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# Inadequate Coping Attitudes, Disordered Eating Behaviours and Eating Disorders in Type 1 Diabetic Patients

Ricardo V. García-Mayor and Alejandra Larrañaga  
*Eating Disorders Section, Endocrinology, Diabetes,  
 Nutrition and Metabolism Department,  
 University Hospital of Vigo  
 Spain*

## 1. Introduction

Diabetes mellitus has been found to be the sixth leading cause of death for those living in the United States affecting the young and old at an alarming rate (National Center for Health Statistics, 2011). Type 1 diabetes typically has an early onset in life, but can occur at any age. It primarily develops when the body's own immune system attacks and destroys pancreatic beta cells, which produce the hormone insulin that regulates blood glucose levels. This type of diabetes accounts for 5 to 10 % of all diagnosed cases. Type 2 diabetes affects mainly adult subjects, its prevalence around the world has increased in relationship with the increase of the prevalence of overweight and obesity, attributed to lifestyle changes such as sedentary habits and overeating. Consequently, diabetes is one of the most challenging and burdensome chronic diseases of the 21st century, and it is a growing threat to the world's public health (King et al, 1995; King et al, 1998). Diabetes mellitus, especially type 1 form represent a very hard experience that requires subsequent psychological adaptation. Unfortunately, this often does not occur and it is followed by frustration and the non-acceptance of the disease. Problems with coping are one of the important consequences of the disease and the cause of uncountable problems in the future.

The management of type1 diabetes and its associated health-risk factors are often complex and require considerable patient education and frequent medical monitoring (Koopmanschap, 2002). The participation of the patients is basic in order to obtain a correct degree of metabolic control; however, this carries as a consequence considerable amount of stress. People on insulin must learn how to regulate their blood sugars by monitoring blood glucose levels daily while carefully attending to their food intake and an exercise regimen. Careful blood glucose monitoring is necessary to prevent wide variations in blood sugars that affect both short term and long term health and functioning. Hypoglycaemia reactions are a concern in the short run not only because they are frightening and disruptive, but also because, when severe, they can lead to unconsciousness, coma and death (Cox & Gonder-Frederick, 1992). The constant stress of maintaining tight glycaemia control can result in two types of psychological distress (a) subclinical emotional distress, and (b) diagnosable psychological disorders (Rubin & Payrot, 2001). Additionally, psychiatric conditions can

occur independently without being a consequence of diabetes. It has been shown that individuals with diabetes have a disproportionately higher rate of psychiatric disorders (Bogner et al, 2007; Llorente & Urrutia, 2006), with affective and anxiety disorders being more commonly diagnosed than in the general population (De Mont-Marin et al, 1995). This is evidenced by research showing high rates of psychiatric disorders, particularly depression and anxiety, for example, Fettahoglu et al., (Fettahoglu et al, 2007) found over 40% increased risk in having any type of psychiatric disorder in patients with diabetes, and Gülseren et al. (Gülseren et al, 2001) found that depression and anxiety account for 45% of psychiatric disorders in patients with diabetes. These results show the negative impact that diabetes can have on an individual's psychosocial adjustment, and the need for research to determine the most appropriate and common coping strategies to deal with the stress of illness.

Other psychological problems of these patients are Eating Disorders (ED). The classical ED are anorexia nervosa (AN) and bulimia nervosa (BN), but recently another entity was recognized, the so called eating disorders not otherwise specified (EDNOS), which are incomplete forms of classical ED that are diagnosed when patients did not fulfill the classical ED diagnostic criteria. Type 1 diabetic patients have a high risk of suffering from ED due to these patients have to select the food they eat carefully in an early period of their development and because both entities, type 1 diabetes and ED, often affect adolescents and young adults. Furthermore, type 1 diabetic patients suffer from other eating behavior anomalies, which mainly appear in girls, that consist in splitting insulin doses or restricting food intake in order to reduce their body weight, but with the high price of the metabolic disturbance and subsequent chronic vascular complications if such behavior persists over time.

In this chapter we will review these psychological anomalies suffered by type 1 diabetic patients, especially problems with coping attitudes, disordered eating behaviors (DEB) and eating disorders (ED), and also discuss some aspects of their forms of presentation, management and prevention.

## **2. Search strategy for identification and selection of studies**

We identified relevant studies published in English by searching MEDLINE from January 1990 to December 2010. We included randomised and quasi-randomised controlled studies, clinical series, reviews and systematic reviews on type 1 diabetic patients with inadequate coping attitudes, disordered eating behaviors and eating disorders, in which children, adolescents and young adults with type 1 diabetes were properly defined. As study strategy, relevant questions about type 1 diabetes and eating disorders were previously determined: coping with diabetes, epidemiology, clinical forms of eating disorders and specific behavioral anomalies in type 1 diabetic patients, metabolic consequences and vascular complications, management and prevention.

## **3. Inadequate coping attitudes in type 1 diabetic patients**

People suffering from any type of chronic disease, need to make minor or major lifestyle adjustments. Diabetes, in particular, can eventually take its toll on the emotional, psychological, and physical well being of any person. These adjustments can lead to either successful adherence to medical regimens and control of the disease, or among other things, ineffective or maladaptive coping. The literature reveals that successfully adjusting to a

chronic illness yields the following outcomes: successful performance of adaptive tests, absence of psychological disorders, low experience of negative affect, improved functional status, and appraisals of well-being in varying life domains (Stanton et al, 2001).

Coping can generally be defined as cognitive and/or behavioral attempts to manage and tolerate situations that are appraised as stressful to an individual. No single coping strategy or dimension can be considered maladaptive. The quality of the coping strategy and process is evaluated according to its impact on the outcome of interest. From the previous conceptual definition, Folkman and Lazarus (Folkman & Lazarus, 1980; Folkman & Lazarus, 1985; Folkman & Lazarus, 1988) distinguished two primary dimensions of coping (or categories): emotion-focused (composed of individual coping strategies such as seeking emotional support) and problem-focused (composed of individual coping strategies such as making a plan of action). These coping categories described efforts to either alleviate the personal emotional stress induced by the stressor or alter the source of stress in the environment. Use of problem-focused coping has been found to be associated with better metabolic control, emotional status, and better adjustment overall in patients with diabetes (Lundman & Norberg, 1993); use of emotion-focused coping has been found to be associated with poor adjustment and adherence to health regimens in chronically ill samples (Bombardier et al, 1990).

