Diagnosis, Therapy and Follow-Up of Diabetes Mellitus in Children and Adolescents

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ABBREVIATIONS

µg	microgram
ABCC8	gene localization for the sulfonylurea receptor 1
Abs	antibodies
ACE	angiotensin-converting enzyme
ACR	albumin creatinine ratio
ADA	American Diabetes Association
ADHD	attention deficit/hyperactivity disorder
AER	albumin excretion rate
AGA	Working Group for Obesity/Arbeitsgemeinschaft für Adipositas

AGPDA	Working Group for Paediatric Diabetology/Arbeitsgemeinschaft für Pädiatrische Diabetologie
AHCPR	Agency for Health Care Policy and Research
AIHA	autoimmune hemolytic anemia
ALT	alanine transaminase = liver enzyme
APS	Working Group for Paediatric Metabolic Disorders/Arbeitsgemeinschaft für Pädiatrische Stoffwechselstörungen
AT_1	Angiotensin II receptor type 1
avg.	average
AWMF	German Association of the Scientific Medical Professional Societies/Arbeitsgemeinschaft der wissenschaftlichen medizinischen Fachgesellschaften
BABYDIAB	German BabyDiab-Study (German baby diabetes study)
BAR	Federal Working Group for Rehabilitation/Bundesarbeitsgemeinschaft für Rehabilitation
BdKJ	Association of Diabetic Children and Adolescents/Bund diabetischer Kinder und Jugendlicher
BG	blood glucose
BMI	body mass index
BMI-SDS	body mass index standard deviation score
BS	blood sugar
BW	body weight
c. a.	condition after
C-peptide	connecting peptide = part of proinsulin
CFRD	cystic fibrosis-related diabetes
CGM	continuous glucose monitoring
CK	creatine kinase
CNS	central nervous system
CSII	continuous subcutaneous insulin injection = insulin pump
CT	computer tomography
DAG	German Obesity Society/Deutsche Adipositas Gesellschaft
DAISY	Diabetes Autoimmunity Study of the Young (autoimmunity study for adolescents with diabetes)
DCC-Trial	Diabetes Control and Complications Trial (study on the control and complications of diabetes)
DDG	German Diabetes Society/Deutsche Diabetes Gesellschaft
DEND	diabetes epilepsy and beurological delay (genetic syndrome with diabetes, epilepsy and neurological developmental disorder)
DENIS	German Nicotinamide Intervention Study/Deutsche Nicotinamide-Intervention-Study
DEPS-R	Diabetes Eating Problem Survey – Revised
DGE	German Nutrition Society/Deutsche Gesellschaft für Ernährung
DGEM	German Society for Nutritional Medicine/Deutsche Gesellschaft für Ernährungsmedizin
DGKJP	German Society for Paediatric and Adolescent Psychiatry, Psychosomatics and Psychotherapy/Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie
diab.	diabetic
diabetesDE	Diabetes Germany
DIAMYD	Diamyd® Study
DIPP	Diabetes Prediction and Prevention Project
DKA	diabetic ketoacidosis
dl	decilitre
DNSG	Diabetes And Nutrition Study Group
DPT-1	Diabetes Prevention Trial – Type 1
DPM	Diabetes patient management (documentation system)
EASD	European Association for the Study of Diabetes
EDIC-Trial	Epidemiology of Diabetes Interventions and Complications Trial = Follow-up Study of the DCC Trial
EIF2AK3	Eukaryotic Translation Initiation Factor 2 Alpha Kinase 3 – gene locus for mutations leading to a genetic syndrome with diabetes
EC	evidence class (methodological quality of a study according to criteria of evidence-based medicine)
ECG	electrocardiogram
EMA	European Medicines Agency
ENDIT	European Nicotinamide Intervention Trial
ES	educational support (therapeutic support in parenting)
esp.	especially
ethn.	ethnic
fam.	familiar
FES	family environment scale = scale for the evaluation of social characteristics and the environment of families
FOXP3	forkhead box P3 – gene locus for mutations leading to genetic syndromes with diabetes
FST-D	family system therapy for patients with diabetes
fT3	free triiodothyronine
fT4	free thyroxine
g	gram
GAD	glutamate decarboxylase
GCK	glucokinase

h	hour
HbA1c	glycated haemoglobin
HDL	high-density lipoprotein
HHS	hyperglycaemic hyperosmolar syndrome
HLA	human leukocyte antigen
HNF	hepatocyte nuclear factor
HTA	health technology assessment = systematic assessment of medical technologies, procedures aids and organizational structures, in which medical services are provided
I.U.	international unit(s)
i. m.	intramuscular
IV	intravenously
IA-2	tyrosine phosphatase IA-2 antibody
IAA	insulin autoantibodies
ICA	islet cell antibody
ICT	intensified conventional therapy
IgA	immunoglobulin A
IgG	immunoglobulin G
INS	insulin(s)
IPEX	immunodysregulation polyendocrinopathy enteropathy X-linked syndrome
IPF-1	insulin promoter factor 1 = gene locus with mutations leading to MODY-4 diabetes
IRMA	intraretinal microvascular anomaly
ISPAD	International Society for Paediatric and Adolescent Diabetes
ITP	immune thrombocytopenic purpura
n/a	not available
kcal	kilocalories
KCNJ11	inward-rectifier potassium ion channel, subfamily J, member 11
kg	kilogram
Kir6.2	major subunit of the ATP-sensitive K+ channel
KJHG	child and youth welfare law
l	litres
LDL	low-density lipoprotein
LGS	low-glucose suspend
m^2	square meters
max.	maximum
mg	milligram
micro	microalbuminuria
min.	minimum
MJ	megajoules
ml	millilitres
mm	millimetres
mmHg	millimetres of mercury = used to measure blood pressure
mmol	millimole
mon	month(s)
MODY	maturity onset diabetes of the young (adult diabetes in adolescents) = monogenetic diabetes
MRI	magnetic resonance imaging
n	number
NaCl	sodium chloride
NDM	neonatal diabetes mellitus
NCV	nerve conduction velocity
NPH	neutral protamine Hagedorn
NYHA	New York Heart Association classification system for the severity of heart failure
OGTT	oral glucose tolerance test
p	p-value/probability value – exceeding probability, statistical information
PAL	physical activity level (value for measuring the daily physical activity expenditure)
Pat.	patient(s)
pCO_2	arterial partial pressure of carbon dioxide
pH	potentia hydrogenii (capacity of hydrogen) = negative logarithm of the hydrogen ion concentration/activity, measure for acidity of a medium
PGAs	polyglandular autoimmune syndromes
PLGM	predictive low glucose management
PNDM	permanent neonatal diabetes mellitus
RCT	randomized controlled trial
RR	Riva Rocci = arterial blood pressure, measured according to the method of Riva Rocci
s. c.	subcutaneous
SC	standard care (standard treatment)
SEARCH	search for diabetes in the youth study (studies for the identification of diabetes in children and adolescents)
SGB	Social Code (Sozialgesetzbuch)
SIGN	Scottish Intercollegiate Guidelines Network
sign.	significant
SSRI	selective serotonin reuptake inhibitor
STIKO	Standing Vaccination Commission of the Federal Republic of Germany/Ständige Impfkommission der Bundesrepublik Deutschland
SaP	sensor-augmented pump therapy
SUR 1	sulphonylurea receptor 1
SaT	sensor-augmented insulin therapy
T3	triiodothyronine
T4	thyroxine
tTG	tissue transglutaminase
Tg	thyroglobulin
TNDM	transient neonatal diabetes mellitus
TPO	thyroid peroxidase
TSHR	thyrotropin receptor
TRIGR	Trial to Reduce IDDM in the Genetically at the Risk (Study on the reduction of diabetes mellitus by immunodeficiency

	for genetical risks)
TSH	thyroid-stimulating hormone/thyrotropin
U	unit
UK	United Kingdom
vs.	versus
WHO	World Health Organization
Y	years
ZnT8	zinc transporter 8

Causes and background

The improvement of the care of children and adolescents with diabetes mellitus is an essential task of the Working Group for Paediatric Diabetology/Arbeitsgeschaft für Pädiatrische Diabetologie (AGPD).

In order to meet the needs of a chronic disease in childhood and adolescence, specific aspects of this stage of life must be taken into account.

These guidelines are addressed to all professional groups that care for and support children and adolescents with diabetes and their families, as well as to higher-level organisations (e. g. health insurance companies) that are involved with or affected by the disease.

In accordance with the specifications of the health ministers of the federal German states as well as the current practice of many clinics, these paediatric guidelines are valid until the age of up to 18 years. In individual clinical cases, however, these guidelines can also be extended to apply to early adulthood.

Epidemiology and types of diabetes in childhood and adolescence

Type 1 diabetes

Type 1 diabetes is still the most common metabolic disease in children. According to current estimates, 15600 to 17400 children and adolescents aged 0–14 years live with type 1 diabetes in Germany [Rosenbauer et al. 2013]. At the beginning of the millennium, 21000 to 24000 children and adolescents aged 0–19 years were affected [Rosenbauer et al. 2002]. This figure is currently estimated at around 30000 to 32000 [Rosenbauer et al. 2012].

In the 1990s, average annual new illness rates (incidence rates) were reported between 12.9 (95 % confidence interval 12.4–13.4) and 14.2 (95 % confidence interval 12.9–15.5) per 100000 children aged 0–14 years and 17.0 (95 % confidence interval 15.2–18.8) per 100000 children aged 0–19 years [Neu et al. 2001; Rosenbauer et al. 2002; Neu et al. 2008]. The incidence rate has increased by 3–4 % per year [Ehehalt et al. 2008; Neu et al. 2013]. Compared to the early 1990s, the new illness rate for 0–14-year-olds has now doubled and is currently 22.9 (95 % confidence interval 22.2–23.6). The increase in incidence rates especially affects the younger age groups.

Type 2 diabetes

Parallel to the increase in the prevalence of excess weight and adiposity in childhood and adolescence [Kurth and Schaffrath (2007); Kromeyer-Hauschild et al. 2001], the incidence of type 2 diabetes has increased in this age group. Initial population-based estimates of type 2 in children and adolesccents showed an incidence of 1.57 per 100000 (95 % confidence interval 0.98–2.42) [Rosenbauer et al. 2003]. Studies carried out in Baden-Württemberg in 2004 showed that type 2 diabetes in Germany occurs in 0 to 20-year-olds with a prevalence of 2.3 per 100000 [Neu et al. 2005]. A second cross-sectional survey in Baden-Württemberg conducted in 2016 confirmed the relatively low and constant incidence of 2.4 per 100000 [Neu et al. 2017].

Risk factors, prevention and early detection of diabetes

According to the current guidelines of the International Pediatric Diabetes Association/Internationalen Pädiatrischen Diabetesgesellschaft ISPAD, the progression of type 1 diabetes has recently been divided into 4 stages [Couper et al., (2018)]. Stage 1, the beginning of type 1 diabetes according to the new classification, is when 2 or more diabetes-specific autoantibodies are detectable but children and adolescents are completely asymptomatic. If glucose tolerance is impaired, this corresponds to stage 2. Stage 1 and stage 2 can precede months and years of clinical manifestation. Stage 3 is when there is a manifestation and stage 4 is the case of a type 1 diabetic who has lived with the disease for some time.

Measures to maintain beta cell function can start before the onset of islet autoimmunity (early stage 1, primary prevention), after the development of autoantibodies but before clinical symptoms (stages 1 and 2) or rapidly after the manifestation of type 1 diabetes (stage 3). The progression of type 1 diabetes with proven autoantibodies occurs more rapidly with seroconversion to islet autoimmunity before the 3rd year of life and in children with an HLA-DR3/DR4-DQ8 genotype [Ziegler et al., (2013)].

The 5 and 10-year risk of type 1 diabetes manifestation in children who show multiple autoantibodies at the age of 5 years or earlier is 51 and 75 %, respectively [Danne et al., (2018)], German Health Report Diabetes/Dt. Gesundheitsbericht Diabetes].

Type 1 diabetes

The diagnosis of type 1 diabetes is based on clinical symptoms and blood glucose monitoring. In case of doubt, further parameters can be used for diagnosis. These include:

- Autoantibodies associated with diabetes (ICA, GAD65, IA-2, IAA, ZnT8),
- An oral glucose tolerance test, and
- Determination of HbA1c [Ehehalt et al. 2010; Mayer-Davis et al., (2018)].

10–15 % of all children and adolescents under the age of 15 with type 1 diabetes have first-degree relatives with diabetes and thus a positive family history [Rosenbauer et al. 2003; Scottish Study Group for the Care of the Young Diabetic (2001)]. The risk of developing diabetes is 3 times higher for children with a father suffering from diabetes than for children with a mother suffering from diabetes [Gale et al. 2001]. While antibodies and other markers might provide a prediction and risk calculation regarding the occurrence of diabetes, there are no effective prevention strategies

that could prevent the manifestation of diabetes [Rosenbloom et al. 2000; Australasian Paediatric Endocrine Group et al. 2005].

A general screening for type 1 diabetes should therefore not be performed in the general population or in high-risk groups among children and adolescents [Australasian Paediatric Endocrine Group et al. 2005]. According to the latest recommendations gleaned from scientific studies, screening and intervention in the absence of symptoms of type 1 diabetes remain reserved [Couper 2018].

Type 2 diabetes

An oral glucose tolerance test for the early detection of type 2 diabetes should be performed as of age 10 in cases of excess weight (BMI > 90th percentile) and the presence of at least 2 of the following risk factors:

- Type 2 diabetes in 1st or 2nd degree relatives,
- Belonging to a group with increased risk (e. g. East Asians, African Americans, Hispanics),
- Extreme obesity (BMI > 99.5th percentile) or
- Signs of insulin resistance or changes associated with it (arterial hypertension, dyslipidaemia, elevated transaminases, polycystic ovarian syndrome, acanthosis nigricans)

[Working Group for Obesity in Childhood and Adolescence (AGA) 2008/Arbeitsgemeinschaft Adipositas im Kindes- und Jugendalter AGA (2008)].

Therapy for type 1 diabetes

Start of therapy

Insulin therapy should be initiated immediately after the diagnosis of type 1 diabetes, as the child's metabolism can deteriorate rapidly. A diabetes team experienced with children should be called in as soon as possible [Bangstad et al. 2007].

Therapy goals

Initial treatment and long-term care should be carried out by a team experienced in paediatric diabetology continuously from ages 1–18, and, in certain cases, also up to the age of 21. Specialised care has been shown to contribute to a reduction in days spent in hospital and readmissions, to a lower HbA1c value, better disease management and fewer complications [Cadario et al. 2009; Pihoker et al. 2014; Australasian Paediatric Endocrine Group et al. 2005].

The treatment of type 1 diabetes by the treatment team should include:

- Insulin therapy,
- Individual metabolic self-monitoring,
- Age-adapted structured training as well as
- Psychosocial care for the affected families.

The following medical goals are in the foreground when caring for paediatric patients with diabetes mellitus [Danne et al. 2014; Ziegler 2018]: avoidance of acute metabolic lapses, prevention of diabetes-related microvascular and macrovascular secondary diseases and normal physical development (growth in height, weight gain, onset of puberty). The patient's psychosocial development should be affected as little as possible by diabetes and its therapy, and integration and inclusion in day care, school and vocational training should be ensured.

Individual therapy goals should be formulated together with the child or adolescent and his or her family (HbA1c value, blood glucose target ranges, behavioural changes that come with risk-taking lifestyles, integration efforts, etc.).

The HbA1c target value of < 7.5 % was modified in 2018 by the ISPAD to a new target value of < 7.0 %, the ADA recommendations still lie at < 7.5 %, whereas the English NICE recommendations assume a target value of < 6.5 % [DiMeglio et al., (2018)].

An additional parameter for evaluating the metabolic state is the time spent in the target range (TIR = time in range). As a rule, the target range is defined as 70–180 mg/dl. An individual goal for the duration of the TIR is recommended [Danne 2017; Battelino T. 2019].

Preprandial glucose values should be between 70 and 130 mg/dl (4.0–7.0 mmol/l) and postprandial values between 90 and 180 mg/dl (5.0–10.0 mmol/l). Values of 80–140 mg/dl (4.4–7.8 mmol/l) are recommended at bedtime [DiMeglio 2018].

The average frequency of glucose control should be between 5 and 6 times a day but can be significantly higher in individual cases [Ziegler et al. 2011].

Continuous treatment of type 1 diabetes

The continuity of the treatment of diabetes mellitus of a child or adolescent with diabetes, both over time and during different phases of life and development, is decisive for ensuring a metabolic situation as close as possible to normoglycaemia and an unencumbered psychosocial development.

Care of children in day cares and schools

Children with diabetes should be cared for in day cares, regular schools and after-school centres [Hellems and Clarke 2007]. The right to inclusion is laid down in § 53 and § 54 of the German Social Code Book XII/Sozialgesetzbuch XII. This provides the basis for the assumption of costs for age-appropriate care.

An individual plan should be created for each institution which includes the frequency and intervention limits of blood glucose measurements, the delivery of insulin (mode, time, dose calculation), defining of mealtimes, symptoms and management of hypoglycaemias and hyperglycaemias [American Diabetes Association (ADA) 2015]. In addition to children, adolescents and their parents, all caregivers in the social environment must also be trained to enable inclusion [Ziegler 2018].

Support during the transition to young adulthood

The transition from paediatric to adult care affects young people with diabetes aged 16–21 years in a life phase of general upheaval and should therefore be accompanied. Various models (transitional consultations, structured paediatric/internal medicine transition, etc.) are practised [Nakhla et al. 2008; Australian Paediatric Endocrine Group et al. 2005; Court JM et al., 2008].

Care in case of illness and preventing illness risks

In the case of serious illnesses or in perioperative cases, children with diabetes should be referred to an experienced centre with

well-trained staff and the paediatric diabetologist should also be consulted [Brink et al. 2007].

Under no circumstances should insulin be completely omitted in the case of low glucose levels or refusal to eat. The administration of carbohydrates is necessary in order to avoid substrate deficiency and ketone body formation. The possibility of measuring β-hydroxybutyrate should be provided [Laffel 2018].

Children with diabetes mellitus should be vaccinated according to STIKO (Ständige Impfkommission/Standing Committee on Vaccination) recommendations.

Diabetes treatment during physical activity/sports

Regular exercise improves metabolic control and should be a matter of course for children and adolescents with diabetes. Regular swimming has been shown to significantly reduce HbA1c [Sideravicite et al. 2006].

Since blood glucose is lowered by energy consumption during physical activity, the risk of hypoglycaemia is increased. The strongest predictor for hypoglycaemia is the initial glucose value, which should be at least 120 mg/dl (6.6 mmol/l); otherwise additional carbohydrates may be required [Tansey et al. 2006]. Individual therapy plans with insulin dose adjustment and corresponding behavioural rules should be put together for each patient [Adolfsson 2018].

Insulin treatment

The standard treatment for paediatric patients with type 1 diabetes is intensified insulin therapy [Danne 2018].

All insulin therapy should be carried out as part of comprehensive diabetic care and with the support of the family.

Insulin therapy should be individually tailored to each child [Diabetes Control and Complications Trial Research Group 1995; White et al. 2008; Nathan et al. 2005; Musen et al. 2008].

Human insulin or insulin analogues should be used for paediatric patients [Bangstad et al. 2007; Danne et al. 2005; Mortensen et al. 2000; Deeb et al. 2001; Plank et al. 2005; Simpson et al. 2007].

Normal insulin should be used for intravenous insulin treatment.

Rapid-acting insulin and insulin analogues (prandial substitution)

There are differences between rapid-acting human insulin and fast-acting insulin analogues in the onset and duration of action in children and can be used flexibly for prandial substitution in children depending on the situation [Danne et al. 2005; Mortensen et al. 2000].

Rapid-acting insulin analogues should be used for insulin pump therapy.

Long-acting insulin and insulin analogues (basal substitution)

Both NPH insulin and long-acting insulin analogues can be used individually for basal insulin substitution in children [Danne et al. 2003; Danne et al. 2008; Thisted et al. 2006; Robertson et al. 2007; Danne et al. 2013; Thalange et al. 2015].

Insulin pump therapy

Insulin pump therapy for children and adolescents is both safe and effective. It has a positive effect on the frequency of hypoglycaemia, ketoacidosis and the metabolism [Karges et al., (2017)]. Particularly in young children, pump therapy enables better adjustment of the insulin dose, especially at night, thus helping to prevent hypoglycaemias. Insulin pump therapy is recommended for the following indications:

- Small children, especially newborns, infants and preschoolers,
- Children and adolescents with a marked increase in blood glucose in the early morning hours (Dawn phenomenon),
- Severe hypoglycaemias, recurrent and nocturnal hypoglycaemias (despite intensified conventional therapy = ICT),
- HbA1c value outside target range (despite ICT),
- Severe blood glucose fluctuations, despite ICT, independent of the HbA1c value,
- Incipient microvascular or macrovascular secondary diseases,
- Limitation of the quality of life through previous insulin therapy
- Children with a great fear of needles,
- Pregnant adolescents (ideally before conception in the case of a planned pregnancy) as well as
- Competitive athletes [Phillip et al. 2007].

Continuous glucose monitoring (CGM), sensoraugmented insulin therapy (SaT) and sensoraugmented pump therapy (SaP)

CGM systems have been approved and can be prescribed for children and adolescents. They are available in the form of rt (real-time) CGM systems and in the form of isc (intermittent scanning) CGM systems. They can be used in combination with ICT (sensor-augmented insulin therapy = SaT). Some CGM systems can be used together with an insulin pump, or the insulin pump can serve as a monitor for CGM data. This combination (CSII + CGM) is now called sensor-augmented pump therapy (SaP). In addition, there is the possibility of switching off the basal rate when the tissue glucose reaches a critical limit (SaP + LGS = low-glucose suspend). A further development of the LGS already interrupts the supply of insulin if it predicts that hypoglycaemia will occur in the foreseeable future (predictive insulin switch-off, predictive low-glucose suspend = PLGS). The combination of both systems is called sensor-integrated pump therapy (SiP). Recently, CGM and insulin pumps have been combined to form an "AID system" (automated insulin delivery). An algorithm continuously calculates the respective insulin dose from the measured tissue glucose values, taking into account individual user data. Currently, "hybrid AIDs" are available for children and adolescents with type 1 diabetes. Here, the term "hybrid" means that the supply of the food-independent, basal insulin component takes place automatically according to the current insulin requirement and the insulin continues to be delivered manually by the user at mealtimes. All studies have shown that such hybrid AID systems can improve metabolic control in children, adolescents and adults with type 1 diabetes at night, but also during the day.

Soon, so-called "Advanced AID Systems" will be available, which, in addition to adjusting the basal rate at higher glucose values, will

automatically deliver small insulin microboli as an additional correction.

CGM should be used for children and adolescents with type 1 diabetes and insulin pump therapy

- To reduce the hypoglycaemia rate (frequency, duration, depth) or
- In cases of recurrent nocturnal hypoglycaemia or
- In cases of a lack of hypoglycaemia perception or
- In cases of severe hypoglycaemia or
- For improvement of metabolic control without a simultaneous increase in hypoglycaemias or
- To reduce pronounced glucose variability

[Bergenstal et al. 2013; Ly et al. 2013; Maahs et al. 2014].

CGM should be used in paediatric patients with type 1 diabetes who have not achieved their HbA1c targets after having considered and used other measures and training courses for optimizing metabolic control [Battelino et al. 2012; Bergenstal et al. 2010; Danne 2017; Sherr 2018].

Nutritional recommendations

Nutritional counselling for children and adolescents with diabetes is an important part of a comprehensive therapy training plan and should include the following components:

- Information on the blood glucose efficacy of carbohydrates, fats and proteins,
- Strengthening healthy diets as part of family meals and in public institutions: regular, balanced meals and snacks (fruit, vegetables, raw vegetables), prevention of eating disorders (especially uncontrolled, binge eating) and the prevention of excess weight,
- Consideration of cultural eating habits,
- Enough energy for age-appropriate growth and development,
- Working toward a normal BMI, which includes regular physical activity,
- A good balance between energy intake and consumption in accordance with the insulin profiles,
- Nutrition during illness and sport and
- Reducing the risk of cardiovascular disease.

Nutrition specialists (dieticians/ecotrophologists) with an in-depth knowledge of paediatric and adolescent nutrition and insulin therapy should provide this counselling [Smart et al. 2014; Craig et al. 2011].

Nutritional recommendations should include all dietary components and their share in daily energy intake [German Nutrition Society/Deutsche Gesellschaft für Ernährung (DGE) 2015].

Diabetes training

Patient training is an essential part of diabetes therapy. It cannot be successful without proper, individualised medical treatment [Bloomgarden et al. 1987; de Weerdt et al. 1991].

