots, Insulin pump	3 to 4 times a day – at meals and bedtime. 2 to 3 times AM once a week; with any suspected hypoglycemic episodes

^dIndividual has not had more than one pump-site infection that caused him or her to miss work or usual daily activities in the preceding six (6) months.

4.3.3.4 The LEO has had hemoglobin A1C measured at least four times a year (intervals of 2 to 3 months) over the last 12 months prior to evaluation if diagnosis has been present for more than a year.⁴ If hemoglobin A1C is > 8%, this may signal a problem with the LEO's diabetes management that warrants further assessment.⁵

4.3.4 – INCAPACITATING EVENTS

4.3.4.1 The LEO has not had any incapacitating episodes within the past one (1) year and no more than two episodes in the past three (3) years, or since diagnosis of diabetes (whichever is shorter) of:

4.3.4.1.1 Severe hypoglycemia (loss of consciousness, seizures, or coma requiring assistance of others or needing urgent treatment [glucagon injection/IV glucose]) or

4.3.4.1.2 Blood sugar <60 mg/dl with unawareness demonstrated in current glucose logs.⁶

4.3.5 – CHRONIC COMPLICATION SCREENING

4.3.5.1 Chronic complications of diabetes are associated with increased risk for severe hypoglycemic episodes and warrant further assessment.^e

4.3.5.2 The components of screening for chronic complications are:

4.3.5.2.1 A complete eye exam by a qualified ophthalmologist or optometrist, including a dilated retinal exam, demonstrating no more than mild background diabetic retinopathy.^{f,7}

4.3.5.2.2 Normal vibratory testing with a 128 Hz tuning fork^g; normal testing with 10 gram Semmes-Weinstein monofilament^g; and normal orthostatic blood pressure^h and pulse testing.^{8,9}

^ePresence of chronic complications of diabetes in and of themselves may not require the implementation of work restrictions.

^fNo more than one dot, blot, or flame-shaped hemorrhages or microaneurysm in all four fundus quadrants.

^gThe Michigan Diabetes Research and Training Center of the University of Michigan Health System recommends the following guidance (see www.med.umich.edu/mdrtc/profs/documents/svi/MNSI_howto.pdf) for conducting vibratory and monofilament testing⁸:

Vibration Sensation: Vibration sensation should be performed with the great toe unsupported. Vibration sensation will be tested bilaterally using a 128 Hz tuning fork placed over the dorsum of the great toe on the bony prominence of the DIP joint. Patients, whose eyes are closed, will be asked to indicate when they can no longer sense the vibration from the vibrating tuning fork. In general, the examiner should be able to feel vibration from the hand-held tuning fork for 5 seconds longer on his distal forefinger than a normal subject can at the great toe (e.g. examiner's DIP joint of the first finger versus patient's toe). If the examiner feels vibration for 10 or more seconds on his or her finger, then vibration is considered decreased. A trial should be given when the tuning fork is not vibrating to be certain that the patient is responding to vibration and not pressure or some other clue. Vibration is scored as: 1) present if the examiner senses the vibration on his or her finger for <10 seconds; 2) reduced if sensed for 10 seconds; or 3) absent (no vibration detection).

Monofilament Testing: For this examination, it is important that the patient's foot be supported (i.e., allow the sole of the foot to rest on a flat, warm surface). The filament should initially be pre-stressed (4-6 perpendicular applications to the dorsum of the examiner's first finger). The filament is then applied to the dorsum of the great toe midway between the nail fold and the DIP joint. Do not hold the toe directly. The filament is applied perpendicularly and briefly, (<1 second) with an even pressure. When the filament bends, the force of 10 grams has been applied. The patient, whose eyes are closed, is asked to respond yes if he/she feels the filament. Eight correct responses out of 10 applications is considered normal: one to seven correct responses indicates reduced sensation and no correct answers translates into absent sensation.

^hOrthostatic hypotension is a physical finding defined by the American Autonomic Society and the American Academy of Neurology as a systolic blood pressure decrease of at least 20 mm Hg or a diastolic blood pressure decrease of at least 10 mm Hg within three minutes of standing.