Diabetic patients initially experience high levels of depression and anxiety (Lustman et al, 1997; Tuncay, 2008). Anderson et al. (Anderson et al, 2001) found that adults with diabetes have twice the odds of comorbid depression. It was also found that this prevalence was much higher in women than in men. Within their sample, one in every three individuals had a level of depression that impaired their ability to function on a daily basis which in turn affected quality of life, regimen adherence, and blood glucose control. Regarding to coping strategies, it has been shown that problem-focused coping was positively associated with glycaemia control and negatively associated with anxiety and depression (Maes et al, 1996). Smari and Valtysdottir (Smari & Valtysdottir, 1997) also found that problem-focused coping was associated with lower blood glucose levels—indicative of better adjustment. On the contrary, individuals who engaged in more emotion-focused types of coping experienced more anxiety, depression, and higher levels of glycaemia. It is obvious that any deviation from a normal routine or health status serves as a continual source of stress that leads to the individuals' inability to care for themselves (White et al, 1992). Therefore, management of this stress via coping strategies is crucial for psychological and physical health.

An author found that treating depression through therapy is effective for individuals with diabetes so they may regain confidence and abilities to control the disease, leading to improved quality of life and social and physiological functioning (Eisenberg, 1992). The treatment includes the development of coping skills through training programs (Grey & Berry, 2004) as well as patient empowerment (Anderson et al, 1995). DeRidder and Schreurs (DeRidder & Schreurs, 2001) observed that diabetic patients in particular are inclined to use coping strategies that are aimed at reducing the negative emotions surrounding the disease and its maintenance. If this suggestion was found to be empirically true across diabetes studies and patients, it may portend a particularly problematic issue since these strategies were generally viewed as less adaptive. It is apparent that stress permeates the management of diabetes and thus use of effective coping skills is imperative not only in illness management but general stress management as well. At present, there is no systematic quantitative review of the stress and coping literature in diabetes that links coping strategies to indices of adjustment. Thus, a summary statement of the adaptive versus maladaptive strategies identified for these coping-adjustment relations cannot be made with any degree of confidence.

#### **4. Epidemiology of disordered eating behavior and eating disorders in type 1 diabetic patients**

Disordered eating behavior (DEB) is common in young women living in westernized countries, where thinness is valued and dietary restraint is pursued (Attie & Brook-Gunn, 1989). Prevalence studies in North America indicate that full syndrome bulimia nervosa may be found in 1-3% of adolescents and young adult women and subthreshold disorders are even more common (American Psychiatric Association, 1994; Fairburn & Beglin, 1990; Jones et al, 2001). The rates of these disorders are lower but rising in less-westernized countries such as Asia and Africa as Western attitudes towards weight and shape become more pervasive (Hoek, 1993; Lee, 1993; Lee & Lee 1996). Differences in the prevalence of eating disorders varies according to different ethnic groups (Abrams et al, 1993; Kumanyika, 1993), however, a study found that ethnic differences in eating disorder symptoms disappeared when body mass index (BMI) was controlled (Arriaza & Mann, 2001). At present, there is no information on the effect of culture and race on eating disorders in people with diabetes.

The risk of eating disturbances has been postulated to be higher in type 1 diabetic patients than in the general population due to multiple interacting factors related to diabetes and its treatment (Colton et al, 1999; Rodin & Daneman, 1992). Diabetes management imposes some degree of perceived dietary restraint, particularly patients who eat according to a predetermined meal plan, rather than in response to internal cues for hunger and satiety. Such neglect of internal cues may contribute to dietary dysregulation in susceptible individuals (Polivy & Herman, 1985). The relationship between higher weight and DEB presents a management dilemma for clinicians, since both dietary restraint and higher weight are clear risk factors for the development of ED and their negative health consequences.

Although until recently it has been unclear whether there is a specific association of eating disorders with diabetes, some studies have suggested an increased incidence of eating disorders in young women with diabetes (Birk & Spencer, 1987; Engstrom et al, 1999; Hudson et al, Lloyd et al, 1987; 1985; Rodin et al, 1985; Rodin et al, 1986/1987; Rodin et al, 1991; Rosmark et al, 1986; Stancin et al, 1989; Steel et al, 1987; Vila, et al, 1993; Vila et al, 1995) whereas others did not find such an increase (Bryden et al, 1999; Fairburn et al, 1991; Friedman et al, 1995; Mannucci et al, 1995; Marcus et al, 1992; Meltzer et al, 2001; Peveler et al, 1992; Powers et al, 1990; Robertson & Rosenvinge, 1990; Striegel-Moore et al, 1992; Wing et al, 1986). However, the conclusions of these studies are limited by the small sample sizes of females in the age of the highest risk for eating disturbances, the absence of control groups, their low statistical power, and/or by the lack of structured diagnostic interviews for the assessment of eating disorders.

A study examined the association between ED and type 1 diabetic girls, aged 12-19, for at least 1 year. Subjects with diabetes were 2.4 times more likely than non diabetic controls to have a clinical ED and 1.9 times more likely to have a subthreshold ED (Affenito & Adams, 2001). In another investigation, the prevalence of ED in a population-based cohort of female adolescents with type 1 diabetes was compared with that found in aged-matched controls. DEB was found in 16.9% of adolescents with diabetes compared with 2.2% of the controls (Hoek, 1993). A longitudinal study of 87 patients with diabetes aged at baseline 11-25 years, in whom eating habits and attitudes were assessed by a semistructured research diagnostic



interview, showed that 14.9%, at baseline, and 26%, at the end of the follow-up period, had evidence of bingeing or purging while insulin misuse for weight control was reported by 35.6% of the patients (Peveler et al, 2005). A recent study from France (Ryan et al, 2008) concluded that abnormal eating behavior is present in French diabetic patients at higher levels than among the general population.

Thus, nowadays, there is clear evidence that EB and DEB are more prevalent in type 1 diabetic women than in the general population.