Children, adolescents and their parents or other primary caregivers should have continuous access to qualified training starting from the time of diagnosis onwards [Craig et al. 2011; Bundesärztekammer (BÄK) et al.; Canadian Diabetes Association Clinical Practice Guidelines Expert Committee 2013; Kulzer et al., 2013; Martin et al. 2012; Lange et al. 2014; Haas et al. 2014].

Training should be offered to caregivers in institutions (e. g. teachers in schools, educators in day cares, nurseries, after-school centres or group homes) [Hellems et al. 2007; Lange et al. 2012; Clarke et al. 2013].

The training should be conducted by a multi-professional diabetes team with proper knowledge of age-specific needs, possibilities and requirements that current diabetes therapies place on patients and their families.

All team members should participate in the training and work toward formulating and achieving uniform therapy concepts and goals [Swift et al. 2010; Lange et al. 2014; Cameron et al. 2013].

The learning process should be accompanied by evaluated training materials that are oriented towards the cognitive development and needs of children and adolescents. The same applies to training materials for parents which should include parenting tasks and age-specific diabetes therapy of their children [Martin et al. 2012; Lange et al. 2012; Lange et al. 2014].

Diabetic training is a continuous process and can only be successful through repeated needs-based offers (at least every 2 years) during long-term care. New therapy concepts, e. g. the start of insulin pump therapy or continuous glucose monitoring (CGM) and new life stages (e. g. starting school) should be accompanied by additional training. Other diseases (e. g. celiac disease or ADHD) or acute complications (e. g. DKA, severe hypoglycaemias) or psychological problems require personalised treatment [Jacobson et al. 1997; Haas et al. 2014; Lange et al. 2014; Delamater et al. 2014].

Rehabilitation

In-patient rehabilitation can be carried out:

- In the case of persistently poor skills in dealing with diabetes,
- If there are diabetic secondary complications which are either already present or imminent in the short-term,
- After the in-patient primary therapy of the newly diagnosed diabetes mellitus if initial training cannot be provided near the patient's home (in the form of follow-up treatment),
- In the case of long-term inadequate metabolic control under out-patient care conditions, e. g. recurrent hypoglycaemia or ketoacidosis, and
- In the event of serious disruptions to activities and/or to the child or adolescent being able to participate in age-appropriate activities or in everyday life, e. g. frequent sick days (§ 4 SGB 9; Federal Working Group for Rehabilitation/Bundesarbeitsgemeinschaft Rehabilitation)

[Federal Working Group for Rehabilitation/Bundesarbeitsgemeinschaft für Rehabilitation (BAR) 2008; Fröhlich et al. 2008; German Pension Insurance Association/Deutsche Rentenversicherung Bund 2009; German Society for Paediatric Rehabilitation and Prevention/Deutsche Gesellschaft für pädiatrische Rehabilitation und Prävention 2007; Stachow et al. 2001].

Psychological and social risks, comorbidities and interventions

In the case of a diabetes diagnosis, a history of the psychosocial family situation should be recorded. The families should also receive psychosocial counselling and the interdisciplinary team should provide them with therapeutic aids for diabetes management. The psychological situation of the parents and other primary caregivers also needs be taken into account [Hürter et al. 1991; Sundelin et al. 1996; Delamater et al. 1990; Craig et al. 2011; Delamater et al. 2014; Forsander et al. 1998; Sullivan-Bolyai et al. 2011; Forsander et al. 2000; Zenlea et al. 2014].

The current psychosocial situation and possibly stressful life events should be continuously recorded within the framework of long-term care (intellectual, academic, emotional and social development) and taken into account in therapy planning.

For this reason, it is important for social workers and psychologists with diabetes-specific expertise to be an integral part of the interdisciplinary diabetes team [Silverstein et al. 2005; Craig et al. 2011; de Wit et al. 2008; Delamater et al. 2014; Kulzer et al. 2013; Hilliard et al. 2011; Haas et al. 2014; de Wit et al., 2012].

Particularly in adolescents, signs of eating disorders and mood affective disorders (e. g. anxiety, depression, adjustment disorders) should be monitored and professional help sought and carried out in a timely manner.

If a psychiatrically-relevant disorder is present, paediatric and adolescent psychiatrists or psychological psychotherapists should be consulted in order to initiate co-treatment if necessary. A coordinated treatment between psychiatrist and diabetes team should be strived for [Northam et al. 2005; Lawrence et al. 2006; Delamater et al. 2014; Kulzer et al. 2013; Young et al. 2013].

Children and adolescents with diabetes have an increased risk of impaired information processing and learning. Children with early onset diabetes, severe hypoglycaemias and chronic hyperglycaemias in early life are particularly affected.

Therefore, the school performance of children with increased risk (diabetes diagnosis under 5 years, severe/chronic hyperglycaemias) should be recorded. In case of learning difficulties, they, just as all children, should be assessed neuro-physiologically and psychologically and, if necessary, receive educational support [Delamater et al. 2014].

Acute complications

Diabetic ketoacidosis

Diabetic ketoacidosis is a potentially life-threatening disease. It should be treated immediately in a specialized facility by a diabetes team experienced with children. There should be a written treatment plan for treating diabetic ketoacidosis in children and adolescents [Australasian Paediatric Endocrine Group et al.; Glaser et al. 2006; Fiordalisi et al. 2007].

The biochemical criteria for ketoacidosis include:

- pH < 7.3,
- Bicarbonate < 15 mmol/l,
- Hyperglycaemia > 11 mmol/l, > 200 mg/dl and
- Ketonuria and presences of ketones in serum.

Ketoacidosis is categorised into 3 stages of severity:

- Mild (pH < 7.3; bicarbonate < 15 mmol/l),
- Moderate (pH < 7.2; bicarbonate < 10 mmol/l) and
- Severe (pH < 7.1; bicarbonate 5 mmol/l)

[Wolfsdorf et al. 2007].

The following therapy goals are to be pursued in ketoacidosis:

- Stabilisation of cardiovascular system with initial volume bolus using isotonic solution,
- Subsequent slow, balanced fluid resuscitation and electrolyte replacement,
- Slow normalization of blood glucose,
- Balancing out of acidosis and ketosis,
- Avoidance of therapy complications (cerebral oedema, hypokalaemia) and
- Diagnosis and therapy of triggering factors

[Australasian Paediatric Endocrine Group et al. 2005b; Wolfsdorf et al. 2018] (▶ **Tab. 1**).

During the treatment of severe diabetic ketoazidoses, clinical observation and monitoring should take place at least every hour [Australasian Paediatric Endocrine Group 2005; Edge et al. 2006; Wolfsdorf et al. 2018].

Patients with severe ketoacidosis and an increased risk of cerebral oedema should be treated immediately in an intensive care unit or a specialized diabetes unit with comparable equipment by a diabetes team experienced with children.

Patients with suspected cerebral oedema should be treated in an intensive care unit in cooperation with an experienced diabetes team [Australasian Paediatric Endocrine Group et al. 2005; Wolfsdorf et al. 2018].

Patients with clear signs of cerebral oedema should be treated with mannitol or hypertonic saline solution before further diagnostic measures (MRT) are initiated [Australasian Paediatric Endocrine Group et al. 2005; Fiordalisi et al. 2007; Hanas et al. 2007; Roberts et al. 2001; Franklin et al. 1982; Banks and Furyk (2008); Wolfsdorf et al. 2018].

Case reports or case series are available on the therapeutic efficacy in symptomatic cerebral oedema of an early intravenous mannitol administration (0.5–1 g/kg) over 10–15 min and repeated if necessary (after 30 min.) [Fiordalisi et al. 2007; Hanas et al. 2007; Roberts et al. 2001; Franklin et al. 1982].

Hypoglycaemia

Hypoglycaemia is the most common acute complication in diabetes [Diabetes Control and Complications Trial Research Group 1994].

According to the latest recommendation by the Hypoglycemia Study Group [International Hypoglycaemia Study Group (2017)], a distinction is made between blood glucose values in the following groups:

Stage 1: < 70 mg/dl (3.9 mmol/l), requires attention and treatment, if necessary

Stage 2: < 54 mg/dl (3 mmol/l), always requires immediate treatment and

▶ **Tab. 1** Medicinal treatment of ketoacidosis (taking the control of electrolytes, pH, blood glucose, ketone bodies into consideration).

Treatment goal/ indication	Medicine	Dose	Chronological sequence
Initial stabilisation of cardiovascular system, if necessary	NaCl 0.9 %	10–20 ml/kg IV	Immediately over 1–2 h
Fluid resuscitation after initial cardiovascular stabilisation	NaCl 0.9 % or Ringer's solution, after 4–6 h NaCl 0.45 % also possible	Maximum daily IV dose < 1.5 to 2 times the maintenance requirement in relation to age/ weight/body	At least over 36–48 h
Lowering of blood glucose	Normal insulin	0.1 U/kg/h IV, for younger children 0.05 U/kg/h	Begin insulin administration 1–2 h after start of volume administration; no interruption of insulin delivery up to pH > 7.3; lowering of blood glucose by 2–5 mmol/l/h (36–90 mg/dl/h)
Avoidance of hypoglycaemia	Glucose	Final concentration: 5 % glucose/0.45 % NaCl solution	Start from BG as of 15 mmol/l (270 mg/dl) or at lowering of BG > 5 mmol/l/h (90 mg/dl/h)
Balance of potassium	KCl	40 mmol/l volume; 5 mmol/kg/ day IV; not > 0,5 mmol/kg/h	For hypokalaemia immediately, for normokalaemia together with the start of insulin administration, in the case of hyperkalaemia only after resumption of urine production; continuous administration until volume compensation has been fully compensated
Balance of phosphates	Potassium phosphate	At pH < 7.1 half the potassium substitution	Until phosphate is in the normal range again

BG = blood glucose

Stage 3: with impaired consciousness, always requires immediate treatment.

Slight hypoglycaemia can be corrected by the patient through the intake of fast-acting carbohydrates.

Severe hypoglycaemia can only be remedied with external help due to the accompanying limitation or loss of consciousness. In addition to a loss of consciousness, a severe hypoglycaemia can also be accompanied by a cerebral seizure.

Children and adolescents with type 1 diabetes should always carry fast-acting carbohydrates in the form of dextrose or the like, in order to be able to act immediately in the event of mild hypoglycaemia and thus prevent severe hypoglycaemia. Parents or other primary caregivers should be instructed in the use of glucagon injections or other immediate measures.

Caregivers in e. g. day cares and day care centres, and teachers in schools should also receive instruction on the risks and treatment options for hypoglycaemia.

In the case of hypoglycaemia perception disorder, a higher blood glucose level should be temporarily set [Australasian Paediatric Endocrine Group et al. 2005; Clarke et al. 2008]. The use of a CGM system with hypoglycaemia suspend should also be considered.

Long-term complications and preventive examinations (screening)

The HbA1c value should be determined at least every 3 months to check metabolic control [Diabetes Control and Complications Trial Research Group 1994; Nathan et al. 2005; White et al. 2008]. All other long-term controls are listed in ▶ **Tab. 2**.

Associated autoimmune diseases

Diagnostics and therapy of thyroid diseases

In children and adolescents with diabetes, TSH determination and determination of thyroid autoantibodies (anti-TPO, TgAb) should be performed upon diabetes manifestation and at regular intervals of 1–2 years or with associated symptoms [Australasian Paediatric Endocrine Group et al. 2005; Bangstad et al. 2007; Silverstein et al. 2005; Kordonouri et al. 2011].

If TPO autoantibodies and/or a TSH increase are present, a sonography of the thyroid should be performed.

For the therapy of autoimmune hypothyroidism or struma, L-thyroxine should be used according to the therapy plan (▶ **Abb. 1**).

Diagnostics and therapy of celiac disease

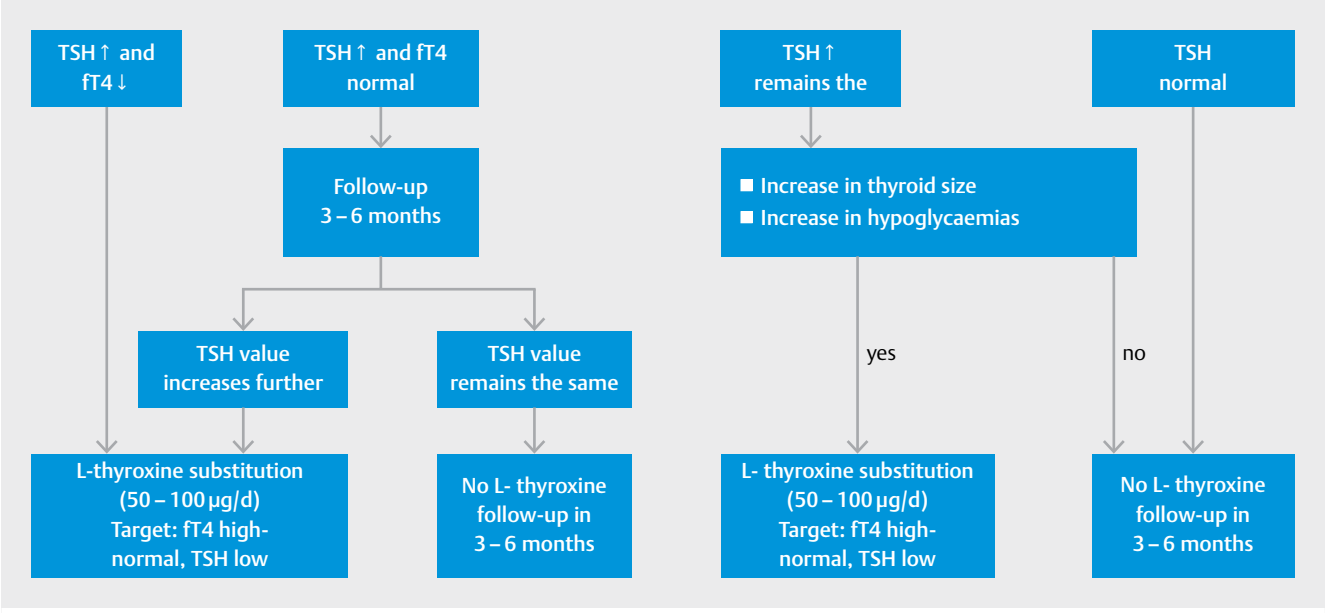
Children and adolescents with diabetes are to be examined for celiac disease in the event of diabetes manifestation and at intervals of 1–2 years and in the case of associated symptoms [Australasian Paediatric Endocrine Group et al. 2005; Hill et al. 2005; Silverstein et al. 2005; Kordonouri et al. 2007; Kordonouri et al. 2014; Kordonouri et al. 2011].

In cases of confirmed celiac disease (serologic and bioptic) with symptoms or extraintestinal manifestation, a gluten-free diet should be followed [Hansen et al. 2006; Amin et al. 2002; Hill et al. 2005; Lewis et al. 1996; Kordonouri et al. 2011].

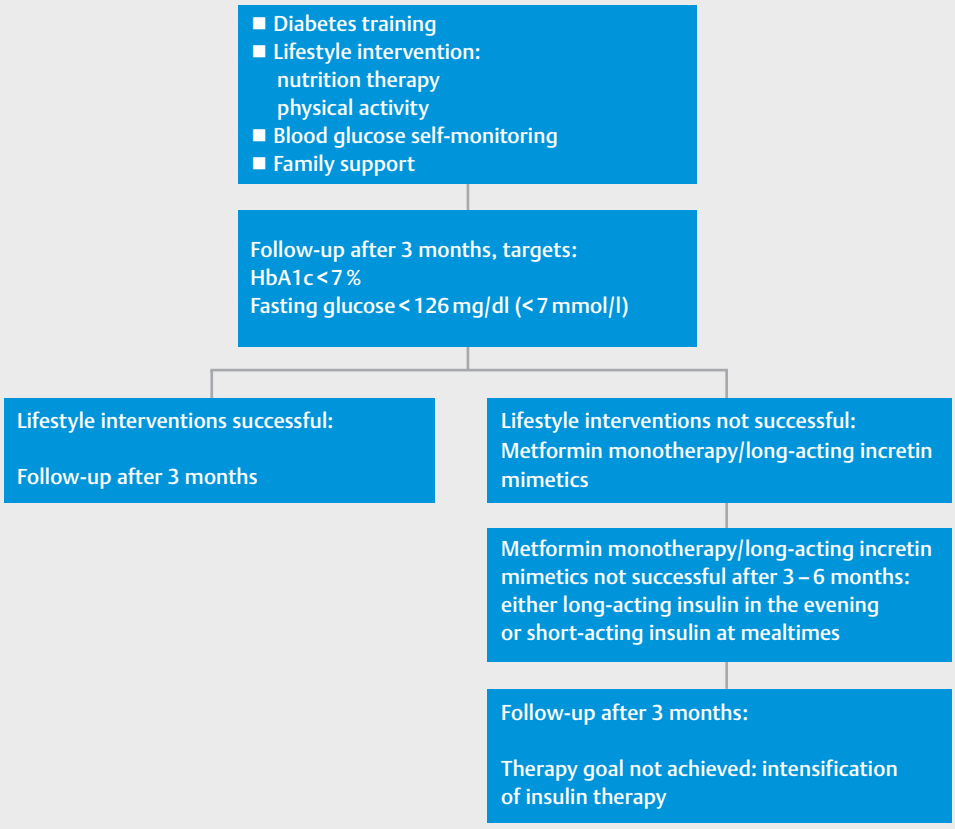
According to the latest recommendations, a biopsy can be dispensed with in the case of clear clinical symptoms, high tTG-A antibodies (> 10 times above norm) and endomysium antibodies as well as a positive HLA-DQ2 or DQ8 haplotype [Mahmud 2018]. However, this recommendation is inconsistent with other guidelines. As most children with type 1 diabetes and positive tTG-A are asymptomatic, a biopsy is still frequently required to confirm the diagnosis.

▶ **Tab. 2** Long-term complications: screening examinations and interventions.

Screening examination and intervals	Recommended screening method(s)	Interventions
1. Retinopathy: ▪ Every 1–2 years ▪ From age 11 or as of 5 years of diabetes	▪ BInocular bi-microscopic funduscopy in mydriasis by experienced ophthalmologist	▪ Improvement of glycaemic control ▪ Normalise blood pressure ▪ Normalise dyslipidaemia ▪ Laser therapy ▪ Intravitreal injections
2. Nephropathy ▪ Annually ▪ From age 11 or as of 5 years of diabetes	Detection of microalbuminuria: ▪ Concentration measurement: 20–200 mg/l ▪ Albumin excretion rate > 20 to < 200 µg/min ▪ Albumin-creatinine ratio ▪ 24-hour urine collection, if necessary	▪ Improvement of glycaemic control ▪ For hypertension + microalbuminuria: ▪ ACE inhibitors ▪ Angiotensin II receptor blockers ▪ Persistent microalbuminuria without hypertension: consider ACE inhibitors ▪ Nicotine abstinence
3. Nephropathy ▪ Annually, for long-term poor metabolic condition from age 11 or as of 5 years of diabetes	▪ Medical examination ▪ Tactile sensitivity (aesthesiometer) ▪ Vibration sensitivity (tuning fork test) ▪ Testing reflexes	▪ Improvement of glycaemic control
4. Hypertension ▪ Every 3 months and, as of age 11, annually at minimum	▪ Resting blood pressure ▪ 24-hour blood pressure at minimum 2 × > 95th percentile or microalbuminuria	▪ Lifestyle intervention (exercise, salt reduction, weight reduction, reduction of alcohol and/or nicotine) ▪ If not successful: ACE inhibitors; for contraindications or side effects: angiotensin II receptor blockers; combination with other drugs if required
5. Hyperlipidaemia: ▪ Within the first year of diagnosis ▪ Then every 2 years ▪ Before puberty every 5 years	Detection of ▪ Total cholesterol ▪ HDL cholesterol ▪ LDL cholesterol ▪ Triglycerides	▪ Dietary therapy ▪ If not sucessful: statins from age 8



▶ **Abb. 1** Diagram for treating Hashimoto's thyroiditis. Source: Diagnosis, Therapy and Follow-Up of Diabetes Mellitus in Children and Adolescents. S3-Guideline of the DDG and AGPD 2015. German Association of the Scientific Medical Professional Societies/AWMF registration number 057–016 [rerif].



▶ **Abb. 2** Diagram for treating type 2 diabetes in children and adolescents. Source: Diagnosis, Therapy and Follow-Up of Diabetes Mellitus in Children and Adolescents. S3-Guideline of the DDG and AGPD 2015. German Association of the Scientific Medical Professional Societies/AWMF registration number 057–016 [rerif].

In asymptomatic patients, the indication for a gluten-free diet or further follow-up should be carried out in cooperation with the paediatric gastroenterologist.

Other forms of diabetes in childhood and adolescence

Type 2 diabetes

Type 2 diabetes in adolescents should be diagnosed according to the limits for fasting glucose and oral glucose tolerance test (OGTT) using the standard or reference method.

If the following limit values are exceeded, the result in asymptomatic patients must be confirmed by a second test on a different day:

- Fasting glucose: > 126 mg/dl (> 7.0 mmol/l) and
- OGTT: 2 h value > 200 mg/dl (> 11.1 mmol/l) [Genuth et al. 2003].

Additional laboratory tests can provide information on the differentiation between type 2 diabetes and type 1 diabetes:

- C-peptide and
- Diabetes-specific autoantibodies (GAD, IA-2, ICA, IAA, ZnT8) [Alberti et al. 2004; Genuth et al. 2003].

In the treatment of type 2 diabetes in adolescents (▶ **Abb. 2**) [Alberti et al. 2004]), the target fasting glucose should be < 126 mg/dl and the target HbA1c value should be < 7 % [Zeitler et al. 2014; UK Prospective Diabetes Study (UKPDS) Group 1998; Holman et al. 2008].

Training for adolescents with type 2 diabetes should include nutritional counselling and guidance on physical activity as part of a structured obesity programme [Reinehr et al. 2007; Working Group for Obesity in Childhood and Adolescence/Arbeitsgemeinschaft Adipositas im Kindes- und Jugendalter (AGA) 2008].

In addition, individually tailored modular training for type 2 diabetes should take place using the relevant contents from the type 1 diabetes training.

At a starting HbA1c value of ≥ 9 % or spontaneous hyperglycaemia ≥ 250 mg/dl and with signs of absolute insulin deficiency (ketonuria, ketoacidosis), an initial insulin therapy should be started. In all other cases, metformin is the first drug of choice for drug therapy in children and adolescents [Shimazaki et al. 2007; UK Prospective Diabetes Study (UKPDS) Group 1998; Jones et al. 2002; Gottschalk et al. 2007; Zeitler et al. 2014]. In addition to insulin, metformin is currently the only approved drug for this age group.

▶ **Tab. 3** The most common MODY forms and their clinical characteristics.

MODY type (international share in percent); heredity	Age (Y) at manifestation	Severity of hyperglycaemia	Clinical picture
HNF1A-MODY (MODY3) HNF-1α-(20–50 %) autosomal dominant	14 (4–18)	Severe hyperglycaemia	▪ Strong increase of BG in OGTT (> 90 mg/dl), low renal threshold (frequent glucosuria in BG values) < 180 mg/dl (< 10 mmol/l)) ▪ Increasing hyperglycaemia with age ▪ Response to sulfonylureas/glinides
GCK-MODY (MODY2) Glucokinase (20–50 %) autosomal dominant	10 (0–18)	Mild hyperglycaemia	▪ Often by chance ▪ Fasting BG slightly increased between 99 and 144 mg/dl (5.5–8 mmol/l) ▪ BG increase in the OGTT low (by < 63 mg/dl or < 3.5 mmol/l) ▪ No BG deterioration in old age ▪ Rarely microvascular or macrovascular complications, even without drug therapy
HNF4A-MODY (MODY1) HNF-4α-(1–5 %) autosomal dominant	17 (5–18)	Significantly hyperglycaemic	▪ Similar to HNF-1α, but renal threshold normal ▪ Response to sulfonylureas

Monogenetic diabetes

A molecular genetic diagnosis of the most common MODY forms can be recommended in cases of justified assumptions because of its importance for therapy, long-term prognosis and genetic counselling of families [Hattersley et al. 2006; Ellard et al. 2008] (▶ **Tab. 3**).

Before the affected genes are sequenced, counselling and information must be provided in accordance with the Gene Diagnostics Act, especially on the right to knowledge and ignorance of genetic information [Murphy et al. 2008; McDonald and Ellard (2013); Ellard et al. 2008; Badenhoop et al. 2008; Deutsche Gesellschaft für Psychiatrie, Psychotherapie und Nervenheilkunde DGPPN (2009)].