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4.3.5.2.3 Normal cardiac physical exam. Cardiac stress testing to at least 12 METS is recommended and should begin based on either the criteria of the American Heart Association/American College of Cardiology,^{i,10} or those of the American Diabetes Association.^{j,11}

Diabetics who have a normal cardiac stress test will be retested every one to three years based on individual clinical assessment. This assessment should consider:

- the age of the individual
- the number and persistence of coronary artery disease (CAD) risk factors
- the severity of CAD risk factors

4.3.5.2.4 Microalbumin/creatinine ratio $\leq 30:1$, measured or calculated^k creatinine clearance >60 ml/min.¹²

4.3.6 – ONGOING EVALUATION AND REQUIREMENTS

4.3.6.1 Should have medical records and glucose meter logs reviewed periodically. Because of the nature of diabetes it is important that regular medical follow up be provided to the LEO. The frequency and content of the evaluation should be determined on an individual basis by the police physician in consultation with the treating physician.¹

4.3.6.2 Must advise police physician of any change in type of medication.

4.3.6.3 Must advise police physician of any episodes of significant hypoglycemia or hyperglycemia (ketoacidosis, hyperosmolar hyperglycemic nonketotic state).¹³

4.3.6.4 Must provide documentation of ongoing evaluation of cardiac, ophthalmological, neurological and/or renal status (see Section 4.3.5).

ⁱThe American Heart Association recommends cardiac stress testing – which should begin when any of the following criteria are met:

- age greater than 35 years
- Type 1 DM greater than 15 years duration
- Type 2 DM greater than 10 years duration
- signs of target organ damage (eyes, kidneys, autonomic, cardiac)
- signs of peripheral vascular disease
- any additional coronary artery disease risk factors

Coronary artery disease risk factors include family history of premature (less than age 60) cardiac event in first degree relative, hypertension, hypercholesterolemia (total cholesterol greater than 240 mg/dL), or cigarette smoking.

^jEvaluating patients with diabetes for asymptomatic coronary artery disease remains controversial. The 2002 American Heart Association Prevention Conference VI Panel advised against routine non-invasive screening for coronary disease in asymptomatic diabetic patients. The American Diabetes Association, in its 2005 Standards of Medical Care in Diabetes, recommends testing for cardiac disease in asymptomatic patients with diabetes when two or more of the following risk factors are present:

- Total cholesterol > 240 mg/dl
- LDL cholesterol > 160 mg/dl, or HDL cholesterol < 35 mg/dl
- Blood pressure $> 140/90$
- Smoking
- Family history of premature coronary artery disease
- Presence of micro- or macro-albuminuria

^kSee MDRD GFR Calculator available on line at www.nkdep.nih.gov/professionals/gfr_calculators/orig_con.htm.

^lThe consensus of the workgroup is that the review by the police physician of glucose monitoring records should occur at a minimum of every 12 months, but may need to be more frequent in specific cases.

4.3.7 – APPENDIX A: COMMENTARY

Diabetes Definitions and Treatments:

Type 1 diabetes was previously called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes. Type 1 diabetes develops when the body's immune system destroys pancreatic beta cells, the only cells in the body that make the hormone insulin that regulates blood glucose. This form of diabetes usually strikes children and young adults, although disease onset can occur at any age. Type 1 diabetes may account for 5 to 10% of all diagnosed cases of diabetes. In order to survive, people with type 1 diabetes must have insulin delivered by injections or a pump.

Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. Type 2 diabetes may account for 90 to 95% of all diagnosed cases of diabetes. It usually begins as insulin resistance, a disorder in which the cells do not use insulin properly. As the need for insulin rises, the pancreas gradually loses its ability to produce sufficient insulin. Type 2 diabetes is associated with older age, obesity, family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity, and race/ethnicity. Type 2 diabetes is increasingly being diagnosed in children and adolescents. Many people with type 2 diabetes can control their blood glucose by following a careful diet and exercise program, losing excess weight, and taking oral medication. According to 2007 statistics from the U.S. Centers for Disease Control and Prevention (CDC), among adults with diagnosed diabetes, about 13% take both insulin and oral medications, 14% take insulin only, 57% take oral medications only, and 16% do not take either insulin or oral medications.¹⁴

Risk of hypoglycemia remains the major concern in regard to those with diabetes being or becoming law enforcement officers (LEOs). This risk occurs primarily in those taking insulin, particularly those with type 1 diabetes, although it may also occur in those with type 2 diabetes who take insulin and/or certain oral anti-diabetic medications. Patients treated with metformin, alpha-glucosidase inhibitors, or thiazolidinediones alone or in combination with each other are at little or no risk of significant hypoglycemia.

Drug Class	Brand Names	Generic Names	Hypoglycemia Risk Compared to Insulin
Sulfonylurea	Amaryl, Glucotrol, Micronase	Glimepiride, Glipizide, Glyburide	0.5
Short acting secretagogues	Prandin, Starlix	Repaglinide, Nateglinide	0.2
Biguanide	Glucophage	Metformin	none
Thiazolidinediones	Avandia, Actos	Rosiglitazone, Pioglitazone	none

Law enforcement entails a unique set of conditions that need to be considered in regard to those with diabetes and the risks of impairment from either hypo or hyperglycemia. These may include (depending upon the duties of the particular LEO position):

- unpredictable meal schedules;
- brief periods of maximal physical exertion;
- prolonged driving with responsibility for others in the vehicle;
- high-speed pursuit driving;
- surveillance requiring sustained attention for prolonged periods of time;
- rapid decision making regarding the use of force, including deadly force;
- rapid analysis of complex visual stimuli to differentiate weapons from other objects; and
- control of one's emotions under stress.

4.3 – DIABETES MELLITUS

The criteria and individualized assessment process included in this Guidance are intended to serve as a means to minimize the risk to individual LEOs and the public while allowing well motivated, well educated persons with well-controlled diabetes to serve as LEOs. Nonetheless, certain persons with diabetes, despite their motivation and adherence to optimum care, are unable to attain adequate control of their diabetes, and therefore have a greater tendency for significant hypoglycemia. Such individuals would not be acceptable candidates to be LEOs.

This individualized assessment is possible in large part because a great deal of change has occurred in the treatment of diabetes over the last number of years. Previously patients used insulins that were somewhat unpredictable in the time course of their action and generally took two or fewer injections per day. Today, there are insulins that are far more predictable and are either very long acting and essentially treat only basal hepatic glucose production (and therefore do not depend on a patient eating on a regular schedule) or are very rapid and therefore can be administered directly before or even shortly after eating, significantly decreasing the chance of insulin being taken and then the meal being interrupted due to professional duties.

Regimens now referred to as “basal bolus” are composed of a very long acting basal (or background) insulin, and rapid-acting (bolus) insulins. The basal insulin controls glucose levels overnight in the absence of carbohydrate intake. The rapid-acting (bolus) insulins that are dosed just prior to, during, or after meals based on blood glucose levels at that time, the amount of carbohydrate that the person expects to consume, and any anticipated change in physical activity patterns over the next several hours. These regimens have resulted in improved overall blood glucose control with significantly less risk of hypoglycemia for many patients.

Additional major advances in the size, speed, and sophistication of blood glucose meters provide for easy, accurate, and rapid assessment of blood glucose levels. All current blood glucose meters can be downloaded to computer programs, facilitating confirmation and review of blood glucose results. Such monitoring techniques, as well as the generally increased self-awareness that accompanies consistent self-monitoring, enables the motivated person with diabetes to assess blood glucose levels and ingest a safety net of carbohydrates before entering a hazardous environment. Similarly, major advances in insulin delivery systems have greatly increased the ability of the motivated individual with diabetes to achieve a level of diabetes self-management consistent with the duties of a LEO.