## 5. Clinical forms of eating disorders in type 1 diabetics

The three diagnostic forms of ED are AN, BN and EDNOS. Common to all three is a core problem in which the self-evaluation is unduly influenced by body weight or shape. This can be characterized by an extreme pursuit of thinness, in the case of AN, or recurrent episodes of binge eating and compensatory caloric purging behaviors, in the case of BN. EDNOS encompasses those ED that are clinically significant enough to compromise the patient health and the quality of life, but do not meet formal diagnostic criteria for AN or BN (American Psychiatric Association, 1994).

Eating disorders that meet Diagnostic and Statistical Manual of Mental Disorders four edition (DSM-IV) diagnostic criteria, mostly bulimia nervosa and EDNOS, are more than twice as common in girls with diabetes compared to their non-diabetic peers, furthermore, subthreshold eating disorders were also almost twice as common in girls with diabetes compared to controls (American Psychiatric Association, 1994). In line with these studies, it was found that the ED associated with bingeing and purging are the most common types of ED among girls with diabetes as they are in girls in the general population (American Psychiatric Association, 1994; Fairburn & Beglin, 1990; Jones et al, 2001). Restricting ED are much less common conditions (Jones et al, 2000), thus a specific association between anorexia nervosa and type 1 diabetes has not been demonstrated (Rodin et al, 2002).

In a longitudinal study by Colton et al, (Colton et al, 2007), at 5 years, 49% of a cohort of girls with type 1 diabetes reported current disordered eating behavior (DEB), 43.9% active dietary restraint, 6.1% binge-eating episodes, 3.1% self-induced vomiting, 3.1% insulin omission and 25.5% excessive exercise for weight control. Furthermore, 13.3% met criteria for an ED: three girls had bulimia nervosa, three had an eating disorder not otherwise specified and seven had a subthreshold ED.

Using the DSM-III-R or the DSM-IV for interview-based diagnosis, the prevalence of AN varies between 0.0-1.8% for diabetic patients, whereas 0.0-0.6% for controls. The prevalence of BN was 0.0-5.8% and 0.0-2.0%, respectively (Engström et al, 1999; Fairburn et al, 1991; Jones et al, 2000; Mannucci et al, 1995; Peveler et al, 1992; Robertson et al, 1990; Striegel-Moore et al, 1992; Vila et al 1995). In a study that aimed to determine the prevalence of ED in young adolescents, 98 type 1 diabetic patients and 575 age-matched controls were studied. The authors found neither AN nor BN case among diabetics and controls. However, the prevalence of EDNOS was significantly higher in adolescent diabetics than in controls both in boys (1.7% vs. 0.9% respectively) and girls (5.3% vs. 1.6% respectively). In addition, subthreshold ED were more common in male diabetic adolescents than in non-diabetic peers (García-Reyna et al, 2004). In a meta-analysis by Mannucci et al (Mannucci et al, 2005),

they found that the prevalence of AN in type 1 diabetes was not significantly different from that in controls, being 0.27 vs. 0.06 %, respectively, while the prevalence of BN was 1.23 vs. 0.69 %, respectively,  $p < 0.05$ , in line with previous studies (Affenito et al, 1997; Jones et al, 2000; Vila et al, 1995).

The cited data indicate that young type 1 diabetic patients have a higher prevalence of BN, EDNOS and subthreshold ED than their non-diabetic peers. Data are summarized in Table 1.

Clinical forms	Globally	Girls	Boys
AN	0.0-1.8 %	0.27 %	-
BN	0.0-5.8 %	1.23-13.3 %	-
EDNOS	7 %	5.3 %	1.7 %
DEB	16.9 %	14.9-49.4 %	-
Insulin misuse	-	3.1-35.6 %	-

Table 1. Estimated prevalence of ED and DEB in type 1 diabetic patients.

6. Specific behavioral anomalies in type 1 diabetics

It is well-known the association of chronic illness, such as type 1 diabetes, asthma, attention deficit disorder, physical disabilities and seizure disorders, with DEB (Neumark-Sztainer et al, 1995; Neumark-Sztainer et al, 1998). Adolescents with chronic illness present higher body dissatisfaction engaged in more high risk weight loss practices (Neumark-Sztainer et al, 1995). These data were confirmed by other studies (Neumark-Sztainer et al, 1998).

While adjusting to the changes of puberty, the adolescence is a period of rapid physical and psychological growth and development. During this time to control weight and to overcome body dissatisfaction, some adolescents commonly diet or exercise. Other may present more severe misbehaviors such as bingeing and purging, the use of laxatives or the adherence to an overly strict exercise regimen.

Before diagnosis and treatment, individuals with type 1 diabetes are likely to lose a large amount of weight. However, once the treatment begins the weight usually returns. By controlling diabetes with insulin injections many diabetics face a constant struggle with their weight (Collazo Clavell, 2010). As insulin encourages fat storage, many people with type 1 diabetes have discovered the relationship between reducing the amount of insulin they take and their corresponding weight loss (Mathur & Conrad, 2008; Mathur & Conrad, 2008). It is well-known that adolescents with type 1 diabetes tend to exhibit increased difficulty in maintaining optimal weight and also are more inclined to be concerned about their weight than their non-diabetic counterparts (Bryden et al, 1999).

Since weight management during this state of development can be especially difficult for those with type 1 diabetes, some diabetics may restrict or omit insulin, a condition known as diabulimia, as a form of weight control (Baginsky, 2009; Hasken et al, 2010; Ruth-Sahd et al, 2009). This is not a medically recognized condition yet, but describes the situation of a considerable number of type 1 diabetic patients.

Insulin restriction becomes a more significant problem in older adolescents, perhaps as parental supervision of insulin administration decreases. It becomes more common a potential worsening in severity and frequency throughout early adulthood. Once the pattern of frequent and habitual insulin restriction became entrenched, the cycle of negative feelings about body image, shape and weight; chronically elevated blood sugars; depression, anxiety and shame; and poor diabetes self-care can be complex and difficult to treat.