Neonatal diabetes mellitus (NDM)

A special form of genetic diabetes is neo-natal diabetes mellitus (NDM) and diabetes that manifests within the first 6 months of life. Clinically, they are classified into 2 subgroups: transient (TNDM) and permanent (PNDM) neonatal diabetes mellitus. For diagnosis of neonatal diabetes or diabetes manifestation up to and including the sixth month of life, see the box "Neonatal diabetes – diagnostic procedure".

In the case of etiologically unexplained neonatal diabetes mellitus and diabetes mellitus, which manifests itself up to the 6th month of life, a molecular genetic analysis should be performed as early as possible in order to start appropriate therapy for sulfonylurea-sensitive mutations as early as possible [Flanagan et al. 2006; Babenko et al. 2006; Klupa et al. 2008; Battaglia et al. 2012; Shah et al. 2012].

In most cases, insulin therapy is administered first if neonatal diabetes is present. Under in-patient conditions and tight controls, an initial therapy attempt with sulfonylureas may be useful if the result of the molecular genetic examination is expected shortly. In the presence of a mutation of the KCNJ11 or the ABCC8 gene, therapy with sulfonylureas should be attempted as early as possible [Hattersley et al. 2006; Pearson et al. 2006; Mlynarski et al. 2007; Koster et al. 2008; Slingerland et al. 2008; Thurber et al., (2015)].

NEONATAL DIABETES – DIAGNOSTIC PROCEDURE

Diagnostic procedure for diabetes manifestation up to the 6th month of life, if necessary up to the 1st year of life

1. Exclusion of pancreatic insufficiency
   - Sonography to rule out pancreatic aplasia
   - Determination of elastase in faeces to exclude exocrine insufficiency
2. If sonography is unremarkable or not assessable:
   - Determination of diabetic autoantibodies (GAD, IA-2, ICA, IAA, ZnT8)
3. If sonography is unremarkable or not assessable, autoantibodies negative and elastase in stool without findings, a molecular genetic analysis should be carried out promptly because of the high therapeutic relevance for the differential diagnosis of:
   - Anomalies of chromosome 6q24 (TNDM)
   - Mutations of the KCNJ11 gene (PNDM, TNDM)
   - Mutations of the ABCC8 gene (PNDM, TNDM)
   - Mutations of insulin gene (PNDM)
4. For reduced elastase in stool and negative molecular genetic analysis for chromosome 6q24, KCNJ11, ABCC8 and insulin gene as well as negative or positive autoantibodies:
   - Examination for rare genetic diseases/genetic syndromes

Diabetes in cystic fibrosis

Since diabetes in cystic fibrosis is often clinically difficult to detect, children with cystic fibrosis as of age 10 should receive an oral glucose tolerance test annually [Lanng et al. 1994]. New studies show better results using CGM to detect glucose variability [Chan 2018].

With a confirmed diagnosis of diabetes, early treatment of cystic fibrosis-related diabetes (CFRD) should be initiated [Nousia-Arvanitakis et al. 2001; Rolon et al. 2001; Lanng et al. 1994; Dobson et al. 2002; Frost et al., 2018].

Insulin is to be used for long-term therapy of CF-related diabetes. In the first 12 months after diagnosis, however, a therapy attempt with glinides or sulphonylureas may be undertaken [Ballmann et al. 2014; O'Riordan et al. 2008].

If cystic fibrosis is present, a high-calorie, high-fat diet should also be followed after the diagnosis of diabetes. Calorie reduction is contraindicated [O'Riordan et al. 2008].

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References

[1] Biester T, Dovc K, Chobot A et al. AID ("automated insulin delivery")-Systeme on der Diabetologie. Der Diabetologe 2021; 17: 627–637

[2] Boughton CK, Hovorka R. New closed-loop insulin systems. Diabetologia 2021; 64: 1007–1015

[3] Fuchs J, Hovorka R. Benefits and challenges of current closed-loop technologies in children and young people with type 1 diabetes. Front Pediatr 2021; 9: 679484

[4] Megarbane B, Guerrier G, Blancher A et al. A possible hypophosphatemia-induced, life-threatening encephalopathy in diabetic ketoacidosis: a case-report. Am J Med Sci 2007; 333: 384–386

[5] Häglin L. Using phosphate supplementation to reverse hypophosphatemia and phosphate depletion in neurological disease and disturbance. Nutr Neurosci 2016; 19: 213–223

[6] Van der Vaart A, Waanders F, van Beek AP et al. Incidence and determinants of hypophosphatemia in diabetic ketoacidosis: an observational study. BMJ Open Diabetes Res Care 2021; 9: e002018

[7] Kelly AS, Auerbach P, Barrientos-Perez M et al. A randomized, controlled trial of liraglutide for adolescents with obesity. N Engl J Med 2020; 382: 2117–2128

Literatur

[8] Adolfsson P, Riddell MC, Taplin CE et al. ISPAD Clinical Practice Consensus Guidelines 2018: Exercise in children and adolescents with diabetes. Pediatr Diabetes 2018; 19 (Suppl. 27): 205–226

[9] Agency for Health Care Policy and Research (AHCPR). Acute Pain Management: Operative or Medical Procedures and Trauma. Clinical Practice Guideline. Rockville, Md, Public Health Service, U.S. Department of Health and Human Services; 1992.

[10] Ahern JA, Ramchandani N, Cooper J et al. Using a primary nurse manager to implement DCCT recommendations in a large pediatric program. Diabetes Educ 2000; 26: 990–994, EK III

[11] Al Hanshi S, Shann F. Insulin infused at 0.05 versus 0.1 units/ kg/hr in children admitted to intensive care with diabetic ketoacidosis. Pediatr Crit Care Med 2011; 12: 137–140, EK III

[12] Alberti G, Zimmet P, Shaw J et al. Type 2 diabetes in the young: the evolving epidemic: the international diabetes federation consensus workshop. Diabetes Care 2004; 27: 1798–1811, EK IV

[13] Ambrosino JM, Fennie K, Whittemore R et al. Short-term effects of coping skills training in school-age children with type 1 diabetes. Pediatr Diabetes 2008; 9: 74–82, EK Ib

[14] American Diabetes Association (ADA). Management of dyslipidemia in children and adolescents with diabetes. Diabetes Care 2003; 26: 2194–2197, EK IV

[15] American Diabetes Association (ADA). Standards of medical care in diabetes-2009. Diabetes Care 2009; 32 Suppl 1: S13-S61, EK IV

[16] American Diabetes Association (ADA). Standards of Medical Care in Diabetes – 2015. Section 11: Children and Adolescents. Diabetes Care 2015; 38: S70-S76, EK IV

[17] Amin R, Murphy N, Edge J et al. A longitudinal study of the effects of a gluten-free diet on glycemic control and weight gain in subjects with type 1 diabetes and celiac disease. Diabetes Care 2002; 25: 1117–1122, EK III

[18] Andersen HU, Lanng S, Pressler T et al. Cystic fibrosis-related diabetes: the presence of microvascular diabetes complications. Diabetes Care 2006; 29: 2660–2663, EK III

[19] Anderson B, Ho J, Brackett J et al. Parental involvement in diabetes management tasks: relationships to blood glucose monitoring adherence and metabolic control in young adolescents with insulin-dependent diabetes mellitus. J Pediatr 1997; 130: 257–265, EK III

[20] Anderson BJ, Brackett J, Ho J et al. An office-based intervention to maintain parent-adolescent teamwork in diabetes management. Impact on parent involvement, family conflict, and subsequent glycemic control. Diabetes Care 1999; 22: 713–721, EK IIb

[21] Anderson RM, Funnell MM, Butler PM et al. Patient empowerment. Results of a randomized controlled trial. Diabetes Care 1995; 18: 943–949, EK Ib

[22] Appel LJ, Champagne CM, Harsha DW et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. JAMA 2003; 289: 2083–2093, EK Ib

[23] Arbeitsgemeinschaft Adipositas im Kindes- und Jugendalter (AGA): Therapie der Adipositas im Kindes- und Jugendalter. Evidenzbasierte Leitlinie der Arbeitsgemeinschaft Adipositas im Kindes- und Jugendalter (AGA) und der beteiligten medizinisch- wissenschaftlichen Fachgesellschaften, Berufsverbände und weiterer Organisationen, AGA, Ulm (2008) EK IV

[24] Arbeitsgemeinschaft für Pädiatrische Diabetologie. Untersuchungen auf diabetische Folgeerkrankungen an Augen, Nieren und Nerven bei pädiatrischen Diabetespatienten. Diabet Inform 1998; 20: 124–127

[25] Arbeitsgemeinschaft für Pädiatrische Diabetologie: Stellungnahme zur Notwendigkeit eines Kinderpsychologen in der Langzeitbetreuung von Kindern und Jugendlichen mit Diabetes mellitus. 20. Auflage. AGPD, (1999)

[26] Arbeitsgemeinschaft für Pädiatrische Diabetologie (AGPD). Kinder mit Diabetes im Kindergarten. Informationen für Erzieherinnen und Erzieher in Kindergärten (2009). Im Internet: http: //www. diabetes-kinder.de, EK IV

[27] Arbeitsgemeinschaft für Pädiatrische Diabetologie (AGPD). Kinder mit Diabetes in der Schule. Informationen für Lehrerinnen und Lehrer (2010). Im Internet: http: //www.diabetes-kinder.de, EK IV

[28] Arbeitsgemeinschaft Pädiatrische Diabetologie (AGPD). Kosten der ambulanten Langzeitbetreuung (1999), EK IV

[29] Astrup A, Ryan L, Grunwald GK et al. The role of dietary fat in body fatness: evidence from a preliminary meta-analysis of ad libitum low-fat dietary intervention studies. Br J Nutr 2000; 83 (Suppl 1): S25–S32, EK Ia

[30] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005a), EK IV

[31] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005b), EK IV

[32] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005), EK Ib

[33] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005), EK IIb-III

[34] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005), EK III

[35] Australasian Paediatric Endocrine Group, Department of Health and Ageing, National Health and Medical Research Council (NHMRC). Clinical practice guidelines: Type 1 diabetes in children and adolescents (2005), EK III/IV

[36] Babcock DS. Thyroid disease in the pediatric patient: emphasizing imaging with sonography. Pediatr Radiol 2006; 36: 299–308, quiz, EK IV

[37] Babenko AP, Polak M, Cave H et al. Activating mutations in the ABCC8 gene in neonatal diabetes mellitus. N Engl J Med 2006; 355: 456–466, EK III

[38] Bachran R, Beyer P, Klinkert C et al. Basal rates and circadian profiles in continuous subcutaneous insulin infusion (CSII) differ for preschool children, prepubertal children, adolescents and young adults. Pediatr Diabetes 2012; 13: 1–5, EK III

[39] Badenhoop K, Kordonouri O, Machicao F. Empfehlungen zur molekulargenetischen Diagnostik bei Verdacht auf MODY, DDG, (2008) EK IV

[40] Baechle C, Castillo K, Strassburger K et al. Is disordered eating behavior more prevalent in adolescents with early-onset type 1 diabetes than in their representative peers? Int J Eat Disord 2014; 47: 342–352, EK IIb

[41] Ballmann M, Hubert D, Assael BM et al. Open randomised prospective comparative multicentre intervention study of patients with cystic fibrosis and early diagnosed diabetes mellitus. BMC Pediatr 2014; 14: 70, EK Ib

[42] Bangstad HJ, Danne T, Deeb LC et al. Insulin treatment. ISPAD clinical practice consensus guidelines 2006–2007. Pediatr Diabetes 2007; 8: 88–102, EK Ib

[43] Bangstad HJ, Danne T, Deeb LC et al. Insulin treatment. ISPAD clinical practice consensus guidelines 2006–2007. Pediatr Diabetes 2007; 8: 88–102, EK IV

[44] Banks CJ, Furyk JS. Review article: hypertonic saline use in the emergency department. Emerg Med Australas 2008; 20: 294–305, EK III

[45] Barlow JH, Ellard DR. Psycho-educational interventions for children with chronic disease, parents and siblings: an overview of the research evidence base. Child Care Health Dev 2004; 30: 637–645, EK Ib

[46] Barnard K, Thomas S, Royle P et al. Fear of hypoglycaemia in parents of young children with type 1 diabetes: a systematic review. BMC Pediatr 2010; 10: 50, EK Ia

[47] Barnea-Goraly N, Raman M, Mazaika P et al. Alterations in white matter structure in young children with type 1 diabetes. Diabetes Care 2014; 37: 332–340, EK III

[48] Battaglia D, Lin YW, Brogna C et al. Glyburide ameliorates motor coordination and glucose homeostasis in a child with diabetes associated with the KCNJ11 / S225 T, del226–232 mutation. Pediatr Diabetes 2012; 13: 656–660

[49] Battelino T, Conget I, Olsen B et al. The use and efficacy of continuous glucose monitoring in type 1 diabetes treated with insulin pump therapy: a randomised controlled trial. Diabetologia 2012; 55: 3155–3162, EK Ib

[50] Battelino T, Danne T, Bergenstal RM et al. Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range. Diabetes Care 2019; 42: 1593–1603

[51] Battelino T, Phillip M, Bratina N et al. Effect of continuous glucose monitoring on hypoglycemia in type 1 diabetes. Diabetes Care 2011; 34: 795–800, EK Ib

[52] Becker M, Galler A, Raile K. Meglitinide analogues in adolescent patients with HNF1A-MODY (MODY 3). Pediatrics 2014; 133: e775–e779

[53] Bell KJ, Barclay AW, Petocz P et al. Efficacy of carbohydrate counting in type 1 diabetes: a systematic review and meta-analysis. Lancet Diabetes Endocrinol 2014; 2: 133–140

[54] Berg CA, Schindler I, Maharajh S. Adolescents' and mothers' perceptions of the cognitive and relational functions of collaboration and adjustment in dealing with type 1 diabetes. J Fam Psychol 2008; 22: 865–874, EK III

[55] Bergenstal RM, Klonoff DC, Garg SK et al. Threshold-based insulin-pump interruption for reduction of hypoglycemia. N Engl J Med 2013; 369: 224–232, EK Ib

[56] Bergenstal RM, Tamborlane WV, Ahmann A et al. Effectiveness of sensor-augmented insulin-pump therapy in type 1 diabetes. N Engl J Med 2010; 363: 311–320, EK Ib

[57] Biester T, Blaesig S, Remus K et al. Insulin degludec's ultra-long pharmacokinetic properties observed in adults are retained in children and adolescents with type 1 diabetes. Pediatr Diabetes 2014; 15: 27–33

[58] Biondi B, Cooper DS. The clinical significance of subclinical thyroid dysfunction. Endocr Rev 2008; 29: 76–131, EK Ib-IV

[59] Bitsko MJ, Bean MK, Bart S et al. Psychological treatment improves hemoglobin A1c outcomes in adolescents with type 1 diabetes mellitus. J Clin Psychol Med Settings 2013; 20: 333–342, EK III

[60] Blackman SM, Raghinaru D, Adi S et al. Insulin pump use in young children in the T1D Exchange clinic registry is associated with lower hemoglobin A1c levels than injection therapy. Pediatr Diabetes 2014; 15: 564–572, EK IIb

[61] Blank W, Braun B. Sonografie der Schilddrüse – Teil 2: Schilddrüsenentzündungen, Schilddrüsenfunktionsstörungen und Interventionen. Ultraschall in Med 2008; 29: 128–149, EK IV

[62] Blankfield AJ, Holahan B. Family support, coping strategies and depressive symptoms among mothers of children with diabetes. J Fam Psychol 1996; 10: 173–179, EK III

[63] Bläsig S, Remus K, Danne T et al. ´Fit for school´: evaluation of a training course for 5–6 year old children with type 1 diabetes. Pediatr Diabetes 2011; 12: 72, EK III

[64] Bloomgarden ZT, Karmally W, Metzger MJ et al. Randomized, controlled trial of diabetic patient education: improved knowledge without improved metabolic status. Diabetes Care 1987; 10: 263–272, EK Ib

[65] Bonfanti R, Colombo C, Nocerino V et al. Insulin gene mutations as cause of diabetes in children negative for five type 1 diabetes autoantibodies. Diabetes Care 2009; 32: 123–125

[66] Bonfig W, Kapellen T, Dost A et al. Growth in children and adolescents with type 1 diabetes. J Pediatr 2012; 160: 900–903

[67] Bonnefond A, Philippe J, Durand E et al. Whole-exome sequencing and high throughput genotyping identified KCNJ11 as the thirteenth MODY gene. PLoS One 2012a; 7: e37 423

[68] Bonnefond A, Sand O, Guerin B et al. GATA6 inactivating mutations are associated with heart defects and, inconsistently, with pancreatic agenesis and diabetes. Diabetologia 2012b; 55: 2845–2847

[69] Bornet F, Haardt MJ, Costagliola D et al. Sucrose or honey at breakfast have no additional acute hyperglycaemic effect over an isoglucidic amount of bread in type 2 diabetic patients. Diabetologia 1985; 28: 213–217, EK Ib

[70] Brackenridge A,Wallbank H, Lawrenson RA et al. Emergency management of diabetes and hypoglycaemia. Emerg Med J 2006; 23: 183–185, EK III

[71] Brand-Miller J, Hayne S, Petocz P et al. Low-glycemic index diets in the management of diabetes: a meta-analysis of randomized controlled trials. Diabetes Care 2003; 26: 2261–2267, EK Ia

[72] Brink S, Laffel L, Likitmaskul S et al. Sick day management in children and adolescents with diabetes. Pediatr Diabetes 2007; 8: 401–407, EK IV

[73] Brink S, Laffel L, Likitmaskul S et al. Sick day management in children and adolescents with diabetes. Pediatr Diabetes 2007; 8: 401–407

[74] Brown M, Ahmed ML, Clayton KL et al. Growth during childhood and final height in type 1 diabetes. Diabet Med 1994; 11: 182–187, EK III

[75] Bryden KS, Neil A, Mayou RA et al. Eating habits, body weight, and insulin misuse. A longitudinal study of teenagers and young adults with type 1 diabetes. Diabetes Care 1999; 22: 1956–1960, EK III

[76] Buckingham BA, Cameron F, Calhoun P et al. Outpatient safety assessment of an in-home predictive low-glucose suspend system with type 1 diabetes subjects at elevated risk of nocturnal hypoglycemia. Diabetes Technol Ther 2013; 15: 622–627, EK Ib

[77] Bundesarbeitsgemeinschaft für Rehabilitation (BAR). Gemeinsames Rahmenkonzept der Gesetzlichen Krankenkassen und der Gesetzlichen Rentenversicherung für die Durchführung stationärer medizinischer Leistungen der Vorsorge und Rehabilitation für Kinder und Jugendliche (2008). Im Internet: http: //www.bar-frankfurt.de/fileadmin/dateiliste/publikationen/ arbeitsmaterialien/downloads/Gemeinsames_Rahmenkonzept. pdf

[78] Bundesärztekammer (BÄK), Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF), Kassenärztliche Bundesvereinigung (KBV). Nationale VersorgungsLeitlinie Diabetes. Strukturierte Schulungsprogramme – Langfassung (2012). 1. Auflage, Version 3. doi: 10.6101/AZQ/000 143, EK IV

[79] Bundesärztekammer (BÄK), Kassenärztliche Bundesvereinigung (KBV), Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF). Nationales Programm für Versorgungs-sLeitlinien. Methoden-Report (2010). 4. Auflage.

[80] Cadario F, Prodam F, Bellone S et al. Transition process of patients with type 1 diabetes (T1DM) from paediatric to the adult health care service: a hospital-based approach. Clin Endocrinol (Oxf) 2009; 71: 346–350, EK III

[81] Cameron FJ, Amin R, de BC et al. ISPAD Clinical Practice Consensus Guidelines 2014. Diabetes in adolescence. Pediatr Diabetes 2014; 15: 245–256, EK III

[82] Cameron FJ, de BC, Aanstoot HJ et al. Lessons from the Hvidoere International Study Group on childhood diabetes: be dogmatic about outcome and flexible in approach. Pediatr Diabetes 2013; 14: 473–480, EK III

[83] Cameron FJ, Scratch SE, Nadebaum C et al. Neurological consequences of diabetic ketoacidosis at initial presentation of type 1 diabetes in a prospective cohort study of children. Diabetes Care 2014; 37: 1554–1562, EK IIb

[84] Cameron FJ, Skinner TC, de Beaufort CE et al. Are family factors universally related to metabolic outcomes in adolescents with Type 1 diabetes? Diabet Med 2008; 25: 463–468, EK III

[85] Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2013 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes 2013; 37: S1–S212, EK IV

[86] Carlsson AK, Axelsson IE, Borulf SK et al. Prevalence of IgA-antiendomy- sium and IgA-antigliadin autoantibodies at diagnosis of insulin- dependent diabetes mellitus in Swedish children and adolescents. Pediatrics 1999; 103: 1248–1252, EK III

[87] Ceriello A, Giugliano D, Quatraro A et al. Anti-oxidants show an anti-hypertensive effect in diabetic and hypertensive subjects. Clin Sci (Lond) 1991; 81: 739–742, EK Ib

[88] Chan CL, Vigers T, Pyle L et al. Continuous glucose monitoring abnormalities in cystic fibrosis youth correlate with pulmonary function decline. J Cyst Fibros. 2018; 17: 783–790.