In order to obtain maximum effect from these medical advances, and to minimize the risk of hypoglycemia, patients with diabetes must check their blood glucose level frequently (as recommended based on factors such as type of therapy and glycemic history), review these results on a regular basis, and see their diabetes care provider regularly for discussion in regard to any necessary changes in treatment. Patient evaluation needs to look for any of the known risk factors for serious hypoglycemia or evidence of any of the known microvascular (eye disease, kidney disease, or nerve disease) or macrovascular (cardiovascular disease, peripheral arterial disease) complications of diabetes.

The above described individualized assessment demands a very close and good working relationship between the patient and the diabetes care provider.

Conclusion:

Current published data suggest that persons with diabetes who can safely and effectively function as LEOs can be reliably identified through careful individualized assessment. Thus blanket bans of all people with diabetes, in addition to being illegal, are not consistent with current medical knowledge. Because diabetes affects individuals very differently, whether or not an individual can safely perform a particular job must be determined using the combined expertise of the treating physician and the police physician. This guidance provides the information necessary for the police physician to work with a diabetes expert on this important task.

4.3.8 – APPENDIX B: PHYSICIAN EVALUATION FORM FOR THE LEO WITH DIABETES

The following evaluation form is based on the guidance established by the American College of Occupational and Environmental Medicine (ACOEM).

I. INTRODUCTION

The educated and motivated law enforcement officer (LEO) or applicant with well-managed diabetes mellitus can be capable of safe and effective job performance. An individualized assessment of the LEO's or applicant's diabetes should be performed including an assessment of the following:

- history of blood glucose control;
- current stability of blood glucose;
- risk for significant hypoglycemia or hyperglycemia;
- presence of diabetic complications; and
- knowledge of diabetes and its management.

Risk of hypoglycemia remains the major concern in regard to those with diabetes being or becoming LEOs. This risk occurs primarily in those taking insulin, particularly those with type 1 diabetes, although it may also occur in those with type 2 diabetes who take insulin and/or sulfonylureas and other secretagogues.

Law enforcement entails a unique set of conditions that need to be considered in regard to those with diabetes and the risks of either hypo or hyperglycemia. These may include (depending upon the duties of the particular LEO position):

- unpredictable meal schedules;
- brief periods of maximal physical exertion;
- prolonged driving with responsibility for others in the vehicle;
- high-speed pursuit driving;
- surveillance requiring sustained attention for prolonged periods of time;
- rapid decision making regarding the use of force, including deadly force;
- rapid analysis of complex visual stimuli to differentiate weapons from other objects; and
- control of one's emotions under stress.

II. ASSESSMENT*

1. LEO has been under the care of an endocrinologist or other physician knowledgeable about diabetes management. Outpatient and in-patient medical record(s) of the last three years or since date of diagnosis (whichever is shorter) should be reviewed by the treating physician and provided to the police physician.

My credentials as a physician knowledgeable about diabetes management are as follows (or attach CV):

This person has: *type 1 diabetes* *type 2 diabetes*

Date of diagnosis: ____ / ____ / ____

Attached records for prior 3 years or since onset of diabetes whichever is shorter for:

out-patient treatment *in-patient treatment*

2. If type 1 diabetes, patient has been on a basal/bolus regimen or an insulin pump using analogue insulins for the six (6) months prior to evaluation.

Current insulin regimen: _____

Insulin pump brand _____

***Times cited** for durations of stable treatment regimen or stability of management are in reference to the date of current evaluation for a law enforcement position. **Date sought** is when patient first began current insulin regimen (pump or injection) using current types of insulin (long acting, intermediate acting, short or rapid acting).

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Multiple dose insulin (specify regimen)

Rate					
Time					

Rate					
Time					

Bolus doses:

Breakfast _____

Lunch _____

Supper _____

Other _____

Multiple dose insulin (specify regimen)

Basal: _____

Bolus: _____

Starting date on current regimen: ____ / ____ / ____

3. If type 2 diabetes on insulin, has been on a stable medication regimen for the three (3) months prior to evaluation. If on oral agents alone, should be on a stable medication regimen for the month prior to evaluation.