In a study that looked at 143 adolescents with type 1 diabetes who completed the Assessing Health and Eating among Adolescents with Diabetes survey; unhealthy weight control practice was observed in 37.9 % of females and 15.9% of males. Among the females, 10.3% reported skipping insulin and 7.4 % reported taking less insulin to control their weight (Neumark-Sztainer et al, 2002). Only one male reported doing either of these behaviors. In another 4 years follow-up study of 91 girls with diabetes aged 12 to 18, dieting was reported by 38% of the sample, binge eating by 45%, insulin omission by 14 % and self-induced vomiting by 8% at baseline, these behaviors were even more common at follow-up, when most of the girls were in the age of the highest risk for ED. At this time, more than half of the sample reported dieting for weight loss and binge eating, and one-third reported deliberate insulin omission to prevent weight gain (Rydall et al, 1997).

In general terms, it is estimated that between 30% and 40% of adolescents and young adults with diabetes skip or reduce insulin after meals to lose weight (Hasken 2010).

## **7. Metabolic consequences and vascular complications of disordered eating behaviors and eating disorders in type 1 diabetics**

There is a spectrum of severity of disturbance of eating habits and attitudes, and subthreshold eating problems, seen as relatively mild in non diabetic patients, can give rise to clinically important disturbances of self-care and glycaemia control in diabetics. In general terms, glycosilated hemoglobin was higher in patients with diabetes who had ED compared with those with diabetes without ED (Affenito & Adams, 2001). A study by Rydall et al (Rydall et al, 1997), found that the mean HbA1c was significantly higher among girls with clinical DEB compared to those moderately disordered of eating habits or with no disordered behavior. Another 3-year longitudinal study by Figueroa Sobrero et al (Figueroa Sobrero et al, 2010) revealed that the presence and persistence of disordered eating behavior is associated with worse prognosis in type 1 diabetic children and adolescents.

The lack of proper insulin treatment in type 1 diabetics may lead to many harmful physical effects. Reducing insulin to lose weight increases the risk of dehydration, break down of muscle tissue, high risk of developed infections and fatigue. If this behavior continues, it may also result in kidney failure, eye disease leading to blindness, vascular disease and even death.

In particular, patients who misuse insulin to control body weight (Crow et al, 1998; Rodin et al, 1989), are thought to be at increased risk for microvascular complications (Rydall et al, 1997; Steel et al, 1987), but the extent of the risk has not been well characterized, as most studies have been cross-sectional. Clinical outcome in terms of physical and psychological health are not known with certainty. One longitudinal study of patients with diabetes and DEB over 9 years, found a low rate of microvascular complications (Pollock et al, 1995). On the contrary, another study, taking place over 4 years, found that insulin-dependent girls



with DEB had an increased risk for retinopathy (Rydall et al, 1997). A more recent longitudinal study observed that diabetic patients aged 11 to 25 years with DEB or insulin misuse had a significant risk for the development of two or more serious complications, such as repeated episodes of diabetic ketoacidosis, increased rate of hospital admission and mortality (Peveler et al, 2005).

Therefore, ED in type 1 diabetics have clearly shown to be associated with impaired metabolic control (Jones et al, 2000; Vila et al, 1993; Friedman S et al, 1995; Affenito et al 1997; Affenito et al 1998; Rydall et al, 1997), more frequent episodes of ketoacidosis (Polonsky et al, 1994), and an earlier than expected onset of diabetes-related microvascular complications, particularly, retinopathy (Affenito et al, 1997; Colas et al, 1991; Rydall et al, 1997; Steel et al, 1987; Ward et al, 1995). In this sense, disordered eating status was more predictive of diabetic retinopathy than was the duration of diabetes, which is a well-established risk factor for microvascular complications (Diabetes Control and Complications Trial Research Group, 1993). Furthermore, ED in type 1 diabetic patients is associated with high mortality (Walker et al, 2002).

Regarding to mortality, an 11-year follow-up study reports that insulin restriction conveyed more than a three-fold increased risk of mortality in type 1 diabetic patients after controlling for age, body mass index and HbA1c values. Age of death was younger among insulin restrictors, with a mean age of death of 45 years, as compared to 58 years among those reporting appropriate insulin use (Goebel-Fabbri et al, 2007).

Insulin restriction becomes a more significant problem in older adolescents and in early adulthood. Once the pattern of frequent and habitual insulin restriction becomes entrenched, its consequent poor diabetes self-care can be complex and difficult to treat. Figure 1.

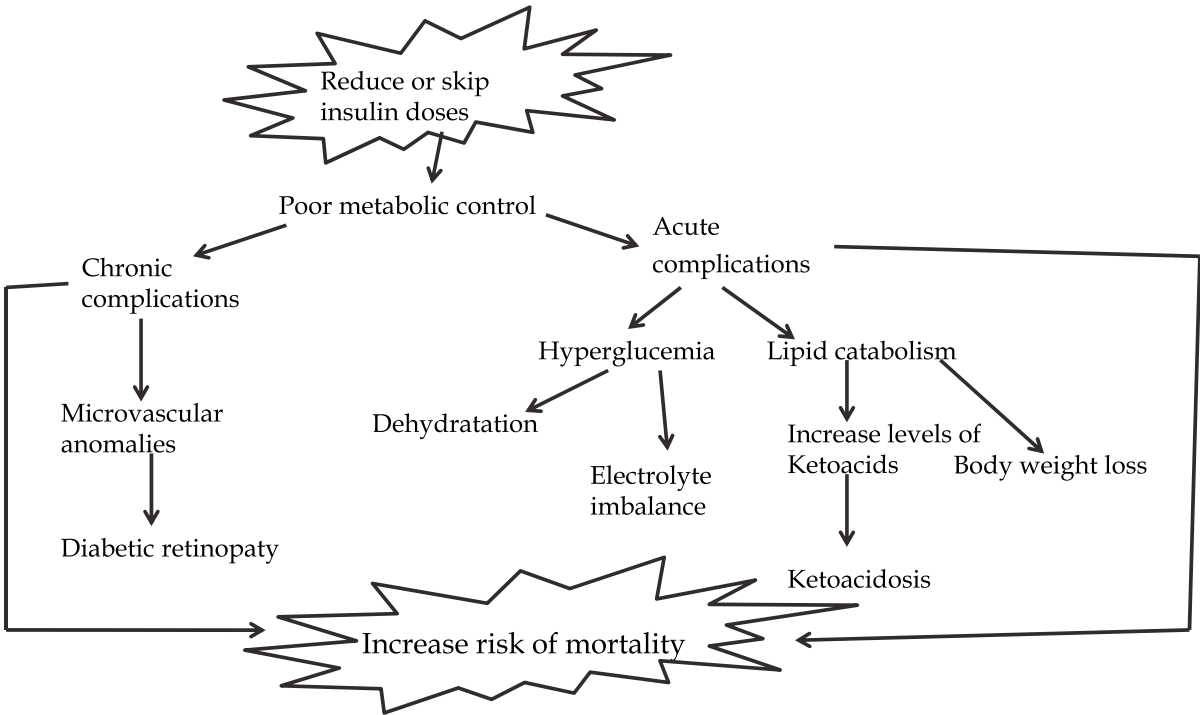


Fig. 1. Consequences of insulin misuse in type1 diabetic patients.