[89] Chan NN, Brain HP, Feher MD. Metformin-associated lactic acidosis: a rare or very rare clinical entity? Diabet Med 1999; 16: 273–281, EK IIa

[90] Chandalia M, Garg A, Lutjohann D et al. Beneficial effects of high dietary fiber intake in patients with type 2 diabetes mellitus. N Engl J Med 2000; 342: 1392–1398, EK Ib

[91] Channon SJ, Huws-Thomas MV, Rollnick S et al. A multicenter randomized controlled trial of motivational interviewing in teenagers with diabetes. Diabetes Care 2007; 30: 1390–1395, EK Ib

[92] Chetty VT, Almulla A, Odueyungbo A et al. The effect of continuous subcutaneous glucose monitoring (CGMS) versus intermittent whole blood finger-stick glucose monitoring (SBGM) on hemoglobin A1c (HBA1c) levels in Type I diabetic patients: a systematic review. Diabetes Res Clin Pract 2008; 81: 79–87, EK Ia

[93] Cheung N, Rogers SL, Donaghue KC et al. Retinal arteriolar dilation predicts retinopathy in adolescents with type 1 diabetes. Diabetes Care 2008; 31: 1842–1846, EK IIb

[94] Chiang JL, Kirkman MS, Laffel LM et al. Type 1 diabetes through the life span: a position statement of the American Diabetes Association. Diabetes Care 2014; 37: 2034–2054

[95] Christiansen E, Schnider S, Palmvig B et al. Intake of a diet high in trans monounsaturated fatty acids or saturated fatty acids. Effects on postprandial insulinemia and glycemia in obese patients with NIDDM. Diabetes Care 1997; 20: 881–887, EK Ib

[96] Churchill JN, Ruppe RL, Smaldone A. Use of continuous insulin infusion pumps in young children with type 1 diabetes: a systematic review. J Pediatr Health Care 2009; 23: 173–179, EK 1a

[97] Clar C, Waugh N, Thomas S. Routine hospital admission versus out-patient or home care in children at diagnosis of type 1 diabetes mellitus. Cochrane Database Syst Rev 2007; CD004 099, EK IIa–III

[98] Clarke W, Deeb LC, Jameson P et al. Diabetes care in the school and day care setting. Diabetes Care 2013; 36: S75–S79, EK IV

[99] Clarke W, Jones T, Rewers A et al. Assessment and management of hypoglycemia in children and adolescents with diabetes. Pediatr Diabetes 2008a; 9: 165–174, EK IV

[100] Clarke W, Jones T, Rewers A et al. Assessment and management of hypoglycemia in children and adolescents with diabetes. Pediatr Diabetes 2008b; 9: 165–174, EK IV

[101] Clarke W, Jones T, Rewers A et al. Assessment and management of hypoglycemia in children and adolescents with diabetes. Pediatr Diabetes 2008; 9: 165–174, EK III

[102] Cochran JB, Walters S, Losek JD. Pediatric hyperglycemic hyperosmolar syndrome: diagnostic difficulties and high mortality rate. Am J Emerg Med 2006; 24: 297–301, EK III

[103] Colombo C, Porzio O, Liu M et al. Seven mutations in the human insulin gene linked to permanent neonatal/infancy-onset diabetes mellitus. J Clin Invest 2008; 118: 2148–2156, EK III

[104] Colquitt J, Royle P, Waugh N. Are analogue insulins better than soluble in continuous subcutaneous insulin infusion? Results of a meta-analysis. Diabet Med 2003; 20: 863–866, EK Ia

[105] Colton P, Olmsted M, Daneman D et al. Disturbed eating behavior and eating disorders in preteen and early teenage girls with type 1 diabetes: a case-controlled study. Diabetes Care 2004; 27: 1654–1659, EK III

[106] Colton PA, Olmsted MP, Daneman D et al. Depression, disturbed eating behavior, and metabolic control in teenage girls with type 1 diabetes. Pediatr Diabetes 2013; 14: 372–376, EK III

[107] Copeland PM, Anderson B. Diabetes mellitus and eating disorders. Harv Rev Psychiatry 1995; 3: 36–40, EK IV

[108] Coster S, Gulliford MC, Seed PT et al. Monitoring blood glucose control in diabetes mellitus: a systematic review. Health Technol Assess 2000; 4: i-93, EK Ia

[109] Couch R, Jetha M, Dryden DM. Diabetes education for children with type 1 diabetes mellitus and their families. Evid Rep Rechnol Assess (Full Rep) 2008: 1–144, EK Ia

[110] Couper JJ, Haller MJ, Greenbaum CJ et al. ISPAD Clinical Practice Consensus Guidelines 2018: Stages of type 1 diabetes in children and adolescents. Pediatr Diabetes 2018; 19 (Suppl 27): 20–27

[111] Court JM, Cameron FJ, Berg-Kelly K et al. Diabetes in adolescence. Pediatr Diabetes 2008; 9: 255–262, EK IV

[112] Craig ME, Twigg SM, Donaghue KC et al. Australian Type Diabetes Guidelines Expert Advisory Group: National evidence-based clinical care guidelines for type 1 diabetes in children, adolescents and adults, Canberra: Australian Government Department of Health and Ageing; 2011, EK IV

[113] Cranston I, Lomas J, Maran A et al. Restoration of hypoglycaemia awareness in patients with longduration insulin-dependent diabetes. Lancet 1994; 344: 283–287, EK III

[114] d'Emden H, Holden L, McDermott B et al. Disturbed eating behaviours and thoughts in Australian adolescents with type 1 diabetes. J Paediatr Child Health 2013; 49: E317-E323, EK III

[115] Dalla Pozza R, Bechtold S, Bonfig W et al. Age of onset of type 1 diabetes in children and carotid intima medial thickness. J Clin Endocrinol Metab 2007; 92: 2053–2057, EK IIb

[116] Danne T. Deutscher Gesundheitsbericht. Diabetes 2014. http: // www.diabetesde.org/fileadmin/users/Patientenseite/ PDFs_und_TEXTE/Infomaterial/Gesundheitsbericht_2014_ kl.pdf, 2014, EK IIb

[117] Danne T, Aman J, Schober E et al. A comparison of postprandial and preprandial administration of insulin aspart in children and adolescents with type 1 diabetes. Diabetes Care 2003; 26: 2359–2364, EK Ib

[118] Danne T, Bangstad HJ, Deeb L et al. ISPAD Clinical Practice Consensus Guidelines 2014. Insulin treatment in children and adolescents with diabetes. Pediatr Diabetes 2014; 15: 115–134, EK IV

[119] Danne T, Battelino T, Jarosz-Chobot P et al. Establishing glycaemic control with continuous subcutaneous insulin infusion in children and adolescents with type 1 diabetes: experience of the PedPump Study in 17 countries. Diabetologia 2008; 51: 1594–1601, EK III

[120] Danne T, Becker RH, Heise T et al. Pharmacokinetics, prandial glucose control, and safety of insulin glulisine in children and adolescents with type 1 diabetes. Diabetes Care 2005; 28: 2100–2105, EK Ib

[121] Danne T, Datz N, Endahl L et al. Insulin detemir is characterized by a more reproducible pharmacokinetic profile than insulin glargine in children and adolescents with type 1 diabetes: results from a randomized, double-blind, controlled trial. Pediatr Diabetes 2008; 9: 554–560, EK Ib

[122] Danne T, Kordonouri O. Use of technology to potentially preserve C-Peptide in type 1 diabetes mellitus. Pediatr Endocrinol Rev 2010; 7 Suppl 3: 396–400, EK Ib

[123] Danne T, Kordonouri O, Enders I et al. Factors influencing height and weight development in children with diabetes. Results of the Berlin Retinopathy Study. Diabetes Care 1997; 20: 281–285, EK III

[124] Danne T, Mortensen HB, Hougaard P et al. Persistent differences among centers over 3 years in glycemic control and hypoglycemia in a study of 3805 children and adolescents with type 1 diabetes from the Hvidore Study Group. Diabetes Care 2001; 24: 1342–1347, EK III

[125] Danne T, Nimri R, Battelino T et al . International consensus on use of continous glucose monitoring. Diabetes Care 2017; 40: 1631-1640

[126] Danne T, Phillip M, Buckingham BA et al. ISPAD Clinical Practice Consensus Guidelines 2018: Insulin treatment in children and adolescents with diabetes. Pediatr Diabetes 2018; 19 (Suppl. 27): 115–135

[127] Danne T, Philotheou A, Goldman D et al. A randomized trial comparing the rate of hypoglycemia– assessed using continuous glucose monitoring–in 125 preschool children with type 1 diabetes treated with insulin glargine or NPH insulin (the PRESCHOOL study). Pediatr Diabetes 2013; 14: 593–601, EK1b

[128] Danne T, Rastam J, Odendahl R et al. Parental preference of prandial insulin aspart compared with preprandial human insulin in a basal-bolus scheme with NPH insulin in a 12-wk crossover study of preschool children with type 1 diabetes. Pediatr Diabetes 2007; 8: 278–285, EK IIa

[129] Danne T, Tsioli C, Kordonouri O et al. The PILGRIM study: in silico modeling of a predictive low glucose management system and feasibility in youth with type 1 diabetes during exercise. Diabetes Technol Ther 2014; 16: 338–347, EK IIb

[130] Danne T, Weber B, Hartmann R et al. Long-term glycemic control has a nonlinear association to the frequency of background retinopathy in adolescents with diabetes. Follow-up of the Berlin Retinopathy Study. Diabetes Care 1994; 17: 1390–1396, EK III

[131] Danne T, Ziegler R, Kapellen T. Diabetes bei Kindern und Jugendlichen. Dt. Gesundheitsbericht Diabetes 2019. Mainz: Kirchheim-Verlag; 2019, 124–135

[132] Davis CL, Delamater AM, Shaw KH et al. Parenting styles, regimen adherence, and glycemic control in 4- to 10-year-old children with diabetes. J Pediatr Psychol 2001; 26: 123–129, EK III

[133] de Beaufort CE, Lange K, Swift PG et al. Metabolic outcomes in young children with type 1 diabetes differ between treatment centers: the Hvidoere Study in Young Children 2009. Pediatr Diabetes 2013; 14: 422–428, EK IIb

[134] de Man SA, Andre JL, Bachmann H et al. Blood pressure in childhood: pooled findings of six European studies. J Hypertens 1991; 9: 109–114, EK IIb

[135] de Weerdt I, Visser AP, Kok GJ et al. Randomized controlled multicentre evaluation of an education programme for insulin-treated diabetic patients: effects on metabolic control, quality of life, and costs of therapy. Diabet Med 1991; 8: 338–345, EK Ib

[136] de Wit M, Winterdijk P, Aanstoot HJ et al. Assessing diabetes-related quality of life of youth with type 1 diabetes in routine clinical care: the MIND Youth Questionnaire (MY-Q). Pediatr Diabetes 2012; 13: 638–646, EK IV

[137] de Wit M, Delemarre-van de Waal HA, Bokma JA et al. Monitoring and discussing health-related quality of life in adolescents with type 1 diabetes improve psychosocial well-being: a randomized controlled trial. Diabetes Care 2008; 31: 1521–1526, EK Ib

[138] de Wit M, Pouwer F, Gemke RJ et al. Validation of the WHO-5 Well-Being Index in adolescents with type 1 diabetes. Diabetes Care 2007; 30: 2003–2006, EK III

[139] Decourcey DD, Steil GM, Wypij D et al. Increasing use of hypertonic saline over mannitol in the treatment of symptomatic cerebral edema in pediatric diabetic ketoacidosis: an 11-year retrospective analysis of mortality*. Pediatr Crit Care Med 2013; 14: 694–700, EK III

[140] Deeb LC, Holcombe JH, Brunelle R et al. Insulin lispro lowers postprandial glucose in prepubertal children with diabetes. Pediatrics 2001; 108: 1175–1179, EK Ib

[141] Deiss D, Bolinder J, Riveline JP et al. Improved glycemic control in poorly controlled patients with type 1 diabetes using real-time continuous glucose monitoring. Diabetes Care 2006; 29: 2730–2732, EK Ib

[142] Delamater AM, Bubb J, Davis SG et al. Randomized prospective study of self-management training with newly diagnosed diabetic children. Diabetes Care 1990; 13: 492–498, EK Ib

[143] Delamater AM, de WM, McDarby V et al. ISPAD Clinical Practice Consensus Guidelines 2014. Psychological care of children and adolescents with type 1 diabetes. Pediatr Diabetes 2014; 15: 232–244, EK IV

[144] Delamater AM, Jacobson AM, Anderson B et al. Psychosocial therapies in diabetes: report of the Psychosocial Therapies Working Group. Diabetes Care 2001; 24: 1286–1292, EK Ia

[145] Delamater AM, Shaw KH, Applegate EB et al. Risk for metabolic control problems in minority youth with diabetes. Diabetes Care 1999; 22: 700–705, EK III

[146] Delamater AM, de Wit M, McDarby V et al. Psychological care of children and adolescents with type 1 diabetes. Pediatric Diabetes 2014; 15: 232–244

[147] Deutsche Gesellschaft für Ernährung (DGE), Österreichische Gesellschaft für Ernährung (ÖGE), Schweizerische Gesellschaft für Ernährungsforschung (SGE), Hrsg. Referenzwerte für die Nährstoffzufuhr. 2. Auflage. Bonn: DGE-Verlag; 2015, EK IV

[148] Deutsche Gesellschaft für Ernährung (DGE), Österreichische Gesellschaft für Ernährung (ÖGE), Schweizerische Gesellschaft für Ernährungsforschung (SGE), Schweizerische Vereinigung für Ernährung (SVE): Referenzwerte für die Nährstoffzufuhr. Neustadt/Weinstraße: Neuer Umschau Buchverlag; 2008, EK IV

[149] Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie (DGKJP). Behandlung von depressiven Störungen bei Kindern und Jugendlichen. Evidenz- und konsensbasierte Leitlinie (S3). Langfassung. (01.07.2013). Im Internet: http: // www.awmf.org/uploads/tx_szleitlinien/ 028–043l_S3_Depressive_St%C3 %B6rungen_bei_ Kindern_Jugendlichen_2013–07.pdf, EK IV

[150] Deutsche Gesellschaft für pädiatrische Rehabilitation und Prävention. Leitlinie Rehabilitation Diabetes mellitus im Kindes- und Jugendalter 2007. Im Internet: http: //www.awmf.org/uploads/ tx_ szleitlinien/070–003k_S2_Diabetes_mellitus_ stationaere_Rehabilitation.pdf

[151] Deutsche Gesellschaft für Psychiatrie, Psychotherapie und Nervenheilkunde (DGPPN), Bundesärztekammer (BÄK), Kassenärztliche Bundesvereinigung (KBV), Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF). S3-Leitlinie/Nationale VersorgungsLeitlinie Unipolare Depression – Langfassung. 1. Auflage, Version 5 (2009).

[152] Deutsche Hochdruckliga, Deutsche Hypertoniegesellschaft: Leitlinien zur Behandlung der arteriellen Hypertonie. Heidelberg: DHL; 2008

[153] Deutsche Rentenversicherung Bund: Rahmenkonzept zur medizinischen Rehabilitation in der gesetzlichen Rentenversicherung, 3. Auflage. Berlin: Deutsche Rentenversicherung Bund; 2009

[154] Diabetes Control and Complications Trial Research Group. Epidemiology of severe hypoglycemia in the diabetes control and complications trial. The DCCT Research Group. Am J Med 1991; 90: 450–459, EK III

[155] Diabetes Control and Complications Trial Research Group. Effect of intensive diabetes treatment on the development and progression of long-term complications in adolescents with insulin-dependent diabetes mellitus: Diabetes Control and Complications Trial. J Pediatr 1994; 125: 177–188, EK Ib

[156] Diabetes Control and Complications Trial Research Group. The relationship of glycemic exposure (HbA1c) to the risk of development and progression of retinopathy in the diabetes control and complications trial. Diabetes 1995; 44: 968–983, EK Ib

[157] Diabetes Control and Complications Trial Research Group. The absence of a glycemic threshold for the development of long-term complications: the perspective of the Diabetes Control and Complications Trial. Diabetes 1996; 45: 1289–1298

[158] Diabetes Prevention Trial-Type 1 Diabetes Study Group. Effects of insulin in relatives of patients with type 1 diabetes mellitus. N Engl J Med 2002; 346: 1685–1691, EK Ib

[159] DiMeglio LA, Acerini CL, Codner E et al. ISPAD Clinical Practice Consensus Guidelines 2018: Glycemic control targets and glucose monitoring for children, adolescents, and young adults with diabetes. Pediatr Diabetes. 2018; 19 (Suppl. 27): 10–114. doi: 10.1111/ pedi.12737

[160] Dobson L, Hattersley AT, Tiley S et al. Clinical improvement in cystic fibrosis with early insulin treatment. Arch Dis Child 2002; 87: 430–431

[161] Dodson PM, Beevers M, Hallworth R et al. Sodium restriction and blood pressure in hypertensive type II diabetics: randomised blind controlled and crossover studies of moderate sodium restriction and sodium supplementation. BMJ 1989; 298: 227–230, EK Ib

[162] Doherty FM, Calam R, Sanders MR. Positive parenting program (triple P) for families of adolescents with type 1 diabetes: a randomized controlled trial of self-directed teen triple P. J Pediatr Psychol 2013; 38: 846–858, EK Ib

[163] Donaghue KC, Chiarelli F, Trotta D et al. ISPAD clinical practice consensus guidelines 2006–2007. Microvascular and macrovascular complications. Pediatr Diabetes 2007; 8: 163–170, EK III

[164] Donaghue KC, Chiarelli F, Trotta D et al. ISPAD clinical practice consensus guidelines 2006–2007. Microvascular and macrovascular complications. Pediatr Diabetes 2007; 8: 163–170, EK IIb

[165] Donaghue KC, Chiarelli F, Trotta D et al. ISPAD clinical practice consensus guidelines 2006–2007. Microvascular and macrovascular complications. Pediatr Diabetes 2007; 8: 163–170, EK IV

[166] Donaghue KC, Chiarelli F, Trotta D et al. ISPAD clinical practice consensus guidelines 2006–2007. Microvascular and macrovascular complications. Pediatr Diabetes 2007; 8: 163–170

[167] Donaghue KC, Craig ME, Chan AK et al. Prevalence of diabetes complications 6 years after diagnosis in an incident cohort of childhood diabetes. Diabet Med 2005; 22: 711–718, EK IIb-III

[168] Donaghue KC,Wadwa RP, Dimeglio LA et al. ISPAD Clinical Practice Consensus Guidelines 2014. Microvascular and macrovascular complications in children and adolescents. Pediatr Diabetes 2014; 15 Suppl 20: 257–269, EK IV

[169] Doolan A, Donaghue K, Fairchild J et al. Use of HLA typing in diagnosing celiac disease in patients with type 1 diabetes. Diabetes Care 2005; 28: 806–809, EK IIa

[170] Dost A, Klinkert C, Kapellen T et al. Arterial hypertension determined by ambulatory blood pressure profiles: contribution to microalbuminuria risk in a multicenter investigation in 2105 children and adolescents with type 1 diabetes. Diabetes Care 2008; 31: 720–725

[171] Dunger DB, Sperling MA, Acerini CL et al. ESPE/LWPES consensus statement on diabetic ketoacidosis in children and adolescents. Arch Dis Child 2004; 89: 188–194, EK IV

[172] Edge JA, Jakes RW, Roy Y et al. The UK case-control study of cerebral oedema complicating diabetic ketoacidosis in children. Diabetologia 2006; 49: 2002–2009, EK II

[173] Edghill E, Flanagan SE, Patch AM et al. Insulin mutation screening in 1044 patients with diabetes: mutations in the INS gene are a common cause of neonatal diabetes but a rare cause of diabetes diagnosed in childhood or adulthood. Diabetes 2008; 57: 1034–1042, EK III

[174] Ehehalt S, Blumenstock G, Willasch AM et al. Continuous rise in incidence of childhood Type 1 diabetes in Germany. Diabet Med 2008; 25: 755–757, EK III

[175] Ehehalt S, Dietz K, Willasch AM et al. Prediction model for the incidence and prevalence of type 1 diabetes in childhood and adolescence: evidence for a cohort-dependent increase within the next two decades in Germany. Pediatr Diabetes 2012; 13: 15–20, EK III

[176] Ehehalt S, Gauger N, Blumenstock G et al. Hemoglobin A1c is a reliable criterion for diagnosing type 1 diabetes in childhood and adolescence. Pediatr Diabetes 2010; 11: 446–449

[177] Ellard S, Bellanne-Chantelot C, Hattersley AT. Best practice guidelines for the molecular genetic diagnosis of maturityonset diabetes of the young. Diabetologia 2008; 51: 546–553, EK III

[178] Ellard S, Flanagan SE, Girard CA et al. Permanent neonatal diabetes caused by dominant, recessive, or compound heterozygous SUR1 mutations with opposite functional effects. Am J Hum Genet 2007; 81: 375–382

[179] Ellert U, Brettschneider AK, Ravens-Sieberer U. Gesundheitsbezogene Lebensqualität bei Kindern und Jugendlichen in Deutschland. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2014; 57: 798–806, EK IIb

[180] Ellis D, Naar-King S, Templin T et al. Multisystemic therapy for adolescents with poorly controlled type 1 diabetes: reduced diabetic ketoacidosis admissions and related costs over 24 months. Diabetes Care 2008; 31: 1746–1747, EK Ib

[181] Ellis DA, Naar-King S, Chen X et al. Multisystemic therapy compared to telephone support for youth with poorly controlled diabetes: findings from a randomized controlled trial. Ann Behav Med 2012; 44: 207–215, EK Ib

[182] Ellis SE, Speroff T, Dittus RS et al. Diabetes patient education: a meta-analysis and metaregression. Patient Educ Couns 2004; 52: 97–105, EK Ib

[183] Eppens MC, Craig ME, Jones TW et al. Type 2 diabetes in youth from the Western Pacific region: glycaemic control, diabetes care and complications. Curr Med Res Opin 2006; 22: 1013–1020, EK III

[184] Erhart M, Holling H, Bettge S et al. Der Kinder- und Jugendgesundheitssurvey (KiGGS): Risiken und Ressourcen für die psychische Entwicklung von Kindern und Jugendlichen. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2007; 50: 800–809, EK III

[185] European Medicines Agency (EMA). Outcome of review of new safety data on insulin glargine (2013). Im Internet: http: //www.ema.europa. eu/docs/en_GB/document_library/Medicine_QA/2013/ 05/WC500 143 823.pdf

[186] European Society of Cardiology. Leitlinien für das Management der arteriellen Hypertonie. ESC Pocket Guideline (2013). Im Internet: http: //leitlinien. dgk.org/files/2014_Pocket-Leitlinien_Arterielle_Hypertonie. pdf

[187] Fagot-Campagna A, Narayan KM, Imperatore G. Type 2 diabetes in children. BMJ 2001; 322: 377–378, EK III

[188] Felber J, Aust D, Baas S et al. Ergebnisse einer S2k-Konsensuskonferenz der Deutschen Gesellschaft für Gastroenterologie, Verdauungs- und Stoffwechselerkrankungen (DGVS) gemeinsam mit der Deutschen Zöliakie-Gesellschaft (DZG) zur Zöliakie, Weizenallergie und Weizensensitivität. Z Gastroenterol 2014; 52: 711–743, EK IV

[189] Feldt-Rasmussen B, Mathiesen ER, Jensen T et al. Effect of improved metabolic control on loss of kidney function in type 1 (insulin-dependent) diabetic patients: an update of the Steno studies. Diabetologia 1991; 34: 164–170

[190] Fendler W, Baranowska AI, Mianowska B et al. Three-year comparison of subcutaneous insulin pump treatment with multi-daily injections on HbA1c, its variability and hospital burden of children with type 1 diabetes. Acta Diabetol 2012; 49: 363–370, EK IIb

[191] Ficociello LH, Perkins BA, Silva KH et al. Determinants of progression from microalbuminuria to proteinuria in patients who have type 1 diabetes and are treated with angiotensin-converting enzyme inhibitors. Clin J Am Soc Nephrol 2007; 2: 461–469, EK IIb

[192] Fiordalisi I, Novotny WE, Holbert D et al. An 18-yr prospective study of pediatric diabetic ketoacidosis: an approach to minimizing the risk of brain herniation during treatment. Pediatr Diabetes 2007; 8: 142–149, EK III

[193] Flanagan SE, Edghill EL, Gloyn AL et al. Mutations in KCNJ11, which encodes Kir6.2, are a common cause of diabetes diagnosed in the first 6 months of life, with the phenotype determined by genotype. Diabetologia 2006; 49: 1190–1197, EK IIb-III

[194] Flanagan SE, Patch AM, Mackay DJ et al. Mutations in ATP-sensitive K+ channel genes cause transient neonatal diabetes and permanent diabetes in childhood or adulthood. Diabetes 2007; 56: 1930–1937, EK IIb-III

[195] Forsander G, Persson B, Sundelin J et al. Metabolic control in children with insulin-dependent diabetes mellitus 5y after diagnosis. Early detection of patients at risk for poor metabolic control. Acta Paediatr 1998; 87: 857–864, EK III

[196] Forsander GA, Sundelin J, Persson B. Influence of the initial management regimen and family social situation on glycemic control and medical care in children with type I diabetes mellitus. Acta Paediatr 2000; 89: 1462–1468, EK IIa

[197] Franklin B, Liu J, Ginsberg-Fellner F. Cerebral edema and ophthalmoplegia reversed by mannitol in a new case of insulin-dependent diabetes mellitus. Pediatrics 1982; 69: 87–90, EK III

[198] Frost F, Dyce P, Nazareth D et al. Continuous glucose monitoring guided insulin therapy is associated with improved clinical outcomes in cystic fibrosisrelated diabetes. J Cyst Fibros. 2018; 17(6): 798–803

[199] Fröhlich C, Hermann T, Koch S et al. Indikationen für eine stationäre Rehabilitation von Kindern und Jugendlichen mit Typ-1-Diabetes– eine bundesweite "DPV-Wiss"-Analyse. Diabet Stoffw 2008;93, EK III

[200] Fröhlich-Reiterer EE, Hofer S, Kaspers S et al. Screening frequency for celiac disease and autoimmune thyroiditis in children and adolescents with type 1 diabetes mellitus–data from a German/Austrian multicentre survey. Pediatr Diabetes 2008; 9: 546–553, EK III

[201] Fröhlich-Reiterer EE, Kaspers S, Hofer S et al. Anthropometry, metabolic control, and follow-up in children and adolescents with type 1 diabetes mellitus and biopsy-proven celiac disease. J Pediatr 2011; 158: 589–593, EK III

[202] Gaede P, Vedel P, Parving HH et al. 21 Intensified multifactorial intervention in patients with type 2 diabetes mellitus and microalbuminuria: the Steno type 2 randomised study. Lancet 1999; 353: 617–622

[203] Gage H, Hampson S, Skinner TC et al. Educational and psychosocial programmes for adolescents with diabetes: approaches, outcomes and cost-effectiveness. Patient Educ Couns 2004; 53: 333–346, EK Ib

[204] Gale EA, Bingley PJ, Emmett CL et al. European Nicotinamide Diabetes Intervention Trial (ENDIT): a randomised controlled trial of intervention before the onset of type 1 diabetes. Lancet 2004; 363: 925–931, EK Ib

[205] Gale EA, Gillespie KM. Diabetes and gender. Diabetologia 2001; 44: 3–15, EK IIb

[206] Garg A. High-monounsaturated-fat diets for patients with diabetes mellitus: a meta-analysis. Am J Clin Nutr 1998; 67: 577S-582S, EK Ia

[207] Garin I, Edghill EL, Akerman I et al. Recessive mutations in the INS gene result in neonatal diabetes through reduced insulin biosynthesis. Proc Natl Acad Sci U S A 2010; 107: 3105–3110

[208] Gaudieri PA, Chen R, Greer TF et al. Cognitive function in children with type 1 diabetes: a meta-analysis. Diabetes Care 2008; 31: 1892–1897, EK Ib

[209] Gayes LA, Steele RG. A meta-analysis of motivational interviewing interventions for pediatric health behavior change. J Consult Clin Psychol 2014; 82: 521–535, EK Ia