Current medication regimen:

Oral agents	Insulin
_____	_____
_____	_____
_____	_____
_____	_____

Starting date on current regimen: ____ / ____ / ____

4. Has documentation of ongoing self-monitoring of blood glucose. This must be done with a glucose meter that stores every reading, records date and time of reading and from which data can be downloaded. Monitoring records must be available covering the time periods (1, 3, or 6 months), as described in Sections 2 and 3, following a schedule acceptable to the police physician.

The individual has been asked to test glucose _____ times a day, and

- is adhering to my recommended schedule for testing.*
- is **not** adhering to my recommended schedule for testing.*

Glucose logs:

- are attached for review
- are not attached for review (please explain): _____
- _____

5. Has been educated in diabetes and its management and thoroughly informed of and understands the procedures that must be followed to monitor and manage his/her diabetes and what procedures should be followed if complications arise.

The individual has completed the following diabetes education (include year of completion):

6. If an insulin pump user, documents:

- proper understanding and education in the use of the insulin pump
- start date for the use of the pump
- history of insulin site infections
- history of pump cessation and pump malfunction
- backup plan for pump malfunction including use of injectable insulin
- frequency of infusion set changes

The individual has completed the following education in the use of a continuous insulin infusion pump (indicate year of completion): _____

The individual routinely carries appropriate supplies to compensate for pump malfunction, including syringes and insulin vials or insulin pens.

Yes

No – please explain: _____

The individual has had more than one pump site infection that caused him/her to miss work or usual daily activities in the preceding six (6) months.

Yes – please explain: _____

No

7. Has had hemoglobin A1C measured at least four times a year (intervals of two to three months) over the last 12 months prior to evaluation if diagnosis has been present over a year.

<i>Date</i>	<i>HbA1C</i>
_____	_____
_____	_____
_____	_____
_____	_____

8. Incapacitating events – Has not had any within the past one (1) year and no more than two (2) episodes in the past three (3) years, or since diagnosis of diabetes (whichever is shorter) episodes of:

a. severe hypoglycemia (loss of consciousness, seizures or coma, requiring the assistance of others or needing urgent treatment [glucagon injection or IV glucose]) or

b. a blood sugar < 60 mg/dl with unawareness³⁰ demonstrated in current glucose logs.

Has this individual had an episode of hypoglycemia as described above?

Yes

No

If the individual has had such episode(s), please describe episodes and provide dates of episodes:

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9. Has had a complete eye exam by a qualified ophthalmologist or optometrist, including a dilated retinal exam, demonstrating no more than mild background diabetic retinopathy.

Copy of ophthalmology or optometry report is attached:

Yes No – please explain: _____

10. Has normal vibratory testing with 128 Hz tuning fork, has normal testing with 10 gram Semmes-Weinstein monofilament and normal orthostatic blood pressure and pulse testing.

Vibration sensation: _____

Monofilament: _____

BP supine: _____

Pulse supine: _____

BP standing: _____

Pulse standing: _____

11. Has normal cardiac physical exam and normal cardiac stress testing to at least 12 METS. Annual cardiac stress testing³⁴ should begin when any of the following criteria are met:

- age greater than 35 years
- Type 1 DM greater than 15 years duration
- Type 2 DM greater than 10 years duration
- signs of target organ damage (eyes, kidneys, autonomic, cardiac)
- any other coronary artery disease risk factors

Copy of stress test report performed within the last 12 months is attached:

Yes No – please explain: _____

12. Has normal renal function based on albumin/creatinine ratio $\leq 30:1$, and measured or calculated creatinine clearance >60 ml/min.³⁵

Serum Creatinine: _____

Calculated creatinine clearance (Specify Method): _____

Cockcroft Gault or

MDRD

Urine microalbumin/creatinine ratio: _____

III. Treating Physician Statement

The above named individual meets all of the criteria provided on this form:

- Yes No – not recommended for position
 No, but IS recommended for position (letter of explanation attached)

It is my opinion that the above named individual is well-educated and well-motivated in diabetes self-management and has achieved a level of diabetes management to be capable of safe and effective job performance as a law enforcement officer. I have reached this opinion after careful review of the above criteria.

Signature of Physician

Date

Printed or Typed Name of Physician

Telephone Number

4.3.9 – REFERENCES

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