## **8. Management of inadequate coping attitudes in type 1 diabetic patients**

Several major trial carried out in the past decades, have demonstrated that intensive diabetes management for type 1, as well as type 2 diabetes, can delay or prevent the onset and progression of many complications of the disease, especially microvascular complications (DCCT, 1993; UKPDS, 1998). Such studies also have demonstrated that achieving excellent glycaemia control requires complex self-management behaviors to be learned and maintained.

Traditionally, diabetes education has focused on increasing knowledge about diabetes and its care and increasing skills to perform self-care behaviors, such as blood glucose monitoring. However, it is clear that although knowledge and skills are important prerequisites to diabetes self-management, additional training in the application of this knowledge and skills in day-to-day living are necessary for longer-term maintenance and improved outcomes. Cognitive-behavioral interventions such as coping skills training focus primarily on improving behavioral skills are necessary to achieve better glycaemia and psychosocial outcomes in patients with diabetes and in their relative members (Grey & Berry, 2004).

### **8.1 Social problem solving**

Social problem solving assists individuals when they are faced with peer or family pressures or any decision in which they are confronted with a dilemma. Social problem solving is a process by which an individual learns to think through the steps of having a problem and reaching a decision about how to handle the problem. The process assists individuals to look at all possible outcomes of situations and the possible consequences of their decisions (Duangdao & Roesch, 2008).

### **8.2 Conflict resolution**

The basis of conflict resolution is the acquisition of skills necessary to resolve conflict in a positive manner that results in positive outcomes for all parties involved in the conflict (Deustsch & Brickman, 1994). The first step in this training is development of the understanding that in any conflict both parties can win and that every conflict should be approached in this manner. The individual is helped to focus on clear communication and problem-solving skills. Once the conflict is identified, all possible outcomes and the consequences to these outcomes are explored. Role-playing can then be set up to try out the communication of the decision. Role-play is used as both forms of practice and feedback on communication skills.

### **8.3 Communication skills training**

This kind of training aims to help individuals express themselves in ways that are clear, appropriate, and constructive. Two main skills are identified under communication skills training: social skills training and assertiveness training. Models for social skills training include those by Cartledge & Milburn (Cartledge & Milburn, 1980) and Goldstein *et al.* (Goldstein *et al.*, 1980). These models strive to teach individuals how to work with others in a way that will result in positive outcomes for all. Assertiveness training permits one to communicate in ways that are direct, honest, and appropriate. Working groups allow

members to observe the behavior of others as well as practice and obtain feedback on how effectively they communicate with the other members of the group.

#### **8.4 Coping skills training**

Coping skills training has been utilized by Grey and Barry (Grey & Berry, 2004) in individuals with diabetes, particularly, in the area of problem solving. The framework is derived from Bandura's conceptualization of self-efficacy, where the individuals act as the catalyst for positive changes in their lives (Bandura, 1986). When a person can practice and rehearse a new behavior, such as learning how to cope successfully with a problem situation, self-efficacy or self-concept can be enhanced. Further, by enhancing self-efficacy, problems with psychosocial well-being may be decreased. When an individual cannot cope effectively with a problem situation, confidence is decreased for dealing with the next problem, and less successful coping patterns are employed (Marlatt & Gordon, 1985).

This kind of training was originally developed for work with youth to prevent drug and alcohol use, training in the use of coping skills can teach personal and social behaviors that can assist individuals in dealing with potential stressors they encounter in their daily lives and the stress reactions that may result from these situations (Forman et al, 1993). In children and youth, such interventions have been demonstrated to reduce substance abuse (Forman et al, 1993), improve social adjustment (Bierman & Furman, 1984), prevent smoking (DelGreco et al, 1986) and reduce responses to stressors (Elias et al, 1986). In adults, coping skills training has been used to address drug and alcohol use and weight reduction.

#### **8.5 Cognitive-behavioural modification**

The cognitive-behavioural modification process comprises three steps. The first is working with the individual to reflect on how they think and then respond to situations. The individual's thoughts are then examined to consider if the thoughts are based on fact or assumption. Once the thoughts are examined the next step is to solve the social problem. The last step consists in teaching the individual to use his or her thoughts to help follow through on the decision made in the previous step. The group members can list their negative thoughts and then the member and the group can formulate alternate positive thoughts to counter the negative thoughts.

#### **8.6 Coping skills training with children and adolescents**

The use of coping skills training for youth with diabetes was based on the hypothesis that improving coping skills would improve the ability of youth to cope with the problems faced on a day-to-day basis in managing diabetes. Initially, a number of studies were conducted in five to 10 years old school-children and preadolescents using coping skills training (Gross et al, 1982; Gross et al, 1983; Johnson et al, 1982). The results of these studies suggested that coping skills training increased appropriate verbal assertiveness and performance in social situation, but not glycaemia control. An experimental pilot study by Boardway et al (Boardway et al, 1993) also supported the potential of this intervention to assist adolescents to manage diabetes, the authors observed that diabetes-specific stress was found to decrease significantly after stress management training, but glycaemia control, coping styles, self-efficacy, and adherence to regimen remained unchanged.