[210] Genuth S, Alberti KG, Bennett P et al. Follow-up report on the diagnosis of diabetes mellitus. Diabetes Care 2003; 26: 3160–3167

[211] Gerstl EM, Rabl W, Rosenbauer J et al. Metabolic control as reflected by HbA1c in children, adolescents and young adults with type-1 diabetes mellitus: combined longitudinal analysis including 27 035 patients from 207 centers in Germany and Austria during the last decade. Eur J Pediatr 2008; 167: 447–453, EK IIb–III

[212] Gheissari A, Javanmard SH, Shirzadi R et al. The effects of blocking Angiotensin receptors on early stages of diabetic nephropathy. Int J Prev Med 2012; 3: 477–482

[213] Giacco R, Parillo M, Rivellese AA et al. Long-term dietary treatment with increased amounts of fiber-rich low-glycemic index natural foods improves blood glucose control and reduces the number of hypoglycemic events in type 1 diabetic patients. Diabetes Care 2000; 23: 1461–1466, EK Ib

[214] Glaser N, Barnett P, McCaslin I et al. Risk factors for cerebral edema in children with diabetic ketoacidosis. The Pediatric Emergency Medicine Collaborative Research Committee of the American Academy of Pediatrics. N Engl J Med 2001; 344: 264–269, EK III

[215] Glaser NS, Wootton-Gorges SL, Buonocore MH et al. Frequency of sub-clinical cerebral edema in children with diabetic ketoacidosis. Pediatr Diabetes 2006; 7: 75–80, EK III

[216] Glasgow RE, Fisher EB, Anderson BJ et al. Behavioral science in diabetes. Contributions and opportunities. Diabetes Care 1999; 22: 832–843, EK Ia

[217] Gloyn AL, Diatloff-Zito C, Edghill EL et al. KCNJ11 activating mutations are associated with developmental delay, epilepsy and neonatal diabetes syndrome and other neurological features. Eur J Hum Genet 2006; 14: 824–830

[218] Gloyn AL, Pearson ER, Antcliff JF et al. Activating mutations in the gene encoding the ATP-sensitive potassium-channel subunit Kir6.2 and permanent neonatal diabetes. N Engl J Med 2004; 350: 1838–1849, EK III

[219] Goebel-Fabbri AE, Fikkan J, Franko DL et al. Insulin restriction and associated morbidity and mortality in women with type 1 diabetes. Diabetes Care 2008; 31: 415–419, EK IIb

[220] Golicki DT, Golicka D, Groele L et al. Continuous Glucose Monitoring System in children with type 1 diabetes mellitus: a systematic review and meta-analysis. Diabetologia 2008; 51: 233–240, EK Ia

[221] Gong M, Simaite D, Kuhnen P et al. Two novel GATA6 mutations cause childhood-onset diabetes mellitus, pancreas malformation and congenital heart disease. Horm Res Paediatr 2013; 79: 250–256

[222] Gottschalk M, Danne T, Vlajnic A et al. Glimepiride versus metformin as monotherapy in pediatric patients with type 2 diabetes: a randomized, single-blind comparative study. Diabetes Care 2007; 30: 790–794, EK Ib

[223] Grabert M, Schweiggert F, Holl RW. A framework for diabetes documentation and quality management in Germany: 10 years of experience with DPV. Comput Methods Programs Biomed 2002; 69: 115–121, EK III

[224] Graham DJ, Staffa JA, Shatin D et al. Incidence of hospitalized rhabdomyolysis in patients treated with lipidlowering drugs. JAMA 2004; 292: 2585–2590, EK III

[225] Green SM, Rothrock SG, Ho JD et al. Failure of adjunctive bicarbonate to improve outcome in severe pediatric diabetic ketoacidosis. Ann Emerg Med 1998; 31: 41–48

[226] Grey M, Boland EA, Davidson M et al. Coping skills training for youth with diabetes mellitus has longlasting effects on metabolic control and quality of life. J Pediatr 2000; 137: 107–113, EK Ib

[227] Grey M, Cameron ME, Lipman TH et al. Psychosocial status of children with diabetes in the first 2 years after diagnosis. Diabetes Care 1995; 18: 1330–1336, EK IIb

[228] Grey M, Cameron ME, Lipman TH et al. Psychosocial status of children with diabetes in the first 2 years after diagnosis. Diabetes Care 1995; 18: 1330–1336, EK III

[229] Grey M, Whittemore R, Jaser S et al. Effects of coping skills training in school-age children with type 1 diabetes. Res Nurs Health 2009; 32: 405–418, EK Ib

[230] Grey M, Whittemore R, Jeon S et al. Internet psycho-education programs improve outcomes in youth with type 1 diabetes. Diabetes Care 2013; 36: 2475–2482, EK Ib

[231] Grulich-Henn J, Wagner V, Thon A et al. Entities and frequency of neonatal diabetes: data from the diabetes documentation and quality management system (DPV). Diabet Med 2010; 27: 709–712, EK III

[232] Haas L, Maryniuk M, Beck J et al. National standards for diabetes self-management education and support. Diabetes Care 2014; 37 (Suppl 1): S144-S153, EK IV

[233] Hale PJ, Crase J, Nattrass M. Metabolic effects of bicarbonate in the treatment of diabetic ketoacidosis. Br Med J (Clin Res Ed) 1984; 289: 1035–1038, EK IIa

[234] Hammes HP, Kerner W, Hofer S et al. Diabetic retinopathy in type 1 diabetes-a contemporary analysis of 8784 patients. Diabetologia 2011; 54: 1977–1984

[235] Hampson SE, Skinner TC, Hart J et al. Effects of educational and psychosocial interventions for adolescents with diabetes mellitus: a systematic review. Health Technol Assess 2001; 5: 1–79, EK Ia

[236] Hanas R, Adolfsson P. Insulin pumps in pediatric routine care improve long-term metabolic control without increasing the risk of hypoglycemia. Pediatr Diabetes 2006; 7: 25–31, EK III

[237] Hanas R, Lindgren F, Lindblad B. Diabetic ketoacidosis and cerebral oedema in Sweden–a 2-year paediatric population study. Diabet Med 2007; 24: 1080–1085, EK III

[238] Hanberger L, Ludvigsson J, Nordfeldt S. Use of a web 2.0 portal to improve education and communication in young patients with families: randomized controlled trial. J Med Internet Res 2013; 15: e175, EK Ib

[239] Hansen D, Brock-Jacobsen B, Lund E et al. Clinical benefit of a gluten-free diet in type 1 diabetic children with screeningdetected celiac disease: a population-based screening study with 2 years follow-up. Diabetes Care 2006; 29: 2452–2456, EK IIa

[240] Harris MA, Freeman KA, Beers M. Family therapy for adolescents with poorly controlled diabetes: initial test of clinical significance. J Pediatr Psychol 2009; 34: 1097–1107, EK IIb

[241] Hattersley A, Bruining J, Shield J et al. ISPAD Clinical Practice Consensus Guidelines 2006–2007. The diagnosis and management of monogenic diabetes in children. Pediatr Diabetes 2006; 7: 352–360, EK IV

[242] Haugstvedt A,Wentzel-Larsen T, Graue M et al. Fear of hypoglycaemia in mothers and fathers of children with Type 1 diabetes is associated with poor glycaemic control and parental emotional distress: a population-based study. Diabet Med 2010; 27: 72–78, EK IIb

[243] Haugstvedt A, Wentzel-Larsen T, Rokne B et al. Perceived family burden and emotional distress: similarities and differences between mothers and fathers of children with type 1 diabetes in a population-based study. Pediatr Diabetes 2011; 12: 107–114, EK IIb

[244] Hecker W, Bartus B, Heinze E et al. Stoffwechseleinstellung des Diabetes mellitus Typ 1 bei Kindern und Jugendlichen deutscher und ausländischer Herkunft. Diabet Stoffw 1998; 5: 177–180, EK III

[245] Hecker W, Grabert M, Holl RW. Quality of paediatric IDDM care in Germany: a multicentre analysis. German Paediatric Diabetology Group. J Pediatr Endocrinol Metab 1999; 12: 31–38, EK III

[246] Helgeson VS, Reynolds KA, Becker D et al. Relations of behavioral autonomy to health outcomes among emerging adults with and without type 1 diabetes. J Pediatr Psychol 2014; 39: 1126–1137, EK III

[247] Helgeson VS, Siminerio L, Escobar O et al. Predictors of metabolic control among adolescents with diabetes: a 4-year longitudinal study. J Pediatr Psychol 2009; 34: 254–270, EK III

[248] Helgeson VS, Snyder PR, Escobar O et al. Comparison of adolescents with and without diabetes on indices of psychosocial functioning for three years. J Pediatr Psychol 2007; 32: 794–806, EK IIb

[249] Helgeson VS, Viccaro L, Becker D et al. Diet of adolescents with and without diabetes: Trading candy for potato chips? Diabetes Care 2006; 29: 982–987, EK III

[250] Hellems MA, Clarke WL. Safe at school: a Virginia experience. Diabetes Care 2007; 30: 1396–1398, EK III

[251] Hermann JM, Hammes HP, Rami-Merhar B et al. HbA1c variability as an independent risk factor for diabetic retinopathy in type 1 diabetes: a German/Austrian multicenter analysis on 35 891 patients. PLoS One 2014; 9: e91 137

[252] Herzer M, Hood KK. Anxiety symptoms in adolescents with type 1 diabetes: association with blood glucose monitoring and glycemic control. J Pediatr Psychol 2010; 35: 415–425, EK III

[253] Herzer M, Vesco A, Ingerski LM et al. Explaining the family conflict-glycemic control link through psychological variables in adolescents with type 1 diabetes. J Behav Med 2011; 34: 268–274, EK III

[254] Hieftje K, Edelman EJ, Camenga DR et al. Electronic media-based health interventions promoting behavior change in youth: a systematic review. JAMA Pediatr 2013; 167: 574–580, EK Ia

[255] Hill ID, Dirks MH, Liptak GS et al. Guideline for the diagnosis and treatment of celiac disease in children: recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. J Pediatr Gastroenterol Nutr 2005; 40: 1–19, EK III

[256] Hilliard ME, Herzer M, Dolan LM et al. Psychological screening in adolescents with type 1 diabetes predicts outcomes one year later. Diabetes Res Clin Pract 2011; 94: 39–44, EK III

[257] Hirsch IB, Abelseth J, Bode BW et al. Sensor-augmented insulin pump therapy: results of the first randomized treat-to-target study. Diabetes Technol Ther 2008; 10: 377–383, EK Ib

[258] Hoey H. Psychosocial factors are associated with metabolic control in adolescents: research from the Hvidoere Study Group on Childhood Diabetes. Pediatr Diabetes 2009; 10 (Suppl 13): 9–14, EK IIb

[259] Holl RW, Grabert M. Versorgung von Kindern und Jugendlichen mit Diabetes–Entwicklungen der letzten 19 Jahre. In: Holl RW, Grabert M, Hrsg. Deutsche Diabetes-Hilfe. Gesundheitsbericht Diabetes 2015, S. 128–138, EK III

[260] Holl RW, Grabert M, Heinze E et al. Age at onset and long-term metabolic control affect height in type-1 diabetes mellitus. Eur J Pediatr 1998a; 157: 972–977, EK III

[261] Holl RW, Heinze E. Dawn- oder Somogyi-Phänomen? Hohe morgendliche Nüchternblutzuckerwerte bei jugendlichen Typ-1-Diabetikern. Dtsch Med Wochenschr 1992; 117: 1503–1507, EK III

[262] Holl RW, Lang GE, Grabert M et al. Diabetic retinopathy in pediatric patients with type-1 diabetes: effect of diabetes duration, prepubertal and pubertal onset of diabetes, and metabolic control. J Pediatr 1998b; 132: 790–794, EK III

[263] Holl RW, Pavlovic M, Heinze E et al. Circadian blood pressure during the early course of type 1 diabetes. Analysis of 1011 ambulatory blood pressure recordings in 354 adolescents and young adults. Diabetes Care 1999; 22: 1151–1157, EK III

[264] Holl RW, Wolf A, Heinze E et al. Nicht-immunologisch bedingte Formen des Diabetes mellitus bei Kindern und Jugendlichen. Monatsschr Kinderheilkd 1997; 145: 159–176, EK III

[265] Hölling H, Erhart M, Ravens-Sieberer U et al. Verhaltensauffälligkeiten bei Kindern und Jugendlichen. Erste Ergebnisse aus dem Kinder- und Jugendgesundheitssurvey (KiGGS). Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2007a; 50: 784–793, EK III

[266] Hölling H, Schlack R. Essstörungen im Kindes- und Jugendalter. Erste Ergebnisse aus dem Kinder- und Jugendgesundheitssurvey (KiGGS). Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2007b; 50: 794–799, EK III

[267] Hölling H, Schlack R, Petermann F et al. Psychische Auffälligkeiten und psychosoziale Beeinträchtigungen bei Kindern und Jugendlichen im Alter von 3 bis 17 Jahren in Deutschland–Prävalenz und zeitliche Trends zu 2 Erhebungszeitpunkten (2003–2006 und 2009–2012). Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2014; 57: 807–819, EK IIb

[268] Holman RR, Paul SK, Bethel MA et al. 10-year follow-up of intensive glucose control in type 2 diabetes. N Engl J Med 2008; 359: 1577–1589, EK Ib

[269] Holmes CS, Chen R, Streisand R et al. Predictors of youth diabetes care behaviors and metabolic control: a structural equation modeling approach. J Pediatr Psychol 2006; 31: 770–784, EK III

[270] Holterhus PM, Odendahl R, Oesingmann S et al. Classification of distinct baseline insulin infusion patterns in children and adolescents with type 1 diabetes on continuous subcutaneous insulin infusion therapy. Diabetes Care 2007; 30: 568–573, EK IIb–III

[271] Hommel E, Olsen B, Battelino T et al. Impact of continuous glucose monitoring on quality of life, treatment satisfaction, and use of medical care resources: analyses from the SWITCH study. Acta Diabetol 2014; 51: 845–851, EK Ib

[272] Hood KK, Huestis S, Maher A et al. Depressive symptoms in children and adolescents with type 1 diabetes: association with diabetes-specific characteristics. Diabetes Care 2006; 29: 1389–1391, EK III

[273] Hood KK, Rausch JR, Dolan LM. Depressive symptoms predict change in glycemic control in adolescents with type 1 diabetes: rates, magnitude, and moderators of change. Pediatr Diabetes 2011; 12: 718–723, EK III

[274] Hood KK, Rohan JM, Peterson CM et al. Interventions with adherence-promoting components in pediatric type 1 diabetes: meta-analysis of their impact on glycemic control. Diabetes Care 2010; 33: 1658–1664, EK Ia

[275] Horsch A, McManus F, Kennedy P et al. Anxiety, depressive, and posttraumatic stress symptoms in mothers of children with type 1 diabetes. J Trauma Stress 2007; 20: 881–891, EK III

[276] Hovorka R, Elleri D, Thabit H et al. Overnight closed-loop insulin delivery in young people with type 1 diabetes: a free-living, randomized clinical trial. Diabetes Care 2014; 37: 1204–1211, EK Ib

[277] Howell WH, McNamara DJ, Tosca MA et al. Plasma lipid and lipoprotein responses to dietary fat and cholesterol: a meta-analysis. Am J Clin Nutr 1997; 65: 1747–1764, EK Ia

[278] Hu FB, Cho E, Rexrode KM et al. Fish and long-chain omega-3 fatty acid intake and risk of coronary heart disease and total mortality in diabetic women. Circulation 2003; 107: 1852–1857, EK III

[279] Hürter A, Otten A. Familien mit diabetischen Kindern und Jugendlichen: Psychische und soziale Probleme und der Wunsch nach psychologischer Hilfe im Vergleich mit anderen chronischen Erkrankungen. In: Roth R, Borkenstein M, Hrsg.: Psychosoziale Aspekte in der Betreuung von Kindern und Jugendlichen mit Diabetes. Basel: Karger; 1991: 150–159, EK III

[280] Hürter P, Bürger W, Schober E et al. Qualitätssicherung in der Pädiatrischen Diabetologie. Monatsschr Kinderheilkd 1995; 143: 1146–1149, EK IV

[281] Hürter P, von Schütz W, Lange K. Kinder und Jugendliche mit Diabetes. Medizinischer und psychologischer Ratgeber für Eltern. 3. Auflage. Berlin: Springer; 2012

[282] Husby S, Koletzko S, Korponay-Szabo IR et al. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition guidelines for the diagnosis of coeliac disease. J Pediatr Gastroenterol Nutr 2012; 54: 136–160, EK IV

[283] Hutchinson A, McIntosh A, Peters J et al. Effectiveness of screening and monitoring tests for diabetic retinopathy–a systematic review. Diabet Med 2000; 17: 495–506, EK IIa

[284] Icks A, Razum O, Rosenbauer J et al. Lower frequency of insulin pump treatment in children and adolescents of Turkish background with type 1 diabetes: analysis of 21 497 patients in Germany. Diabetes Technol Ther 2012; 14: 1105–1109, EK IIb

[285] Icks A, Rosenbauer J, Holl RW et al. Increased hospitalization with longer distance from treatment centre in diabetic paediatric patients in Germany. Diabetologia 2001; 44: 1068–1069, EK IIb-III

[286] Icks A, Rosenbauer J, Strassburger K et al. Persistent social disparities in the risk of hospital admission of paediatric diabetic patients in Germany-prospective data from 1277 diabetic children and adolescents. Diabet Med 2007; 24: 440–442, EK III

[287] Ingerski LM, Laffel L, Drotar D et al. Correlates of glycemic control and quality of life outcomes in adolescents with type 1 diabetes. Pediatr Diabetes 2010; 11: 563–571, EK III

[288] Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (IQWiG): Kurzwirksame Insulinanaloga zur Behandlung des Diabetes mellitus Typ 1. Abschlussbericht. Auftrag A05–02. Version 1.0. Stand: 30.03.2007. Köln: IQWiG; 2007

[289] International Hypoglycaemia Study Group: Glucose concentrations of less than 3.0mmol/L (54mg/dL) should be reported in clinical trials: a joint position statement of the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care 2017; 40: 155–157

[290] International Society for Pediatric and Adolescent Diabetes (ISPAD). Clinical Practice Consensus Guidelines 2014. Pediatr Diabetes 2014; 15: 1–290

[291] Irgens HU, Molnes J, Johansson BB et al. Prevalence of monogenic diabetes in the population-based Norwegian Childhood Diabetes Registry. Diabetologia 2013; 56: 1512–1519

[292] Jacobson AM, Hauser ST, Lavori P et al. Family environment and glycemic control: a four-year prospective study of children and adolescents with insulin-dependent diabetes mellitus. Psychosom Med 1994; 56: 401–409, EK III

[293] Jacobson AM, Hauser ST, Willett J et al. Consequences of irregular versus continuous medical follow- up in children and adolescents with insulin-dependent diabetes mellitus. J Pediatr 1997; 131: 727–733, EK III

[294] Jacobson AM, Musen G, Ryan CM et al. Longterm effect of diabetes and its treatment on cognitive function. N Engl J Med 2007; 356: 1842–1852, EK Ib

[295] Janner M, Knill SE, Diem P et al. Persistent microalbuminuria in adolescents with type I (insulin-dependent) diabetes mellitus is associated to early rather than late puberty. Results of a prospective longitudinal study. Eur J Pediatr 1994; 153: 403–408, EK IIb

[296] Jefferies C, Solomon M, Perlman K et al. Continuous glucose monitoring in adolescents with cystic fibrosis. J Pediatr 2005; 147: 396–398, EK IIb

[297] Jefferson IG, Swift PG, Skinner TC et al. Diabetes services in the UK: third national survey confirms continuing deficiencies. Arch Dis Child 2003; 88: 53–56, EK III

[298] Jeitler K, Horvath K, Berghold A et al. Continuous subcutaneous insulin infusion versus multiple daily insulin injections in patients with diabetes mellitus: systematic review and meta-analysis. Diabetologia 2008; 51: 941–951, Ia

[299] Johansson S, Irgens H, Chudasama KK et al. Exome sequencing and genetic testing for MODY. PLoS One 2012; 7: e38 050

[300] Jones CA, Leese GP, Kerr S et al. Development and progression of microalbuminuria in a clinic sample of patients with insulin dependent diabetes mellitus. Arch Dis Child 1998; 78: 518–523, EK III

[301] Jones KL, Arslanian S, Peterokova VA et al. Effect of metformin in pediatric patients with type 2 diabetes: a randomized controlled trial. Diabetes Care 2002; 25: 89–94, EK Ib

[302] Kalk WJ, Osler C, Constable J et al. Influence of dietary protein on glomerular filtration and urinary albumin excretion in insulin-dependent diabetes. Am J Clin Nutr 1992; 56: 169–173, EK III

[303] Kapellen T, Vogel C, Telleis D et al. Treatment of diabetic ketoacidosis (DKA) with 2 different regimens regarding fluid substitution and insulin dosage (0.025 vs. 0.1 units/kg/h). Exp Clin Endocrinol Diabetes 2012; 120: 273–276, EK III

[304] Kapellen TM, Klinkert C, Heidtmann B et al. Insulin pump treatment in children and adolescents with type 1 diabetes: experiences of the German working group for insulin pump treatment in pediatric patients. Postgrad Med 2010; 122: 98–105

[305] Karges B, Muche R, Knerr I et al. Levothyroxine in euthyroid autoimmune thyroiditis and type 1 diabetes: a randomized, controlled trial. J Clin Endocrinol Metab 2007; 92: 1647–1652, EK Ib

[306] Karges B, Rosenbauer J, Holterhus PM et al. Hospital admission for diabetic ketoacidosis or severe hypoglycemia in 31 330 young patients with type 1 diabetes. Eur J Endocrinol 2015; 173: 341–350, EK III

[307] Karges B, Rosenbauer J, Kapellen T et al. Hemoglobin A1c Levels and risk of severe hypoglycemia in children and young adults with type 1 diabetes from Germany and Austria: a trend analysis in a cohort of 37 539 patients between 1995 and 2012. PLoS Med 2014; 11: e1001 742, EK III

[308] Karges B, Schwandt A, Heidtmann B et al. Association of Insulin Pump Therapy vs. Insulin Injection Therapy With Severe Hypoglycemia, Ketoacidosis, and Glycemic Control Among Children, Adolescents, and Young Adults With Type 1 Diabetes. JAMA 2017; 318: 1358–1366

[309] Katan MB, Zock PL, Mensink RP. Dietary oils, serum lipoproteins, and coronary heart disease. Am J Clin Nutr 1995; 61: 1368S-1373S, EK Ia

[310] Katz ML, Volkening LK, Butler DA et al. Family-based psychoeducation and Care Ambassador intervention to improve glycemic control in youth with type 1 diabetes: a randomized trial. Pediatr Diabetes 2014; 15: 142–150, EK Ib

[311] Keane S, Gallagher A, Ackroyd S et al. Cerebral venous thrombosis during diabetic ketoacidosis. Arch Dis Child 2002; 86: 204–205, EK IV

[312] Kellerer M, Danne T. Praxis-Leitlinien der Deutschen Diabetes Gesellschaft. Diabet Stoffw 2010; 5: S107-S108

[313] Kellerer M, Siegel E, Hrsg. Praxisleitlinien der Deutschen Diabetes Gesellschaft. Diabet Stoffw 2014; 9: S95-S228

[314] Kempf K, Rathmann W, Herder C. Impaired glucose regulation and type 2 diabetes in children and adolescents. Diabetes Metab Res Rev 2008; 24: 427–437, EK IIb-III

[315] Kiess W, Bottner A, Raile K et al. Type 2 diabetes mellitus in children and adolescents: a review from a European perspective. Horm Res 2003; 59 (Suppl 1): 77–84, EK III

[316] Kilpatrick ES, Rigby AS, Atkin SL. The effect of glucose variability on the risk of microvascular complications in type 1 diabetes. Diabetes Care 2006; 29: 1486–1490, EK IIa

[317] Kintzel R, Holl R, Haberland H et al. Die diabetische Ketoazidose bei Erkrankungsbeginn im Kindes- und Jugendalter in der Bundesrepublik. Diab Stoffw 2003; 12: 8–12, EK IIb

[318] Klupa T, Kowalska I, Wyka K et al. Mutations in the ABCC8 gene are associated with a variable clinical phenotype. Clin Endocrinol (Oxf) 2009; 71: 358–362, EK III

[319] Knerr I, Dost A, Lepler R et al. Tracking and prediction of arterial blood pressure from childhood to young adulthood in 868 patients with type 1 diabetes: a multicenter longitudinal survey in Germany and Austria. Diabetes Care 2008; 31: 726–727, EK IIb-III

[320] Knowler WC, Barrett-Connor E, Fowler SE et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002; 346: 393–403, EK Ib