Some controlled studies (Davidson et al, 1997; Grey et al, 1998; Grey et al, 2000) were conducted to determine whether coping skills training would improve glycaemia and

psychosocial outcomes in adolescents with type 1 diabetes mellitus implementing intensive diabetes management. They showed that, at 3 months, adolescents who received coping skills training had lower hemoglobin A1c levels and less distress about coping with their diabetes than adolescents receiving intensive management alone. Furthermore, adolescents who received coping skills training found it easier to cope with their diabetes and experienced less negative impact from diabetes on their quality of life than those who did not receive the training. The authors also demonstrated that the effects on glycaemia control and quality of life associated with coping skills training combined with intensive diabetes management can be sustained over 1 year (Grey et al, 2000).

Hains et al, (Hains et al, 2001) examined the impact of a cognitive behavioral intervention for distressed adolescents with type 1 diabetes mellitus. They studied six youths who had increased levels of anxiety, diabetes stress, or anger who received eight individual sessions using cognitive restructuring with problem solving through a conceptualization phase, skill acquisition phase, and application phase. Four patients demonstrated improvement on anxiety, anger expression, or diabetes stress, compared with baseline.

The results of the aforementioned studies suggest that in children and adolescents with type 1 diabetes, coping skills training increases the repertoire of skills that youth have to self-manage diabetes. Thus, they can improve their metabolic control and their quality of life.

### **8.7 Coping skills training with parents and children or adolescents**

Family environment has been found to play an important role in the adaptation of children with type 1 diabetes (McDougal, 2002). It has been shown that family interventions decrease parent-child conflicts about diabetes and improve metabolic control (Grey et al, 2003; Wysocki et al, 2000; Wysocki et al, 2001). One study that includes 119 families of adolescents with type 1 diabetes mellitus, assessed the effectiveness of an experimental group receiving Behavioral-Family Systems Therapy compared to both education and support groups in reducing parent-adolescent conflict in diabetes management. The Behavioral-Family Systems Therapy intervention targeted parent-adolescent conflict by focusing on family problem solving, communication skills training, cognitive restructuring, and aspects of functional and structural family therapy over 10 sessions. The results revealed that the experimental group showed significant improvement in parent-adolescent relationships, decreased diabetes-specific family conflicts, and increased treatment adherence when compared with education and support groups. At 6-month follow-up, parent-adolescent relationships remained significantly improved for the experimental group as compared to the control group. At 12 months, diabetes-specific family conflict was significantly improved compared to the control group. The experimental group showed improved treatment adherence compared with the control and education groups that both showed deteriorated adherence (Wysocki et al, 2000; Wysocki et al, 2001).

When parental involvement decreases, which is frequent in early adolescence, the metabolic control tends to deteriorate. Anderson et al. (Anderson et al, 1995) studied an office-based intervention to maintain parent adolescent teamwork in diabetes management. The study variables included parental involvement in diabetes care, family conflict, and subsequent metabolic control. Eighty-five patients aged 10 to 15 years were randomly assigned to one of three groups, which included teamwork, attention control, or standard control for 24 months. The teamwork families reported less conflict at 12 months. More adolescents in the teamwork group when compared to the comparison groups improved their HbA1c levels

from the 12- to 24-month period. The results suggested the value of parent-adolescent partnership in diabetes management.

The results of the mentioned studies of coping skills training and problem-solving interventions in children, and adolescents with diabetes, as well as parents of children with diabetes, have demonstrated that these interventions are effective in assisting people to improve diabetes self management and to achieve better diabetes outcomes (Grey & Berry, 2004).

## **9. The management of eating behavioral anomalies in type 1 diabetics**

No treatment outcome studies to date have examined treatment efficacy for DEB and ED in type1 diabetics, for this reason, many of the recommendations have not yet been empirically evaluated. ED have been shown to convey their own significant medical risk and also appear to persist and worsen over time. Treatment aimed at promoting family co-management of diabetes treatment tasks and decreasing diabetes-related family conflict have already been shown to promote improved diabetes outcomes in children and teens with type 1 diabetes (Nansel et al, 2008).

Despite the fact that little research has been done to determine the best treatment approaches for the problem of type 1 diabetic patients with ED or DEB, a multidisciplinary care team is considered the standard to treat these people. Such a team should include an endocrinologist/diabetologist, a nurse educator, a nutritionist with ED and/or diabetes training and a psychologist or social worker to provide weekly therapy. Depending on the severity of related psychiatric symptoms, such as depression and anxiety, a psychiatrist for psychopharmacologic evaluation and treatment should also be consulted. Team members must be allowed to frequently and openly communicate with each other to maintain congruent treatment approaches, messages and goals. Patients may require a medical or psychiatric inpatient hospitalization until they are medically stable and emotionally ready to engage in treatment as outpatients. Early in the treatment, monthly appointments with a team endocrinologist or nurse educator may be necessary to maintain medical stability, and monthly appointments with the nutritionists are also recommended. Laboratory tests, especially HbA1c and electrolytes, and weight checks should occur routinely at medical appointments. Unfortunately, such specialty services are rarely available to individuals with diabetes.

As a result, detection of insulin restriction may be unlikely until after the problem has become habitual and entrenched. Goebel-Fabbri et al (Goebel-Fabbri 2008) suggest that insulin restriction can be captured by a single screening item "I take less insulin than I should". The use of this question in routine clinical practice has the potential to identify at-risk subjects and, consequently, to make possible an early intervention. However, further studies are needed to assess the clinical utility of adopting such a question as a screening tool to identify insulin restrictors.

The overall goal of the treatment of patients with type 1 diabetes and DEB and ED is to return the patients to a state of premorbid physical and mental health. Treatment begins with emphasis on nutritional rehabilitation, weight restoration and adequate diabetes control (Anzai et al, 2002; Krakoff, 1991).

Psychotherapy should begin immediately for the patient and family, but it is not effective for the patient when is in a starvation mode (Walsh et al, 2000).



### 9.1 Diabetes treatment

The diabetes team has the important responsibility of monitoring insulin regimens and providing education about diabetes management and potential complications to patients and families (Krakoff, 1991). There are no studies looking at treatment of ED/DEB in youth with type 1 diabetes. The traditional approaches to poor blood glucose control involving a stricter and more intensive monitoring of the diabetic management may increase the risk for disordered eating (Colton et al, 1999). For this reason, it is recommended a less rigid approach in the insulin regimen and nutrition therapy to improve DEB. Lowering the amount of time spent on diabetes management during the day may help to lessen stress associated with the diabetes, which may in turn help alleviate DEB. Krokoff (Krokoff, 1991) suggested that self-destructive insulin manipulation within the context of an ED may also be an indirect call for help, signaling the need for more parental/adult intervention in patient's physical and mental health.

Trento et al, (Trento et al, 2009) suggest that offering a carbohydrate counting program within a group care management approach may help patients with type 1 diabetes acquire better self-efficacy and restructure their cognitive and lifestyle potential.

Technological advances can also be used to address specific treatment issues seen in these patients. For example, the first challenge that most patients face is weight gain associated with insulin restart. Patients need to be taught to indentify insulin edema, which may make them feel fat, bloated and uncomfortable, as temporary water retention that is different from the development of fatty tissue. Special tools designed to measure water-related weight versus lean muscle mass versus fat mass could help patients tolerate the temporary weight gain related to edema (Goebel-Fabbri 2008). Additionally, newer insulin analogs show evidence of improving weight profiles which could be of help (Goebel-Fabbri 2008; Russell-Jones & Khan, 2007).

### 9.2 Nutritional management

The dietician must balance the difficult tasks of providing diabetes education, ED education, writing meal plans and defining weight goals for patients and families (Anzai et al, 2002; Krakoff, 1991). The challenge presents when trying to balance the goal of slow weight gain and /or maintenance with diabetes meal planning. As the patient continues to increase calorie intake, insulin doses will need to be adjusted to match the amount of food eaten avoiding hyperglycemia. It is recommend a realistic goal of good blood glucose control instead of optimal blood glucose levels as the body readjusts to refeeding and the patient begins to benefit from psychotherapy. Multiple daily injections regimens that use insulin to carbohydrate ratios provide greater flexibility with meal times and amounts of food but do require increased blood glucose monitoring and insulin injections. Such intense diabetes management may increase the potential for disordered eating as the child or adolescent must think constantly about the effects of food, insulin and exercise on his or her blood glucose levels. This may not be an ideal approach to diabetes meal planning during the treatment and recovery from the ED. As the individual's physical and psychological health improves, the incorporation of more flexible meal-planning strategies may be useful. Care professionals, including nutrition therapists and diabetes educators, should be sensitive to weight-related changes and concerns in youth with type 1 diabetes. It is important for all health care professionals to be aware that weight loss may be related to glycaemia control.

9.3 Psychological therapy

Psychotherapy individual, group, and family therapy are the most common ways to treat ED. There are no studies showing the best psychotherapy modality for patients with type 1 diabetes and ED or DEB. Some authors propose individual therapy to help patients to recover from ED and diabetes mismanagement (Krokoff, 1991). Adolescents with type 1 diabetes often struggle with emotional issues related to having the illness and use an ED as a maladaptive coping mechanism. Individual therapy can help patients to develop more healthy coping strategies. Often families of patients with diabetes and ED have not adequately coped with the feelings of grief related to having a chronic illness in the family and thus they have not adequately supported the patient with diabetes. Dysfunctional family dynamics can exacerbate difficulties of adjusting to the illness and of resolving issues of grief and loss associated with the diagnosis. Family therapy is recommended to help the family in developing more functional ways of relating and in addressing issues of grief and loss that may be contributing to ED symptoms.

Psychoeducation is a useful method to aid the patient to develop skills that will help him or her to cope with a chronic disease. Therefore, it can be helpful in type 1 diabetic patients who have difficulties accepting the disease.

Psycho-pharmaceutical agents may be useful to treat comorbid mental health problems (Rosen, 2003). Table 2.

One uncontrolled study of cognitive behavior therapy (Peveler & Fairburn, 1992) and several case reports of other treatment approaches for ED associated with type1 diabetes have been reported (Nielsen et al, 1987; Peveler & Fairburn, 1989; Ramirez et al, 1990). Further research is needed to demonstrate whether more intensive, prolonged or alternative interventions may have a more significant impact on metabolic control and other diabetes-related outcomes.

Components	Recommendations
Diabetes therapy	Avoid intensive insulin regimens Avoid intensive glucose monitoring Use insulin analog with better weight gain profile Measure body weight with bioimpedance devices Involve family member in metabolic control
Nutrition	Less rigid diet recommendations Avoid excessive attention to the foods Meal planning based on family customs
Psychotherapy	Family therapy Psychoeducation Individual or group psychotherapy promote self-esteem Individual psychotherapy to promote adequate coping
Pharmacotherapy	Drugs to treat comorbidities associated with ED or DEB: depression, anxiety, etc.

Table 2. Components for the treatment of type 1 diabetic patients with ED or DEB.

## 10. Prevention

Since most type 1 diabetic patients do not admit to having an ED, this condition is commonly detected first by health care professionals (Walsh et al, 2000). The diabetes team may be the first to discover an ED and can play a crucial role in recommending proper treatment to the patient and family. It is unlikely that diabetes management will improve until appropriate treatment begins for the concurrent ED.

The results of studies on coping skills training and problem-solving interventions in children, adolescents, and adults with diabetes, as well as parents of children with diabetes, have demonstrated that these interventions are effective assisting people to improve diabetes self-management and to achieve better diabetes outcomes.

In childhood, the data suggest that interventions should include both children or adolescents and their parents within the first years after the diagnosis to improve self-management through learning problem-solving skills. Health care providers need to pay particular attention to adolescents with poorer glycaemia control and quality of life when they intensify their treatment, because they are less likely to reach treatment goals and may require additional support. Serious problems with self-management usually emerge during early adolescence and are difficult to correct [41,42]. The family management of diabetes should include a cooperative relationship between the patient, his or her family, and the diabetes health care provider team. The complexities of diabetes care demand a multifaceted approach that includes a strong foundation of diabetes education, medical supervision, reinforcement of positive self-care behaviors, and behavioral interventions that include problem solving and coping skills training. It is imperative to use problem solving strategies with psychological support that meet the developmental stage and level of adjustment for all family members involved in diabetes care.