[321] Koch C, Rainisio M, Madessani U et al. Presence of cystic fibrosis-related diabetes mellitus is tightly linked to poor lung function in patients with cystic fibrosis: data from the European Epidemiologic Registry of Cystic Fibrosis. Pediatr Pulmonol 2001; 32: 343–350, EK III

[322] Koletzko B, Broekaert I, Kreuder J et al. Leitlinien zur Diagnostik und Therapie von Hyperlipidämien bei Kindern und Jugendlichen, APS, (2007)

[323] Kongkaew C, Jampachaisri K, Chaturongkul CA et al. Depression and adherence to treatment in diabetic children and adolescents: a systematic review and meta-analysis of observational studies. Eur J Pediatr 2014; 173: 203–212, EK Ia

[324] Konrad K, Scheuing N, Badenhoop K et al. Cystic fibrosis- related diabetes compared with type 1 and type 2 diabetes in adults. Diabetes Metab Res Rev 2013; 29: 568–575

[325] Konrad K, Thon A, Fritsch M et al. Comparison of cystic fibrosis-related diabetes with type 1 diabetes based on a German/Austrian Pediatric Diabetes Registry. Diabetes Care 2013; 36: 879–886, EK III

[326] Kordonouri O, Biester T, Schnell K et al. Lipoatrophy in children with type 1 diabetes: an increasing incidence? J Diabetes Sci Technol 2015; 9: 206–208, EK III

[327] Kordonouri O, Charpentier N, Hartmann R. GADA positivity at onset of type 1 diabetes is a risk factor for the development of autoimmune thyroiditis. Pediatr Diabetes 2011; 12: 31–33, EK IIb

[328] Kordonouri O, Deiss D, Danne T et al. Predictivity of thyroid autoantibodies for the development of thyroid disorders in children and adolescents with Type 1 diabetes. Diabet Med 2002a; 19: 518–521, EK III

[329] Kordonouri O, Hartmann R, Lauterborn R et al. Age-specific advantages of continuous subcutaneous insulin infusion as compared with multiple daily injections in pediatric patients: one-year follow-up comparison by matched-pair analysis. Diabetes Care 2006; 29: 133–134, EK IIa

[330] Kordonouri O, Klingensmith G, Knip M et al. ISPAD Clinical Practice Consensus Guidelines 2014. Other complications and diabetes-associated conditions in children and adolescents. Pediatr Diabetes 2014; 15: 270–278, EK IV

[331] Kordonouri O, Klinghammer A, Lang EB et al. Thyroid autoimmunity in children and adolescents with type 1 diabetes: a multicenter survey. Diabetes Care 2002b; 25: 1346–1350, EK III

[332] Kordonouri O, Maguire AM, Knip M et al. Other complications and associated conditions. In: International Diabetes Federation (IDF), Hrsg. Global IDF/ISPAD Guideline for Diabetes in Childhood and Adolescence. Brussels; 2011: 124–128; EK IV

[333] Kordonouri O, Maguire AM, Knip M et al. ISPAD Clinical Practice Consensus Guidelines 2006–2007. Other complications and associated conditions. Pediatr Diabetes 2007; 8: 171–176

[334] Kordonouri O, Maguire AM, Knip M et al. ISPAD Clinical Practice Consensus Guidelines 2006–2007. Other complications and associated conditions. Pediatr Diabetes 2007; 8: 171–176, EK IV

[335] Korhonen T, Huttunen JK, Aro A et al. A controlled trial on the effects of patient education in the treatment of insulin-dependent diabetes. Diabetes Care 1983; 6: 256–261, EK Ib

[336] Koster JC, Cadario F, Peruzzi C et al. The G53D mutation in Kir6.2 (KCNJ11) is associated with neonatal diabetes and motor dysfunction in adulthood that is improved with sulfonylurea therapy. J Clin Endocrinol Metab 2008; 93: 1054–1061, EK III

[337] Kovacs M, Feinberg TL, Paulauskas S et al. Initial coping responses and psychosocial characteristics of children with insulin-dependent diabetes mellitus. J Pediatr 1985; 106: 827–834, EK III

[338] Kovacs M, Ho V, Pollock MH. Criterion and predictive validity of the diagnosis of adjustment disorder: a prospective study of youths with new-onset insulin-dependent diabetes mellitus. Am J Psychiatry 1995; 152: 523–528, EK III

[339] Kovacs M, Iyengar S, Goldston D et al. Psychological functioning among mothers of children with insulin-dependent diabetes mellitus: a longitudinal study. J Consult Clin Psychol 1990; 58: 189–195, EK III

[340] Kromeyer-Hauschild K,Wabitsch M, Kunze D et al. Perzentile für den Body-mass-Index für das Kindes- und Jugendalter unter Heranziehung verschiedener deutscher Stichproben. Monatsschr Kinderheilkd 2001; 149: 807–818, EK III

[341] Kulzer B, Albus C, Herpertz S et al. Psychosoziales und Diabetes (Teil 1). S2-Leitlinie Psychosoziales und Diabetes – Langfassung. Diabet Stoffw 2013a; 8: 198–242, EK IV

[342] Kulzer B, Albus C, Herpertz S et al. Psychosoziales und Diabetes (Teil 2). S2-Leitlinie Psychosoziales und Diabetes–Langfassung. Diabet Stoffw 2013b; 8: 292–324, EK IV

[343] Kurth BM, Schaffrath RA. Die Verbreitung von Übergewicht und Adipositas bei Kindern und Jugendlichen in Deutschland. Ergebnisse des bundesweiten Kinder- und Jugendgesundheitssurveys (KiGGS). Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2007; 50: 736–743, EK III

[344] l'Allemand D, Wiegand S, Reinehr T et al. Cardiovascular risk in 26 008 European overweight children as established by a multicenter database. Obesity (Silver Spring) 2008; 16: 1672–1679, EK IIb-III

[345] Laffel LM, Limbert C, Phelan H et al. ISPAD Clinical Practice Consen-sus Guidelines 2018: Sick day management in children andadolescents with diabetes. PediatrDiabetes. 2018; 19 (Suppl 27): 193–204

[346] Laffel LM, Vangsness L, Connell A et al. Impact of ambulatory, family-focused teamwork intervention on glycemic control in youth with type 1 diabetes. J Pediatr 2003; 142: 409–416, EK IIb

[347] Laffel LM, Vangsness L, Connell A et al. Impact of ambulatory, family-focused teamwork intervention on glycemic control in youth with type 1 diabetes. J Pediatr 2003; 142: 409–416, EK IIa

[348] Laffel LM, Wentzell K, Loughlin C et al. Sick day management using blood 3-hydroxybutyrate (3- OHB) compared with urine ketone monitoring reduces hospital visits in young people with T1DM: a randomized clinical trial. Diabet Med 2006; 23: 278–284, EK Ib

[349] Laguna TA, Nathan BM, Moran A. Managing diabetes in cystic fibrosis. Diabetes Obes Metab 2010; 12: 858–864, EK IV

[350] Lampeter EF, Klinghammer A, Scherbaum WA et al. The Deutsche Nicotinamide Intervention Study: an attempt to prevent type 1 diabetes. DENIS Group.Diabetes 1998; 47: 980–984, EK Ib

[351] Landolt MA, Ribi K, Laimbacher J et al. Posttraumatic stress disorder in parents of children with newly diagnosed type 1 diabetes. J Pediatr Psychol 2002; 27: 647–652, EK III

[352] Lange K, Burger W, Holl R et al. Diabetes bei Jugendlichen: ein Schulungsprogramm. Mainz: Kirchheim; 2009

[353] Lange K, Danne T, Kordonouri O et al. Diabetesmanifestation im Kindesalter: Alltagsbelastungen und berufliche Entwicklung der Eltern. Dtsch Med Wochenschr 2004; 129: 1130–1134, EK III

[354] Lange K, Hildebrandt S, Danne T. Diabetesversorgung in der Pädiatrie – Leitlinien und Realität. Ergebnisse zweier bundesweiter Umfragen von 1998 und 2003. Dtsch Arztebl 2007; 104: A-2121–2126, EK III

[355] Lange K, Hürter P. Effekte einer strukturierten Diabetesschulung für Jugendliche auf Stoffwechsel, Wissen, Wohlbefinden und Selbständigkeit – Ergebnisse einer multizentrischen Studie. Diabet Stoffw 1998; 7: 62, EK IIb

[356] Lange K, Kinderling S, Hürter P. Eine multizentrische Studie zur Prozess- und Ergebnisqualität eines strukturierten Schulungsprogramms. Diabet Stoffw 2001; 10: 59–65, EK III

[357] Lange K, Kleine T, Danne T. Initialschulung für Eltern von Kindern mit Diabetes: Aufwand und Effekte bei Kindern und Eltern. Dtsch Med Wochenschr 2011; 136: 1106–1110, EK IIb

[358] Lange K, Klotmann S, Sassmann H et al. A pediatric diabetes toolbox for creating centres of reference. Pediatr Diabetes 2012; 13: 49–61, EK IV

[359] Lange K, Matthaei S, Lueg A et al. Life chances ("Lebenschancen") of young adults with onset of type 1 diabetes during Childhood. Pediatric Diabetes 2013; 14: 35, EK IIb

[360] Lange K, Remus K, Bläsig S et al. Diabetes bei Kindern: ein Behandlungs- und Schulungsprogramm. Mainz: Kirchheim; 2013

[361] Lange K, Stachow U, Kurzinsky R et al. Pädiatrische Betreuung von Kindern und Jugendlichen mit Diabetes. Eine bundesweite Umfrage der Arbeitsgemeinschaft für Pädiatrische Diabetologie in der Deutschen Diabetes-Gesellschaft und der Deutschen Gesellschaft für Kinderheilkunde und Jugendmedizin. Diabet Stoffw 2002; 11: 14–22, EK III

[362] Lange K, Swift P, Pankowska E et al. Diabetes education in children and adolescents. Pediatric Diabetes 2014a; 15: 77–85, EK IV

[363] Lange K, Swift P, Pankowska E et al. ISPAD Clinical Practice Consensus Guidelines 2014. Diabetes education in children and adolescents. Pediatr Diabetes 2014b; 15 (Suppl 20): 77–85, EK IV

[364] Lange K, von Schütz W, Neu A et al. Diabetesschulung. Schulungsprogramme und Curricula für Kinder, Jugendliche mit Typ 1 Diabetes, deren Eltern und andere Betreuer, Lengerich: Pabst; 2014

[365] Lango AH, Flanagan SE, Shaw-Smith C et al. GATA6 haploinsufficiency causes pancreatic agenesis in humans. Nat Genet 2012; 44: 20–22

[366] Lanng S, Thorsteinsson B, Lund-Andersen C et al. Diabetes mellitus in Danish cystic fibrosis patients: prevalence and late diabetic complications. Acta Paediatr 1994; 83: 72–77, EK IIb–III

[367] Lanng S, Thorsteinsson B, Nerup J et al. Influence of the development of diabetes mellitus on clinical status in patients with cystic fibrosis. Eur J Pediatr 1992; 151: 684–687, EK III

[368] Laron Z, Galatzer A, Amir S et al. A multidisciplinary, comprehensive, ambulatory treatment scheme for diabetes mellitus in children. Diabetes Care 1979; 2: 342–348, EK III

[369] Larsson K, Carlsson A, Cederwall E et al. Annual screening detects celiac disease in children with type 1 diabetes. Pediatr Diabetes 2008; 9: 354–359, EK IIb

[370] Lawrence JM, Standiford DA, Loots B et al. Prevalence and correlates of depressed mood among youth with diabetes: the SEARCH for Diabetes in Youth study. Pediatrics 2006; 117: 1348–1358, EK IIb

[371] Lawrence JM, Standiford DA, Loots B et al. Prevalence and correlates of depressed mood among youth with diabetes: the SEARCH for Diabetes in Youth study. Pediatrics 2006; 117: 1348–1358, EK IV

[372] Lazarus J, Brown RS, Daumerie C et al. 2014 European thyroid association guidelines for the management of subclinical hypothyroidism in pregnancy and in children. Eur Thyroid J 2014; 3: 76–94, EK IV

[373] Lehmkuhl HD, Storch EA, Cammarata C et al. Telehealth behavior therapy for the management of type 1 diabetes in adolescents. J Diabetes Sci Technol 2010; 4: 199–208, EK Ib

[374] Levene LS, McNally PG, Fraser RC et al. What characteristics are associated with screening positive for microalbuminuria in patients with diabetes in the community? Pract Diabet Int 2004; 21: 287–292, EK III

[375] Levin DL. Cerebral edema in diabetic ketoacidosis. Pediatr Crit Care Med 2008; 9: 320–329, EK III

[376] Levy-Marchal C, Patterson CC, Green A. Geographical variation of presentation at diagnosis of type I diabetes in children: the EURODIAB study. European and Dibetes. Diabetologia 2001; 44 (Suppl 3): B75-B80, EK III

[377] Levy-Shraga Y, Elisha N, Ben-Ami M et al. Glycemic control and clinic attendance of emerging adults with type 1 diabetes at a transition care clinic. Acta Diabetol 2015; EK III

[378] Lewis HM, Renaula TL, Garioch JJ et al. Protective effect of gluten-free diet against development of lymphoma in dermatitis herpetiformis. Br J Dermatol 1996; 135: 363–367, EK IIa

[379] Liberatore RR, Jr., Barbosa SF, Alkimin MG et al. Is immunity in diabetic patients influencing the susceptibility to infections? Immunoglobulins, complement and phagocytic function in children and adolescents with type 1 diabetes mellitus. Pediatr Diabetes 2005; 6: 206–212, EK III

[380] Lin A, Northam EA, Rankins D et al. Neuropsychological profiles of young people with type 1 diabetes 12 yr after disease onset. Pediatr Diabetes 2010; 11: 235–243, EK IIb

[381] Lind M, Svensson AM, Kosiborod M et al. Glycemic control and excess mortality in type 1 diabetes. N Engl J Med 2014; 371: 1972–1982, EK III

[382] Lindstrom C, Aman J, Norberg AL. Parental burnout in relation to sociodemographic, psychosocial and personality factors as well as disease duration and glycaemic control in children with Type 1 diabetes mellitus. Acta Paediatr 2011; 100: 1011–1017, EK III

[383] Lindstrom J, Ilanne-Parikka P, Peltonen M et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. Lancet 2006; 368: 1673–1679, EK Ib

[384] Liu C, Wu D, Zheng X et al. Efficacy and safety of metformin for patients with type 1 diabetes mellitus: a metaanalysis. Diabetes Technol Ther 2015; 17: 142–148, EK 1b

[385] Lorini R, Klersy C, d'Annunzio G et al. Maturity-onset diabetes of the young in children with incidental hyperglycemia: a multicenter Italian study of 172 families. Diabetes Care 2009; 32: 1864–1866

[386] Lorini R, Scotta MS, Cortona L et al. Celiac disease and type I (insulindependent) diabetes mellitus in childhood: follow-up study. J Diabetes Complications 1996; 10: 154–159, EK III

[387] Ludvigsson J, Bolli GB. Intensive insulin treatment in diabetic children. Diabetes Nutr Metab 2001; 14: 292–304, EK IIb

[388] Ludvigsson J, Krisky D, Casas R et al. GAD65 antigen therapy in recently diagnosed type 1 diabetes mellitus. N Engl J Med 2012; 366: 433–342

[389] Ludwig-Seibold CU, Holder M, Rami B et al. Continuous glucose monitoring in children, adolescents, and adults with type 1 diabetes mellitus: analysis from the prospective DPV diabetes documentation and quality management system from Germany and Austria. Pediatr Diabetes 2012; 13: 12–14

[390] Ly TT, Maahs DM, Rewers A et al. ISPAD Clinical Practice Consensus Guidelines 2014. Assessment and management of hypoglycemia in children and adolescents with diabetes. Pediatr Diabetes 2014; 15 (Suppl 20): 180–192, EK IV

[391] Ly TT, Nicholas JA, Retterath A et al. Effect of sensor-augmented insulin pump therapy and au-tomated insulin suspension vs standard insulin pump therapy on hypoglycemia in patients with type 1 diabetes: a randomized clinical trial. JAMA 2013; 310: 1240–1247, EK Ib

[392] Maahs DM, Calhoun P, Buckingham BA et al. A randomized trial of a home system to reduce nocturnal hypoglycemia in type 1 diabetes. Diabetes Care 2014; 37: 1885–1891, EK Ib

[393] Maahs DM, Hermann JM, DuBose SN et al. Contrasting the clinical care and outcomes of 2622 children with type 1 diabetes less than 6 years of age in the United States T1D Exchange and German/Austrian DPV registries. Diabetologia 2014; 57: 1578–1585, EK III

[394] Mahmud FH, Elbarbary NS, Fröhlich-Reiterer E et al. ISPAD Clinical Practice Consensus Guidelines 2018: Other complications and associated conditions in children and adolescents with type 1 diabetes. Pediatr Diabetes 2018; 19 (Suppl 27): 275–286

[395] Mann JI, De Leeuw I, Hermansen K et al. Evidence-based nutritional approaches to the treatment and prevention of diabetes mellitus. Nutr Metab Cardiovasc Dis 2004; 14: 373–394

[396] Mannucci E, Rotella F, Ricca V et al. Eating disorders in patients with type 1 diabetes: a meta- analysis. J Endocrinol Invest 2005; 28: 417–419, EK Ia

[397] Margeirsdottir HD, Larsen JR, Brunborg C et al. High prevalence of cardiovascular risk factors in children and adolescents with type 1 diabetes: a population- based study. Diabetologia 2008; 51: 554–561, IIb-III

[398] Markowitz JT, Butler DA, Volkening LK et al. Brief screening tool for disordered eating in diabetes: internal consistency and external validity in a contemporary sample of pediatric patients with type 1 diabetes. Diabetes Care 2010; 33: 495–500, EK III

[399] Martin D, Lange K, Sima A et al. Recommendations for age-appropriate education of children and adolescents with diabetes and their parents in the European Union. Pediatr Diabetes 2012; 13 (Suppl 16): 20–28, EK IV

[400] Marzelli MJ, Mazaika PK, Barnea-Goraly N et al. Neuroanatomical correlates of dysglycemia in young children with type 1 diabetes. Diabetes 2014; 63: 343–353, EK III

[401] Mathiesen ER, Saurbrey N, Hommel E et al. Prevalence of microalbuminuria in children with type 1 (insulindependent) diabetes mellitus. Diabetologia 1986; 29: 640–643, EK III

[402] Matthaei S, Bierwirth R, Fritsche A et al. Medikamentöse antihyperglykämische Therapie des Diabetes mellitus Typ 2. Update der Evidenzbasierten Leitlinie der Deutschen Diabetes-Gesellschaft (2008). Im Internet: http: //www.deutsche-diabetes-gesellschaft.de/fileadmin/ Redakteur/Leitlinien/Evidenzbasierte_Leitlinien/EBL_Dm_Typ2_Update_2008.pdf

[403] Mauras N, Beck R, Xing D et al. A randomized clinical trial to assess the efficacy and safety of real-time continuous glucose monitoring in the management of type 1 diabetes in young children aged 4 to < 10 years. Diabetes Care 2012; 35: 204–210, EK Ib

[404] Mayer-Davis EJ, Kahkoska AR, Jefferies C et al. ISPAD Clinical Practice Consensus Guidelines 2018: Definition, epidemiology, and classification of diabetes in children and adolescents. Pediatr Diabetes 2018; 19 (Suppl 27): 7–19

[405] McBroom LA, Enriquez M. Review of family-centered interventions to enhance the health outcomes of children with type 1 diabetes. Diabetes Educ 2009; 35: 428–438, EK Ia

[406] McDonald TJ, Ellard S. Maturity onset diabetes of the young: identification and diagnosis. Ann Clin Biochem 2013; 50: 403–415, EK III

[407] McKnight JA, Wild SH, Lamb MJ et al. Glycaemic control of Type 1 diabetes in clinical practice early in the 21st century: an international comparison. Diabet Med 2015; 32: 1036–1050, EK IIb

[408] Meltzer LJ, Johnson SB, Prine JM et al. Disordered eating, body mass, and glycemic control in adolescents with type 1 diabetes. Diabetes Care 2001; 24: 678–682, EK III

[409] Mensink RP, Zock PL, Kester AD et al. Effects of dietary fatty acids and carbohydrates on the ratio of serum total to HDL cholesterol and on serum lipids and apolipoproteins: a meta-analysis of 60 controlled trials. Am J Clin Nutr 2003; 77: 1146–1155, EK Ia

[410] Milla CE, Warwick WJ, Moran A. Trends in pulmonary function in patients with cystic fibrosis correlate with the degree of glucose intolerance at baseline. Am J Respir Crit Care Med 2000; 162: 891–895, EK III

[411] Miller KM, Beck RW, Bergenstal RM et al. Evidence of a strong association between frequency of self-monitoring of blood glucose and hemoglobin A1c levels in T1D exchange clinic registry participants. Diabetes Care 2013; 36: 2009–2014, EK III

[412] Miller-Johnson S, Emery RE, Marvin RS et al. Parent-child relationships and the management of insulin-dependent diabetes mellitus. J Consult Clin Psychol 1994; 62: 603–610, EK III

[413] Misso ML, Egberts KJ, Page M et al. Continuous subcutaneous insulin infusion (CSII) versus multiple insulin injections for type 1 diabetes mellitus. Cochrane Database Syst Rev 2010; CD005 103. doi: 10.1002/14651858.CD005103.pub2, Ia

[414] Mlynarski W, Tarasov AI, Gach A et al. Sulfonylurea improves CNS function in a case of intermediate DEND syndrome caused by a mutation in KCNJ11. Nat Clin Pract Neurol 2007; 3: 640–645, EK III

[415] Mohn A, Di MS, Di LR et al. The effect of subclinical hypothyroidism on metabolic control in children and adolescents with Type 1 diabetes mellitus. Diabet Med 2002; 19: 70–73, EK IIa

[416] Monetini L, Cavallo MG, Stefanini L et al. Bovine beta-casein antibodies in breast- and bottle-fed infants: their relevance in Type 1 diabetes. Diabetes Metab Res Rev 2001; 17: 51–54, EK III

[417] Moore WV, Donaldson DL, Chonko AM et al. Ambulatory blood pressure in type I diabetes mellitus. Comparison to presence of incipient nephropathy in adolescents and young adults. Diabetes 1992; 41: 1035–1041, EK IIb

[418] Morris LR, Murphy MB, Kitabchi AE. Bicarbonate therapy in severe diabetic ketoacidosis. Ann Intern Med 1986; 105: 836–840

[419] Mortensen HB, Hougaard P, Ibsen KK et al. Relationship between blood pressure and urinary albumin excretion rate in young Danish type 1 diabetic patients: comparison to non-diabetic children. Danish Study Group of Diabetes in Childhood. Diabet Med 1994; 11: 155–161, EK IIa

[420] Mortensen HB, Lindholm A, Olsen BS et al. Rapid appearance and onset of action of insulin aspart in paediatric subjects with type 1 diabetes. Eur J Pediatr 2000; 159: 483–488, EK Ib

[421] Mortensen HB, Robertson KJ, Aanstoot HJ et al. Insulin management and metabolic control of type 1 diabetes mellitus in childhood and adolescence in 18 countries. Hvidore Study Group on Childhood Diabetes. Diabet Med 1998; 15: 752–759, EK III

[422] Muir AB, Quisling RG, Yang MC et al. Cerebral edema in childhood diabetic ketoacidosis: natural history, radiographic findings, and early identification. Diabetes Care 2004; 27: 1541–1546, EK IIb-III

[423] Mulvaney SA, Rothman RL, Osborn CY et al. Self-management problem solving for adolescents with type 1 diabetes: intervention processes associated with an Internet program. Patient Educ Couns 2011; 85: 140–142, EK IIb

[424] Mulvaney SA, Rothman RL, Wallston KA et al. An internet-based program to improve self-management in adolescents with type 1 diabetes. Diabetes Care 2010; 33: 602–604, EK IIb

[425] Murphy HR, Rayman G, Skinner TC. Psycho-educational interventions for children and young people with Type 1 diabetes. Diabet Med 2006; 23: 935–943, EK Ia

[426] Murphy HR, Rayman G, Skinner TC. Psycho-educational interventions for children and young people with Type 1 diabetes. Diabet Med 2006; 23: 935–943, EK Ib

[427] Murphy R, Ellard S, Hattersley AT. Clinical implications of a molecular genetic classification of monogenic beta-cell diabetes. Nat Clin Pract Endocrinol Metab 2008; 4: 200–213, EK IV

[428] Musen G, Jacobson AM, Ryan CM et al. Impact of diabetes and its treatment on cognitive function among adolescents who participated in the Diabetes Control and Complications Trial. Diabetes Care 2008; 31: 1933–1938, EK Ib

[429] Naar-King S, Idalski A, Ellis D et al. Gender differences in adherence and metabolic control in urban youth with poorly controlled type 1 diabetes: the mediating role of mental health symptoms. J Pediatr Psychol 2006; 31: 793–802, EK III

[430] Nadeau KJ, Klingensmith G, Zeitler P. Type 2 diabetes in children is frequently associated with elevated alanine aminotransferase. J Pediatr Gastroenterol Nutr 2005; 41: 94–98, EK IIb-III

[431] Naguib JM, Kulinskaya E, Lomax CL et al. Neurocognitive performance in children with type 1 diabetes–a meta-analysis. J Pediatr Psychol 2009; 34: 271–282, EK Ib

[432] Nahata L. Insulin therapy in pediatric patients with type I diabetes: continuous subcutaneous insulin infusion versus multiple daily injections. Clin Pediatr (Phila) 2006; 45: 503–508, EK Ia

[433] Nakhla M, Daneman D, Frank M et al. Translating transition: a critical review of the diabetes literature. J Pediatr Endocrinol Metab 2008; 21: 507–516, EK III

[434] Nallasamy K, Jayashree M, Singhi S et al. Low-dose vs standard-dose insulin in pediatric diabetic ketoacidosis: a randomized clinical trial. JAMA Pediatr 2014; 168: 999–1005, EK Ib

[435] Nansel TR, Iannotti RJ, Liu A. Clinic-integrated behavioral intervention for families of youth with type 1 diabetes: randomized clinical trial. Pediatrics 2012; 129: e866-e873, EK Ib

[436] Nansel TR, Iannotti RJ, Simons-Morton BG et al. Diabetes personal trainer outcomes: short-term and 1-year outcomes of a diabetes personal trainer intervention among youth with type 1 diabetes. Diabetes Care 2007; 30: 2471–2477, EK IIb

[437] Nansel TR, Iannotti RJ, Simons-Morton BG et al. Long-term maintenance of treatment outcomes: diabetes personal trainer intervention for youth with type 1 diabetes. Diabetes Care 2009; 32: 807–809, EK IIb

[438] Nardi L, Zucchini S, D'Alberton F et al. Quality of life, psychological adjustment and metabolic control in youths with type 1 diabetes: a study with self- and parent-report questionnaires. Pediatr Diabetes 2008; 9: 496–503, EK III

[439] Nathan DM, Cleary PA, Backlund JY et al. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. N Engl J Med 2005; 353: 2643–2653, EK Ib

[440] Neu A, Ehehalt S, Bendas A et al. Incidence of childhood type 1 diabetes in Germany: a nationwide survey over a period of ten years. Pediatric Diabetes 2013; 14: 119

[441] Neu A, Ehehalt S, Feldhahn LM et al. Diabeteshäufigkeit bei Kindern und Jugendlichen in Deutschland – 20 Jahre Diabetes-Inzidenzregister Baden-Württemberg. Diabetologie 2008; 309–313

[442] Neu A, Ehehalt S, Willasch A et al. Rising incidence of type 1 diabetes in Germany: 12-year trend analysis in children 0–14 years of age. Diabetes Care 2001; 24: 785–786, EK IIa

[443] Neu A, Feldhahn L, Ehehalt S et al. No change in type 2 diabetes prevalence in children and ado-lescents over 10 years: Update of a population-based surveyin South Germany. Pediatr Diabetes 2018; 19: 637–639

[444] Neu A, Feldhahn L, Ehehalt S et al. Prevalence of type 2 diabetes and MODY in children and adolescents. A state-wide study in Baden-Wuerttemberg (Germany). Pediatr Diabetes 2005; 6: 27–28, EK III

[445] Neu A, Hofer SE, Karges B et al. Ketoacidosis at diabetes onset is still frequent in children and adolescents: a multicenter analysis of 14 664 patients from 106 institutions. Diabetes Care 2009; 32: 1647–1648, EK IIb

[446] Neu A, Lange K, Lösch-Binder M et al. Diabetes – na und? DVD mit drei Informationsfilmen für Lehrer/innen von Kindern mit Diabetes zum Einsatz im Unterricht. Hrsg. von Arbeitsgemeinschaft pädiatrische Diabetologie (AGPD); 2011

[447] Neu A, Losch-Binder M, Ehehalt S et al. Follow-up of adolescents with diabetes after transition from paediatric to adult care: results of a 10-year prospective study. Exp Clin Endocrinol Diabetes 2010; 118: 353–355, EK III

[448] Neu A, Willasch A, Ehehalt S et al. Ketoacidosis at onset of type 1 diabetes mellitus in children–frequency and clinical presentation. Pediatr Diabetes 2003; 4: 77–81, EK III

[449] Neuhauser H, Schienkiewitz A, Schaffrath RA et al. Referenzperzentile für anthropometrische Maßzahlen und Blutdruck aus der Studie zur Gesundheit von Kindern und Jugendlichen in Deutschland (KiGGS). 2. erweiterte Auflage, RKI, Berlin (2013)

[450] Neuhauser HK, Thamm M, Ellert U et al. Blood pressure percentiles by age and height from nonoverweight children and adolescents in Germany. Pediatrics 2011; 127: e978–e988

[451] Nichols PJ, Norris SL. A systematic literature review of the effectiveness of diabetes education of school personnel. Diabetes Educ 2002; 28: 405–414, EK III

[452] Nieuwesteeg A, Pouwer F, van der Kamp R et al. Quality of life of children with type 1 diabetes: a systematic review. Curr Diabetes Rev 2012; 8: 434–443, EK III

[453] Nimri R, Muller I, Atlas E et al. MD-Logic overnight control for 6 weeks of home use in patients with type 1 diabetes: randomized crossover trial. Diabetes Care 2014; 37: 3025–3032, EK Ib

[454] Nimri R, Weintrob N, Benzaquen H et al. Insulin pump therapy in youth with type 1 diabetes: a retrospective paired study. Pediatrics 2006; 117: 2126–2131, EK IIb-III

[455] Nordfeldt S, Ludvigsson J. Adverse events in intensively treated children and adolescents with type 1 diabetes. Acta Paediatr 1999; 88: 1184–1193, EK IIb

[456] Nordfeldt S, Ludvigsson J. Fear and other disturbances of severe hypoglycaemia in children and adolescents with type 1 diabetes mellitus. J Pediatr Endocrinol Metab 2005; 18: 83–91, EK III

[457] Nordwall M, Hyllienmark L, Ludvigsson J. Early diabetic complications in a population of young patients with type 1 diabetes mellitus despite intensive treatment. J Pediatr Endocrinol Metab 2006; 19: 45–54, EK III

[458] Norris JM, Barriga K, Klingensmith G et al. Timing of initial cereal exposure in infancy and risk of islet autoimmunity. JAMA 2003; 290: 1713–1720, EK III

[459] Northam EA, Anderson PJ, Werther GA et al. Neuropsychological complications of IDDM inchildren 2 years after disease onset. Diabetes Care 1998; 21: 379–384, EK III

[460] Northam EA, Matthews LK, Anderson PJ et al. Psychiatric morbidity and health outcome in Type 1 diabetes–perspectives from a prospective longitudinal study. Diabet Med 2005; 22: 152–157, EK III

[461] Northam EA, Todd S, Cameron FJ. Interventions to promote optimal health outcomes in children with Type 1 diabetes– are they effective? Diabet Med 2006; 23: 113–121, EK Ia-III

[462] Nousia-Arvanitakis S, Galli-Tsinopoulou A, Karamouzis M. Insulin improves clinical status of patients with cystic-fibrosis- related diabetes mellitus. Acta Paediatr 2001; 90: 515–519, EK III

[463] O'Hayon BE, Cummings EA, Daneman D et al. Does dietary protein intake correlate with markers suggestive of early diabetic nephropathy in children and adolescents with Type 1 diabetes mellitus? Diabet Med 2000; 17: 708–712, EK III

[464] O'Riordan SM, Robinson PD, Donaghue KC et al. Management of cystic fibrosis-related diabetes. Pediatr Diabetes 2008; 9: 338–344

[465] Okuda Y, Adrogue HJ, Field JB et al. Counterproductive effects of sodium bicarbonate in diabetic ketoacidosis. J Clin Endocrinol Metab 1996; 81: 314–320

[466] Olmsted MP, Daneman D, Rydall AC et al. The effects of psychoeducation on disturbed eating attitudes and behavior in young women with type 1 diabetes mellitus. Int J Eat Disord 2002; 32: 230–239, EK Ib

[467] Overby NC, Margeirsdottir HD, Brunborg C et al. The influence of dietary intake and meal pattern on blood glucose control in children and adoles- cents using intensive insulin treatment. Diabetologia 2007; 50: 2044–2051, EK IIb

[468] Overstreet S, Goins J, Chen RS et al. Family environment and the interrelation of family structure, child behavior, and metabolic control for children with diabetes. J Pediatr Psychol 1995; 20: 435–447, EK IIa

[469] Pankowska E, Blazik M, Dziechciarz P et al. Continuous subcutaneous insulin infusion vs. multiple daily injections in children with type 1 diabetes: a systematic review and meta-analysis of randomized control trials. Pediatr Diabetes 2008; EK Ia

[470] Pankowska E, Szypowska A, Lipka M et al. Sustained metabolic control and low rates of severe hypoglycaemic episodes in preschool diabetic children treated with continuous subcutaneous insulin infusion. Acta Paediatr 2007; 96: 881–884, EK IIb-III

[471] Pattison HM, Moledina S, Barrett TG. The relationship between parental perceptions of diabetes and glycaemic control. Arch Dis Child 2006; 91: 487–490, EK III

[472] Pavlovic MD, Milenkovic T, Dinic M et al. The prevalence of cutaneous manifestations in young patients with type 1 diabetes. Diabetes Care 2007; 30: 1964–1967, EK III

[473] Pearson ER, Flechtner I, Njolstad PR et al. Switching from insulin to oral sulfonylureas in patients with diabetes due to Kir6.2 mutations. N Engl J Med 2006; 355: 467–477, EK III

[474] Pearson ER, Liddell WG, Shepherd M et al. Sensitivity to sulphonylureas in patients with hepatocyte nuclear factor-1alpha gene mutations: evidence for pharmacogenetics in diabetes. Diabet Med 2000; 17: 543–545, EK III

[475] Perantie DC, Lim A, Wu J et al. Effects of prior hypoglycemia and hyperglycemia on cognition in children with type 1 diabetes mellitus. Pediatr Diabetes 2008; 9: 87–95, EK III

[476] Persson S, Dahlquist G, Gerdtham UG et al. Impact of childhood-onset type 1 diabetes on schooling: a populationbased register study. Diabetologia 2013; 56: 1254–1262, EK IIb

[477] Peterson DB, Lambert J, Gerring S et al. Sucrose in the diet of diabetic patients–just another carbohydrate? Diabetologia 1986; 29: 216–220, EK Ib

[478] Peyrot M, Rubin RR. Behavioral and psychosocial interventions in diabetes: a conceptual review. Diabetes Care 2007; 30: 2433–2440, EK Ib

[479] Peyrot M, Rubin RR. Treatment satisfaction in the sensoraugmented pump therapy for A1C reduction 3 (STAR 3) trial. Diabet Med 2013; 30: 464–467, EK Ib

[480] Phillip M, Battelino T, Atlas E et al. Nocturnal glucose control with an artificial pancreas at a diabetes camp. N Engl J Med 2013; 368: 824–833, EK Ib

[481] Phillip M, Battelino T, Rodriguez H et al. Use of insulin pump therapy in the pediatric age-group: consensus statement from the European Society for Paediatric Endocrinology, the Lawson Wilkins Pediatric Endocrine Society, and the International Society for Pediatric and Adolescent Diabetes, endorsed by the American Diabetes Association and the European Association for the Study of Diabetes. Diabetes Care 2007; 30: 1653–1662

[482] Philotheou A, Arslanian S, Blatniczky L et al. Comparable efficacy and safety of insulin glulisine and insulin lispro when given as part of a Basal-bolus insulin regimen in a 26-week trial in pediatric patients with type 1 diabetes. Diabetes Technol Ther 2011; 13: 327–334

[483] Pihoker C, Forsander G, Fantahun B et al. ISPAD Clinical Practice Consensus Guidelines 2014. The delivery of ambulatory diabetes care to children and adolescents with diabetes. Pediatr Diabetes 2014; 15 (Suppl 20): 86–101, EK IV

[484] Plank J, Siebenhofer A, Berghold A et al. Systematic review and meta-analysis of shortacting insulin analogues in patients with diabetes mellitus. Arch Intern Med 2005; 165: 1337–1344, EK Ia

[485] Plener PL, Molz E, Berger G et al. Depression, metabolic control, and antidepressant medication in young patients with type 1 diabetes. Pediatr Diabetes 2015; 16: 58–66, EK IIb

[486] Polak M, Dechaume A, Cave H et al. Heterozygous missense mutations in the insulin gene are linked to permanent diabetes appearing in the neonatal period or in early infancy: a report from the French ND (Neonatal Diabetes) Study Group. Diabetes 2008; 57: 1115–1119, EK III

[487] Povlsen L, Olsen B, Ladelund S. Diabetes in children and adolescents from ethnic minorities: barriers to education, treatment and good metabolic control. J Adv Nurs 2005; 50: 576–582, EK III

[488] Powers SW, Byars KC, Mitchell MJ et al. Parent report of mealtime behavior and parenting stress in young children with type 1 diabetes and in healthy control subjects. Diabetes Care 2002; 25: 313–318, EK III

[489] Puttha R, Cooke D, Subbarayan A et al. Low dose (0.05 units/ kg/h) is comparable with standard dose (0.1 units/kg/h) intravenous insulin infusion for the initial treatment of diabetic ketoacidosis in children with type 1 diabetes-an observational study. Pediatr Diabetes 2010; 11: 12–17, EK III

[490] Radetti G, Paganini C, Gentili L et al. Frequency of Hashimoto's thyroiditis in children with type 1 diabetes mellitus. Acta Diabetol 1995; 32: 121–124, EK III

[491] Raile K, Galler A, Hofer S et al. Diabetic nephropathy in 27 805 children, adolescents, and adults with type 1 diabetes: effect of diabetes duration, A1C, hypertension, dyslipidemia, diabetes onset, and sex. Diabetes Care 2007; 30: 2523–2528, EK IIb-III

[492] Raile K, Klopocki E, Holder M et al. Expanded clinical spectrum in hepatocyte nuclear factor 1b-maturity-onset diabetes of the young. J Clin Endocrinol Metab 2009; 94: 2658–2664, EK IV

[493] Raile K, O'Connell M, Galler A et al. Diabetes caused by insulin gene (INS) deletion: clinical characteristics of homozygous and heterozygous individuals. Eur J Endocrinol 2011; 165: 255–260

[494] Raile K, Schober E, Konrad K et al. Treatment of young patients with HNF1A mutations (HNF1A-MODY). Diabet Med 2015; 32: 526–530

[495] Rattay P, von der LE, Lampert T. Gesundheit von Kindern und Jugendlichen in Eineltern-, Stief- und Kernfamilien. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2014; 57: 860–868, EK IIb

[496] Reid GJ, Dubow EF, Carey TC et al. Contribution of coping to medical adjustment and treatment responsibility among children and adolescents with diabetes. J Dev Behav Pediatr 1994; 15: 327–335, EK III

[497] Reinehr T, Schober E, Roth CL et al. Type 2 diabetes in children and adolescents in a 2-year follow-up: insufficient adherence to diabetes centers. Horm Res 2008; 69: 107–113, EK III

[498] Reinehr T, Temmesfeld M, Kersting M et al. Four-year follow-up of children and adolescents participating in an obesity intervention program. Int J Obes (Lond) 2007; 31: 1074–1077, EK III

[499] Renders CM, Valk GD, Griffin SJ et al. Interventions to improve the management of diabetes in primary care, outpatient, and community settings: a systematic review. Diabetes Care 2001; 24: 1821–1833, EK Ia

[500] Rewers A, Klingensmith G, Davis C et al. Presence of diabetic ketoacidosis at diagnosis of diabetes mellitus in youth: the Search for Diabetes in Youth Study. Pediatrics 2008; 121: e1258–e1266, EK III

[501] Rewers M, Pihoker C, Donaghue K et al. Assessment and monitoring of glycemic control in children and adolescents with diabetes. Pediatr Diabetes 2007; 8: 408–418

[502] Rewers M, Pihoker C, Donaghue K et al. Assessment and monitoring of glycemic control in children and adolescents with diabetes. Pediatr Diabetes 2007; 8: 408–418, EK IV

[503] Reynolds KA, Helgeson VS. Children with diabetes compared to peers: depressed? Distressed? A meta-analytic review. Ann Behav Med 2011; 42: 29–41, EK Ib

[504] Riccardi G, Rivellese A, Pacioni D et al. Separate influence of dietary carbohydrate and fibre on the metabolic control in diabetes. Diabetologia 1984; 26: 116–421, EK Ib

[505] Richter B, Neises G. 'Human' insulin versus animal insulin in people with diabetes mellitus. Cochrane Database Syst Rev 2005; CD003 816, EK Ia

[506] Riddell MC, Iscoe KE. Physical activity, sport, and pediatric diabetes. Pediatr Diabetes 2006; 7: 60–70, EK IV

[507] Riley MD, Dwyer T. Microalbuminuria is positively associated with usual dietary saturated fat intake and negatively associated with usual dietary protein intake in people with insulin- dependent diabetes mellitus. Am J Clin Nutr 1998; 67: 50–57, EK III

[508] Riveline JP, Schaepelynck P, Chaillous L et al. Assessment of patient-led or physician-driven continuous glucose monitoring in patients with poorly controlled type 1 diabetes using basal-bolus insulin regimens: a 1-year multicenter study. Diabetes Care 2012; 35: 965–971, EK Ib

[509] Rivellese A, Riccardi G, Giacco A et al. Effect of dietary fibre on glucose control and serum lipoproteins in diabetic patients. Lancet 1980; 2: 447–450, EK Ib

[510] Roberts MD, Slover RH, Chase HP. Diabetic ketoacidosis with intracerebral complications. Pediatr Diabetes 2001; 2: 109–114, EK III

[511] Robertson K, Riddell MC, Guinhouya BC et al. ISPAD Clinical Practice Consensus Guidelines 2014. Exercise in children and adolescents with diabetes. Pediatr Diabetes 2014; 15 (Suppl 20): 203–223, EK IV

[512] Robertson KJ, Schoenle E, Gucev Z et al. Insulin detemir compared with NPH insulin in children and adolescents with Type 1 diabetes. Diabet Med 2007; 24: 27–34, EK Ib

[513] Rohrer T, Stierkorb E, Grabert M et al. Delayed menarche in young German women with type 1 diabetes mellitus: recent results from the DPV diabetes documentation and quality management system. Eur J Pediatr 2008; 167: 793–799

[514] Rolon MA, Benali K, Munck A et al. Cystic fibrosis-related diabetes mellitus: clinical impact of prediabetes and effects of insulin therapy. Acta Paediatr 2001; 90: 860–867, EK III

[515] Ronkainen MS, Hamalainen AM, Koskela P et al. Pregnancy induces nonimmunoglobulin insulinbinding activity in both maternal and cord blood serum. Clin Exp Immunol 2001; 124: 190–196, EK Ib

[516] Rosenbauer J, Dost A, Karges B et al. Improved metabolic control in children and adolescents with type 1 diabetes: a trend analysis using prospective multicenter data from Germany and Austria. Diabetes Care 2012; 35: 80–86, EK III

[517] Rosenbauer J, Herzig P, Giani G. Familial risk Type 1 diabetes mellitus in preschool age. Diabetologia 2003; 46: A118, EK IIa

[518] Rosenbauer J, Icks A, du Prel JB et al. Populationsbasierte Daten zur Inzidenz des Typ-2-Diabetes mellitus bei Kindern und Jugendlichen in Deutschland. Monatsschr Kinderheilkd 2003; 151: 71, EK III

[519] Rosenbauer J, Icks A, Giani G. Clinical characteristics and predictors of severe ketoacidosis at onset of type 1 diabetes mellitus in children in a North Rhine-Westphalian region, Germany. J Pediatr Endocrinol Metab 2002a; 15: 1137–1145, EK IIb

[520] Rosenbauer J, Icks A, Giani G. Incidence and prevalence of childhood type 1 diabetes mellitus in Germany–model-based national estimates. J Pediatr Endocrinol Metab 2002b; 15: 1497–1504, EK IIb

[521] Rosenbauer J, Icks A, Grabert M et al. Hohe Prävalenz des Typ-1-Diabetes mellitus im Kindes- und Jugendalter in Deutschland (Abstract). Kinder- Jugendmed 2002; 2: A84, EK III

[522] Rosenbauer J, Rothe U, Bendas A et al. National prevalence estimates of childhood type 1 diabetes in Germany. Pediatric Diabetes 2013; 14: 119, EK III

[523] Rosenbloom AL, Schatz DA, Krischer JP et al. Therapeutic controversy: prevention and treatment of diabetes in children. J Clin Endocrinol Metab 2000; 85: 494–522, EK IV

[524] Rubio-Cabezas O, Klupa T, Malecki MT. Permanent neonatal diabetes mellitus–the importance of diabetes differential diagnosis in neonates and infants. Eur J Clin Invest 2011; 41: 323–333

[525] Rutledge KS, Chase HP, Klingensmith GJ et al. Effectiveness of postprandial Humalog in toddlers with diabetes. Pediatrics 1997; 100: 968–972, EK IIa

[526] Sacks FM, Svetkey LP, Vollmer WM et al. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. N Engl J Med 2001; 344: 3–10, EK Ib

[527] Sagen JV, Raeder H, Hathout E et al. Permanent neonatal diabetes due to mutations in KCNJ11 encoding Kir6.2: patient characteristics and initial response to sulfonylurea therapy. Diabetes 2004; 53: 2713–2718, EK III

[528] Saßmann H, Albrecht C, Busse-Widmann P et al. Psychometric properties of the German version of the Diabetes Eating Problem Survey-Revised: additional benefit of disease-specific screening in adolescents with Type 1 diabetes. Diabet Med 2015; EK IIb

[529] Sassmann H, Danne T, Landgraf R et al. Jugendliche und junge Erwachsene mit Diabetes: Lebensqualität, Stoffwechseleinstellung und Zufriedenheit mit der Langzeitbetreuung von Teilnehmern des CAMP-D. Diabet Stoffw 2007; 2: 69, EK III

[530] Sassmann H, de HM, Danne T et al. Reducing stress and supporting positive relations in families of young children with type 1 diabetes: a randomized controlled study for evaluating the effects of the DELFIN parenting program. BMC Pediatr 2012; 12: 152, EK Ib

[531] Saßmann H, Lange K. Psychische Störungen bei Kindern und Jugendlichen mit Diabetes. In: Petrak F, Herpertz S, Hrsg. Handbuch der Psychodiabetologie. Berlin: Springer; 2013, EK IV

[532] Schatz DA, Bingley PJ. Update on major trials for the prevention of type 1 diabetes mellitus: the American Diabetes Prevention Trial (DPT-1) and the European Nicotinamide Diabetes Intervention Trial (ENDIT). J Pediatr Endocrinol Metab 2001; 14 (Suppl 1): 619–622, EK Ib

[533] Scherbaum W. Verlautbarung der Deutschen Diabetes-Gesellschaft zur Versorgung von Kindern und Jugendlichen. Diabet Inform 1998; 20: 23, EK IV

[534] Scheuing N, Bartus B, Berger G et al. Clinical characteristics and outcome of 467 patients with a clinically recognized eating disorder identified among 52 215 patients with type 1 diabetes: a multicenter german/austrian study. Diabetes Care 2014; 37: 1581–1589, EK IIb

[535] Schiaffini R, Patera PI, Bizzarri C et al. Basal insulin supplementation in Type 1 diabetic children: a long-term comparative observational study between continuous subcutaneous insulin infusion and glargine insulin. J Endocrinol Invest 2007; 30: 572–577, EK Ib

[536] Schlesinger DM, Holsclaw DS, Fyfe B. Generalized Atherosclerosis in an Adult with CF and Diabetes Mellitus. Eleventh Annual North American Cystic Fibrosis Conference 1997;365, EK III

[537] Schmid K, Fink K, Holl RW et al. Predictors for future cystic fibrosis-related diabetes by oral glucose tolerance test. J Cyst Fibros 2014; 13: 80–85

[538] Schober E, Holl RW, Grabert M et al. Diabetes mellitus type 2 in childhood and adolescence in Germany and parts of Austria. Eur J Pediatr 2005; 164: 705–707, EK III