Clinic-based group interventions for young women with diabetes and DEB may be the most practical and nonstigmatizing approach to prevention and early intervention for this problem. Rigid approaches to the dietary management of diabetes can contribute to the development of DEB. Rigid dieting has been shown to be a risk factor for ED in nonobese, nondiabetic women (Stewart et al, 2002). In type 1 diabetic patients feelings of deprivation associated with the perceived requirement for dietary restraint may trigger episodes of binge eating and subsequent insulin omission to prevent weight gain. Further, the weight gain associated with intensive diabetes management may amplify body dissatisfaction and the drive for thinness in susceptible girls (Daneman et al, 1998; Daneman & Rodin, 1999). For these reasons less intensive regimens are recommended in the initial stage of diabetes treatment, especially in young women.

It is recommended that the health care professional who treat young women with type 1 diabetes maintain a high index of suspicion for the presence of an eating disturbance, particularly among those patients with persistent poor metabolic control, repeated episodes of ketoacidosis and/or weight and shape concerns.

Screening for disordered eating behaviors in type 1 diabetics would be the best approach to get an early detection of behavioral abnormalities in these patients, however, a validated screening tool is not available yet (Dion Kelly et al, 2005). Clinicians working with adolescent and young adult women diabetes should be cognizant of patterns that might indicate the presence of DEB in their patients. They can include extreme concerns about weight and body shape, unusual patterns of intense exercise, sometimes accompanied or followed by frequent hypoglycemia, unusually low-calorie meal plans, unexplained

elevations in HbA1c values, repeated problems with diabetic ketoacidosis and amenorrhea (Olmsted et al, 2008). Recently, Markowitz et al. (Markowitz et al, 2010) proposed a 16-items diabetes-specific self-reported measure of disordered eating for brief screening tool for disordered eating in diabetes. Table 3.

Individual or group intervention aimed to increase self-esteem, appearance and body acceptance, and family-based interventions with the objective of developing flexible approaches to food and meal planning may help to avoid the development of DEBs in type 1 diabetic patients.

CLUES
Adolescents or young women with type 1 diabetes
Patients with high concern on body weight or shape
Patients with not adequate coping with diabetes
Poor metabolic control including frequent episodes of ketoacidosis
Type 1 diabetic patients with amenorrhea

Table 3. Clues to early diagnose ED or DEB in type 1 diabetics

11. Conclusions

Diabetes self-management is crucial to prevent early morbidity. Although more experimental research is needed, especially in minority populations and the non-adolescent age range, the addition of coping skills training and problem solving interventions to the clinical care of patients with diabetes appears warranted. Such interventions can be incorporated into routine diabetes education programs or the content included in regular diabetes care visits. Interventions using coping skills training and problem solving for children, adolescents, and adults with diabetes and their families should be individualized to their lifestyle, respect individual differences and routines, incorporate social support, and be reinforced and followed over time. Behavioral theory should be used in the design of future approaches.

Today is well-known that disordered eating behaviors and subthreshold disordered eating disorders are more prevalent in girls with type 1 diabetes than their peers without diabetes. DEB persists over time and its rates and symptoms severity increase with age. In type 1 diabetic women, the predominant ED are BN and EDNOS. Furthermore, these patients also develop specific DEB such as diet restriction, and insulin misuse in order to lose weight, with the consequent impairment of their metabolic control which is followed by acute diabetic complications such as diabetic ketoacidosis, dehydration or electrolyte anomalies, and chronic microvascular complications, mainly diabetic retinopathy, that even increase the risk of mortality.

Full established DEB and ED are difficult to manage. The management of these conditions requires a multidisciplinary team formed by an endocrinologist/diabetologist, nurse educator, nutritionist, psychologist and, frequently, a psychiatrist who should be consulted to evaluate and treat with psycho pharmaceutical products the possible psychiatric comorbidities of these patients. Unfortunately, the mentioned team is often not available for patients.

The best psychological methods to treat these anomalies are not determined yet. According to personal experience, patients tend to be treated individually or in group and, frequently,



it is needed familiar therapy. Results of the treatment of these entities from experienced health professionals are waiting.

The key for the management of type 1 diabetic patients with ED or DEB is the early diagnosis and treatment. Unfortunately, validated questionnaires to screen type 1 diabetic population are not available so far. Therefore it is important that the staff of the diabetes team who treats these patients should know the relationship between poor diabetes metabolic control and intentional misuse of insulin, or the recommended diet to control weight gain. They also should know that strict diet and intensive insulin regimens are risk factors for the development of DEB or ED. Therefore, it would be important to be alert to detect excessive concern about body weight, shape or body dissatisfaction in these patients. Eating disorders in type 1 diabetic patients represent some of the most complex patient problems to treat both medically and psychologically. Given the extent of the problem and the severe medical risk associated with it, more clinical and technological research aimed to improve its treatment is critical to the future health of this at-risk population.

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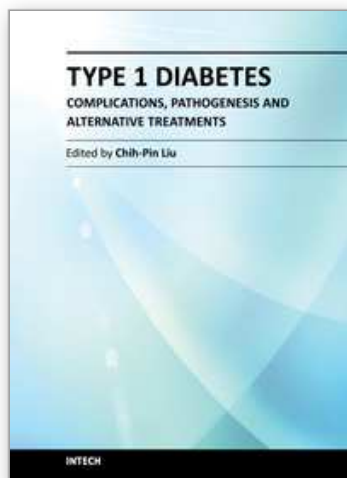


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This book is intended as an overview of recent progress in type 1 diabetes research worldwide, with a focus on different research areas relevant to this disease. These include: diabetes mellitus and complications, psychological aspects of diabetes, perspectives of diabetes pathogenesis, identification and monitoring of diabetes mellitus, and alternative treatments for diabetes. In preparing this book, leading investigators from several countries in these five different categories were invited to contribute a chapter to this book. We have striven for a coherent presentation of concepts based on experiments and observation from the authors own research and from existing published reports. Therefore, the materials presented in this book are expected to be up to date in each research area. While there is no doubt that this book may have omitted some important findings in diabetes field, we hope the information included in this book will be useful for both basic science and clinical investigators. We also hope that diabetes patients and their family will benefit from reading the chapters in this book.

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No.65, Yan An Road (West), Shanghai, 200040, China  
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Phone: +86-21-62489820  
Fax: +86-21-62489821

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