[539] Schober E, Rami B, Grabert M et al. Phenotypical aspects of Maturity-onset diabetes of the young (MODY diabetes) in comparison to Type 2 diabetes mellitus (T2DM) in children and adolescents. Experience from a large multicenter data base. Diabet Med 2009; 26: 466–473

[540] Schoenle EJ, Schoenle D, Molinari L et al. Impaired intellectual development in children with Type I diabetes: association with HbA(1c), age at diagnosis and sex. Diabetologia 2002; 45: 108–114, EK III

[541] Schultz CJ, Konopelska-Bahu T, Dalton RN et al. Microalbuminuria prevalence varies with age, sex, and puberty in children with type 1 diabetes followed from diagnosis in a longitudinal study. Oxford Regional Prospective Study Group. Diabetes Care 1999; 22: 495–502, EK III

[542] Schultz CJ, Neil HA, Dalton RN et al. Blood pressure does not rise before the onset of microalbuminuria in children followed from diagnosis of type 1 diabetes. Oxford Regional Prospective Study Group. Diabetes Care 2001; 24: 555–560, EK III

[543] Schwab KO, Doerfer J, Marg W et al. Characterization of 33 488 children and adolescents with type 1 diabetes based on the gender-specific increase of cardiovascular risk factors. Pediatr Diabetes 2010; 11: 357–363

[544] Schwartz DD, Cline VD, Axelrad ME et al. Feasibility, acceptability, and predictive validity of a psychosocial screening program for children and youth newly diagnosed with type 1 diabetes. Diabetes Care 2011; 34: 326–331, EK III

[545] Schwarzenberg SJ, Thomas W, Olsen TW et al. Microvascular complications in cystic fibrosis- related diabetes. Diabetes Care 2007; 30: 1056–1061, EK III

[546] Scott A, Whitcombe S, Bouchier D et al. Diabetes in children and young adults in Waikato Province, New Zealand: outcomes of care. N Z Med J 2004; 117: U1219, EK III

[547] Scottish Intercollegiate Guidelines Network (SIGN). SIGN 50: A guideline developer's handbook. Quick reference guide; 2014

[548] Scottish Study Group for the Care of the Young Diabetic. Factors influencing glycemic control in young people with type 1 diabetes in Scotland: a population-based study (DIABAUD2). Diabetes Care 2001; 24: 239–244, EK IIa

[549] Scrimgeour L, Cobry E, McFann K et al. Improved glycemic control after long-term insulin pump use in pediatric patients with type 1 diabetes. Diabetes Technol Ther 2007; 9: 421–428, EK IIb-III

[550] Shah RP, Spruyt K, Kragie BC et al. Visuomotor performance in KCNJ11-related neonatal diabetes is impaired in children with DEND-associated mutations and may be improved by early treatment with sulfonylureas. Diabetes Care 2012; 35: 2086–2088

[551] Shepherd M, Hattersley AT. 'I don't feel like a diabetic any more': the impact of stopping insulin in patients with maturity onset diabetes of the young following genetic testing. Clin Med 2004; 4: 144–147

[552] Sherr JL, Tauschmann M, Battelino T et al. ISPAD Clinical Practice Consensus Guidelines 2018: Diabetes technologies. Pediatr Diabetes 2018; 19 (Suppl 27): 302–325

[553] Shichiri M, Kishikawa H, Ohkubo Y et al. Long-term results of the Kumamoto Study on optimal diabetes control in type 2 diabetic patients. Diabetes Care 2000; 23 (Suppl 2): B21–B29

[554] Shimazaki T, Kadowaki T, Ohyama Y et al. Hemoglobin A1c (HbA1c) predicts future drug treatment for diabetes mellitus: a follow-up study using routine clinical data in a Japanese university hospital. Transl Res 2007; 149: 196–204, EK II

[555] Shorer M, David R, Schoenberg-Taz M et al. Role of parenting style in achieving metabolic control in adolescents with type 1 diabetes. Diabetes Care 2011; 34: 1735–1737, EK III

[556] Sideravicite S, Gailiniene A, Visagurskiene K et al. The effect of long-term swimming program on glycemia control in 14–19-year aged healthy girls and girls with type 1 diabetes mellitus. Medicina (Kaunas) 2006; 42: 513–518, EK IIb

[557] Siebenhofer A, Plank J, Berghold A et al. Short acting insulin analogues versus regular human insulin in patients with diabetes mellitus. Cochrane Database Syst Rev 2006; CD003 287, EK Ia

[558] Silverstein J, Klingensmith G, Copeland K et al. Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association. Diabetes Care 2005; 28: 186–212, EK IV

[559] Silverstein J, Klingensmith G, Copeland K et al. Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association. Diabetes Care 2005; 28: 186–212

[560] Simpson D, McCormack PL, Keating GM et al. Insulin lispro: a review of its use in the management of diabetes mellitus. Drugs 2007; 67: 407–434

[561] Skogsberg L, Fors H, Hanas R et al. Improved treatment satisfaction but no difference in metabolic control when using continuous subcutaneous insulin infusion vs.multiple daily injections in children at onset of type 1 diabetes mellitus. Pediatr Diabetes 2008; 9: 472–479, EK1b

[562] Slama G, Haardt MJ, Jean-Joseph P et al. Sucrose taken during mixed meal has no additional hyperglycaemic action over isocaloric amounts of starch in well-controlled diabetics. Lancet 1984; 2: 122–125, EK Ib

[563] Slingerland AS, Hurkx W, Noordam K et al. Sulphonylurea therapy improves cognition in a patient with the V59M KCNJ11 mutation. Diabet Med 2008; 25: 277–281, EK III

[564] Slover RH, Welsh JB, Criego A et al. Effectiveness of sensor-augmented pump therapy in children and adolescents with type 1 diabetes in the STAR 3 study. Pediatr Diabetes 2012; 13: 6–11, EK Ib

[565] Smart CE, Annan F, Bruno LP et al. ISPAD – Clinical Practice Consensus Guidelines 2014. Nutritional management in children and adolescents with diabetes. Pediatr Diabetes 2014; 15 (Suppl 20): 135–153, EK IV

[566] Smith-Palmer J, Brandle M, Trevisan R et al. Assessment of the association between glycemic variability and diabetes-related complications in type 1 and type 2 diabetes. Diabetes Res Clin Pract 2014; 105: 273–284

[567] Sochett EB, Poon I, Balfe W et al. Ambulatory blood pressure monitoring in insulin-dependent diabetes mellitus adolescents with and without microalbuminuria. J Diabetes Complications 1998; 12: 18–23, EK IIa

[568] Soffer B, Zhang Z, Miller K et al. A doubleblind, placebo-controlled, dose-response study of the effectiveness and safety of lisinopril for children with hypertension. Am J Hypertens 2003; 16: 795–800, EK Ib

[569] Sood ED, Pendley JS, Delamater AM et al. Mother-father informant discrepancies regarding diabetes management: associations with diabetes-specific family conflict and glycemic control. Health Psychol 2012; 31: 571–579, EK III

[570] Stachow R, Schiel R, Koch S et al. Effekte der stationären Rehabilitation von Kindern und Jugendlichen mit Diabetes mellitus Typ-1. Monatsschr Kinderheilkd 2013a; 161: 727–734, EK III

[571] Stachow R, Schiel R, Koch S et al. Langfristige Effekte der Rehabilitation für Kinder und Jugendliche mit Diabetes mellitus Typ 1. Diabetologie und Stoffwechsel 2013b; 8: FV17, EK III

[572] Stachow R, Schultz A, Kurzinsky U et al. Anti-Streß-Training für Kinder und Jugendliche mit Diabetes während der stationären Rehabilitation. Kindheit Entwicklung 2001; 10: 226–239, EK III

[573] Stachow R,Wolf J, Kromeyer-Hauschild K et al. Übergewicht und Adipositas bei Kindern und Jugendlichen mit Diabetes mellitus Typ 1. Prävalenz und Einflussfaktoren. Monatsschr Kinderheilkd 2003; 149: 209–216, EK III

[574] Stahl A, Strassburger K, Lange K et al. Health-related quality of life among German youths with early-onset and long-duration type 1 diabetes. Diabetes Care 2012; 35: 1736–1742, EK IIb

[575] Stahl-Pehe A, Strassburger K, Castillo K et al. Quality of life in intensively treated youths with early-onset type 1 diabetes: a population-based survey. Pediatr Diabetes 2014; 15: 436–443, EK IIb

[576] Stanger C, Ryan SR, Delhey LM et al. A multicomponent motivational intervention to improve adherence among adolescents with poorly controlled type 1 diabetes: a pilot study. J Pediatr Psychol 2013; 38: 629–637, EK III

[577] Stanik J, Gasperikova D, Paskova M et al. Prevalence of permanent neonatal diabetes in Slovakia and successful replacement of insulin with sulfonylurea therapy in KCNJ11 and ABCC8 mutation carriers. J Clin Endocrinol Metab 2007; 92: 1276–1282

[578] Stoy J, Edghill EL, Flanagan SE et al. Insulin gene mutations as a cause of permanent neonatal diabetes. Proc Natl Acad Sci U S A 2007; 104: 15040–15044, EK III

[579] Stride A, Vaxillaire M, Tuomi T et al. The genetic abnormality in the beta cell determines the response to an oral glucose load. Diabetologia 2002; 45: 427–435, EK IIb

[580] Sullivan-Bolyai S, Bova C, Lee M et al. Mentoring fathers of children newly diagnosed with T1DM. MCN Am J Matern Child Nurs 2011; 36: 224–231, EK IIb

[581] Sullivan-Bolyai S, Deatrick J, Gruppuso P et al. Constant vigilance: mothers' work parenting young children with type 1 diabetes. J Pediatr Nurs 2003; 18: 21–29, EK III

[582] Summers LK, Fielding BA, Bradshaw HA et al. Substituting dietary saturated fat with polyunsaturated fat changes abdominal fat distribution and improves insulin sensitivity. Diabetologia 2002; 45: 369–377, EK Ib

[583] Sundelin J, Forsander G, Mattson SE. Family-oriented support at the onset of diabetes mellitus: a comparison of two group conditions during 2 years following diagnosis. Acta Paediatr 1996; 85: 49–55, EK III

[584] Sundelin J, Forsander G, Mattson SE. Family-oriented support at the onset of diabetes mellitus: a comparison of two group conditions during 2 years following diagnosis. Acta Paediatr 1996; 85: 49–55, EK IIb

[585] Svensson J, Johannesen J, Mortensen HB et al. Improved metabolic outcome in a Danish diabetic paediatric population aged 0–18 yr: results from a nationwide continuous Registration. Pediatr Diabetes 2009; 10: 461–467, EK III

[586] Svoren BM, Butler D, Levine BS et al. Reducing acute adverse outcomes in youths with type 1 diabetes: a randomized, controlled trial. Pediatrics 2003; 112: 914–922, EK Ib

[587] Svoren BM, Volkening LK, Butler DA et al. Temporal trends in the treatment of pediatric type 1 diabetes and impact on acute outcomes. J Pediatr 2007; 150: 279–285, EK IIa

[588] Swift PG. Diabetes education. ISPAD clinical practice consensus guidelines 2006–2007. Pediatr Diabetes 2007; 8: 103–109, EK IV

[589] Swift PG, Skinner TC, de Beaufort CE et al. Target setting in intensive insulin management is associated with metabolic control: the Hvidoere childhood diabetes study group centre differences study 2005. Pediatr Diabetes 2010; 11: 271–278, EK III

[590] Taha D, Umpaichitra V, Banerji MA et al. Type 2 diabetes mellitus in African-American adolescents: impaired beta- cell function in the face of severe insulin resistance. J Pediatr Endocrinol Metab 2006; 19: 135–142, EK IIb

[591] Takii M, Uchigata Y, Komaki G et al. An integrated inpatient therapy for type 1 diabetic females with bulimia nervosa: a 3-year follow-up study. J Psychosom Res 2003; 55: 349–356, EK III

[592] Tansey MJ, Tsalikian E, Beck RW et al. The effects of aerobic exercise on glucose and counterregulatory hormone concentrations in children with type 1 diabetes. Diabetes Care 2006; 29: 20–25, EK Ib

[593] Temple IK, Gardner RJ, Mackay DJ et al. Transient neonatal diabetes: widening the understanding of the etiopathogenesis of diabetes. Diabetes 2000; 49: 1359–1366, EK III

[594] Temple IK, Shield JP. Transient neonatal diabetes, a disorder of imprinting. J Med Genet 2002; 39: 872–875, EK IV

[595] Thalange N, Deeb L, Iotova V et al. Insulin degludec in combination with bolus insulin aspart is safe and effective in children and adolescents with type 1 diabetes. Pediatr Diabetes 2015; 16: 164–176, EK Ib

[596] Thisted H, Johnsen SP, Rungby J. An update on the longacting insulin analogue glargine. Basic Clin Pharmacol Toxicol 2006; 99: 1–11, EK Ia

[597] Thompson SJ, Auslander WF, White NH. Comparison of single- mother and two-parent families on metabolic control of children with diabetes. Diabetes Care 2001; 24: 234–238, EK IIa

[598] Thomsen C, Storm H, Holst JJ et al. Differential effects of saturated and monounsaturated fats on postprandial lipemia and glucagon-like peptide 1 responses in patients with type 2 diabetes. Am J Clin Nutr 2003; 77: 605–611, EK Ib

[599] Thorpe CT, Fahey LE, Johnson H et al. Facilitating healthy coping in patients with diabetes: a systematic review. Diabetes Educ 2013; 39: 33–52, EK Ia

[600] Thurber BW, Carmody D, Tadie EC et al. Age at the time of sulfonylurea initiation influences treatment outcomes in KCNJ11-related neonatal diabetes. Diabetologia 2015; 58: 1430–1435, EK III

[601] Tiberg I, Katarina SC, Carlsson A et al. Children diagnosed with type 1 diabetes: a randomized controlled trial comparing hospital versus home-based care. Acta Paediatr 2012; 101: 1069–1073, EK Ib

[602] Toeller M. (nach Mann et al. 2004) Evidenz-basierte Ernährungsempfehlungen zur Behandlung und Prävention des Diabetes mellitus. Diabet Stoffw 2005; 14: 75–94, EK Ia-IV

[603] Toni S, Reali MF, Barni F et al. Managing insulin therapy during exercise in type 1 diabetes mellitus. Acta Biomed 2006; 77 Suppl 1: 34–40, EK IIa-III

[604] Triolo TM, Armstrong TK, McFann K et al. Additional autoimmune disease found in 33 % of patients at type 1 diabetes onset. Diabetes Care 2011; 34: 1211–1213, EK III

[605] Tsalikian E, Kollman C, Tamborlane WB et al. Prevention of hypoglycemia during exercise in children with type 1 diabetes by suspending basal insulin. Diabetes Care 2006; 29: 2200–2204, EK Ib

[606] Tsiouli E, Alexopoulos EC, Stefanaki C et al. Effects of diabetes-related family stress on glycemic control in young patients with type 1 diabetes: Systematic review. Can Fam Physician 2013; 59: 143–149, EK Ib

[607] Tubiana-Rufi N, Coutant R, Bloch J et al. Special management of insulin lispro in continuous subcutaneous insulin infusion in young diabetic children: a randomized cross-over study. Horm Res 2004; 62: 265–271, EK Ib

[608] Tuomilehto J, Lindstrom J, Eriksson JG et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med 2001; 344: 1343–1350, EK Ib

[609] Tupola S, Komulainen J, Jaaskelainen J et al. Post-prandial insulin lispro vs. human regular insulin in prepubertal children with Type 1 diabetes mellitus. Diabet Med 2001; 18: 654–658, EK Ib

[610] UK Prospective Diabetes Study (UKPDS) Group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). UK Prospective Diabetes Study (UKPDS) Group. Lancet 1998a; 352: 854–865, EK Ib

[611] UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). UK Prospective Diabetes Study (UKPDS) Group. Lancet 1998b; 352: 837–853, EK Ib

[612] UK Prospective Diabetes Study (UKPDS) Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. BMJ 1998c; 317: 703–713, EK Ib

[613] Vaarala O, Klemetti P, Juhela S et al. Effect of coincident enterovirus infection and cows' milk exposure on immunisation to insulin in early infancy. Diabetologia 2002; 45: 531–534, EK Ib

[614] Valenzuela JM, Patino AM, McCullough J et al. Insulin pump therapy and health-related quality of life in children and adolescents with type 1 diabetes. J Pediatr Psychol 2006; 31: 650–660, EK IIb

[615] van den Berg JM, Morton AM, Kok SW et al. Microvascular complications in patients with cystic fibrosis-related diabetes (CFRD). J Cyst Fibros 2008; 7: 515–519, EK III

[616] Vessby B, Unsitupa M, Hermansen K et al. Substituting dietary saturated for monounsaturated fat impairs insulin sensitivity in healthy men and women: The KANWU Study. Diabetologia 2001; 44: 312–319, EK Ib

[617] Viklund G, Ortqvist E, Wikblad K. Assessment of an empowerment education programme. A randomized study in teenagers with diabetes. Diabet Med 2007; 24: 550–556, EK Ib

[618] Viner RM, Christie D, Taylor V et al. Motivational/solutionfocused intervention improves HbA1c in adolescents with Type 1 diabetes: a pilot study. Diabet Med 2003; 20: 739–742, EK III

[619] von Sengbusch S, Muller-Godeffroy E, Hager S et al. Mobile diabetes education and care: intervention for children and young people with Type 1 diabetes in rural areas of northern Germany. Diabet Med 2006; 23: 122–127, EK IIb

[620] Wabitsch M, Hertrampf M, Mayer H et al. Glucosetoleranz und Insulinresistenz bei Kindern und Jugendlichen mit Adipositas. Diabet Stoffw 2002; Suppl 10: 34, EK III

[621] Wagner VM, Grabert M, Holl RW. Severe hypoglycaemia, metabolic control and diabetes management in children with type 1 diabetes in the decade after the Diabetes Control and Complications Trial – a large-scale multicentre study. Eur J Pediatr 2005; 164: 73–79, IIb–III

[622] Wagner VM, Kremke B, Hiort O et al. Transition from insulin to sulfonylurea in a child with diabetes due to a mutation in KCNJ11 encoding Kir6.2–initial and long-term response to sulfonylurea therapy. Eur J Pediatr 2009; 168: 359–361

[623] Waldron S, Rurik I, Madacsy L et al. Good practice recommendations on paediatric training programmes for health care professionals in the EU. Pediatr Diabetes 2012; 13 Suppl 16: 29–38, EK IV

[624] Wambach JA, Marshall BA, Koster JC et al. Successful sulfonylurea treatment of an insulin-naive neonate with diabetes mellitus due to a KCNJ11 mutation. Pediatr Diabetes 2010; 11: 286–288

[625] Wang YC, Stewart SM, Mackenzie M et al. A randomized controlled trial comparing motivational interviewing in education to structured diabetes education in teens with type 1 diabetes. Diabetes Care 2010; 33: 1741–1743, EK Ib

[626] Warncke K, Frohlich-Reiterer EE, Thon A et al. Polyendocrinopathy in children, adolescents, and young adults with type 1 diabetes: a multicenter analysis of 28 671 patients from the German/Austrian DPV-Wiss database. Diabetes Care 2010; 33: 2010–2012, EK III

[627] Watts GF, Gregory L, Naoumova R et al. Nutrient intake in insulin-dependent diabetic patients with incipient nephropathy. Eur J Clin Nutr 1988; 42: 697–702, EK III

[628] Weinzimer SA, Swan KL, Sikes KA et al. Emerging evidence for the use of insulin pump therapy in infants, toddlers, and preschool-aged children with type 1 diabetes. Pediatr Diabetes 2006; 7 (Suppl 4): 15–19, EK Ia-III

[629] Weissberg-Benchell J, Glasgow AM, Tynan WD et al. Adolescent diabetes management and mismanagement. Diabet Care 1995; 18: 77–82, EK III

[630] Weitzel D, Obermann B, Rogge R. Tagesklinische Ersteinstellung des kindlichen und jugendlichen IDDM. Diabet Stoffw 1997; 6: 110, EK IV

[631] Wells T, Frame V, Soffer B et al. A double-blind, placebo-controlled, dose-response study of the effectiveness and safety of enalapril for children with hypertension. J Clin Pharmacol 2002; 42: 870–880, EK Ib

[632] White NH, Cleary PA, Dahms W et al. Beneficial effects of intensive therapy of diabetes during adolescence: outcomes after the conclusion of the Diabetes Control and Complications Trial (DCCT). J Pediatr 2001; 139: 804–812, EK Ib

[633] White NH, Sun W, Cleary PA et al. Prolonged effect of intensive therapy on the risk of retinopathy complications in patients with type 1 diabetes mellitus: 10 years after the Diabetes Control and Complications Trial. Arch Ophthalmol 2008; 126: 1707–1715, EK Ib

[634] Whittemore R, Jaser S, Chao A et al. Psychological experience of parents of children with type 1 diabetes: a systematic mixed-studies review. Diabetes Educ 2012; 38: 562–579, EK Ib

[635] Wiebe DJ, Berg CA, Korbel C et al. Children's appraisals of maternal involvement in coping with diabetes: enhancing our understanding of adherence, metabolic control, and quality of life across adolescence. J Pediatr Psychol 2005; 30: 167–178, EK III

[636] Wisting L, Froisland DH, Skrivarhaug T et al. Disturbed eating behavior and omission of insulin in adolescents receiving intensified insulin treatment: a nationwide population-based study. Diabetes Care 2013; 36: 3382–3387, EK III

[637] Wolfsdorf J, Craig ME, Daneman D et al. Diabetic ketoacidosis. Pediatr Diabetes 2007; 8: 28–43, EK IV

[638] Wolfsdorf JI, Allgrove J, Craig ME et al. ISPAD Clinical Practice Consensus Guidelines 2014. Diabetic ketoacidosis and hyperglycemic hyperosmolar state. Pediatr Diabetes 2014; 15 (Suppl 20): 154–179, EK IV

[639] Wolfsdorf JI, Glaser N, Agus M et al. ISPAD Clinical Practice Consensus Guidelines 2018: Diabetic ketoacidosis and the hyperglycemic hyperosmolar state. Pediatr Diabetes 2018; 19 (Suppl 27): 155–177. doi:10.1111/pedi.12701.

[640] Wood JR, Moreland EC, Volkening LK et al. Durability of insulin pump use in pediatric patients with type 1 diabetes. Diabetes Care 2006; 29: 2355–2360, EK IIb–III

[641] World Health Organinsation (WHO): Technical Report Series 916. Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint FAO/WHO Expert Consultation. Geneva: WHO; 2003, EK IV

[642] Wühl E, Witte K, Soergel M et al. Distribution of 24-h ambulatory blood pressure in children: normalized reference values and role of body dimensions. J Hypertens 2002; 20: 1995–2007, EK IIb

[643] Wysocki T, Greco P, Harris MA et al. Behavior therapy for families of adolescents with diabetes: maintenance of treatment effects. Diabetes Care 2001; 24: 441–446, EK IIa

[644] Wysocki T, Harris MA, Buckloh LM et al. Randomized trial of behavioral family systems therapy for diabetes: maintenance of effects on diabetes outcomes in adolescents. Diabetes Care 2007; 30: 555–360, EK Ib

[645] Wysocki T, Harris MA, Buckloh LM et al. Randomized, controlled trial of Behavioral Family Systems Therapy for Diabetes: main-tenance and generalization of effects on parent-adolescent communication. Behav Ther 2008; 39: 33–46, EK Ib

[646] Wysocki T, Harris MA, Greco P et al. Randomized, controlled trial of behavior therapy for families of adolescents with insulin- dependent diabetes mellitus. J Pediatr Psychol 2000; 25: 23–33, EK Ib

[647] Wysocki T, Lochrie A, Antal H et al. Youth and parent knowledge and communication about major complications of type 1 diabetes: associations with diabetes outcomes. Diabetes Care 2011; 34: 1701–1705, EK Ib

[648] Wysocki T, Lochrie A, Antal H et al. Youth and parent knowledge and communication about major complications of type 1 diabetes: associations with diabetes outcomes. Diabetes Care 2011; 34: 1701–1705, EK III

[649] Wysocki T, Taylor A, Hough BS et al. Deviation from developmentally appropriate self-care autonomy. Association with diabetes outcomes. Diabet Care 1997; 19: 121–125, EK IIb

[650] Yokota Y, Kikuchi N, Matsuura N. Screening for diabetes by urine glucose testing at school in Japan. Pediatr Diabetes 2004; 5: 212–218, EK III

[651] Young V, Eiser C, Johnson B et al. Eating problems in adolescents with Type 1 diabetes: a systematic review with meta-analysis. Diabet Med 2013; 30: 189–198, EK Ia

[652] Zeitler P, Fu J, Tandon N et al. ISPAD Clinical Practice Consensus Guidelines 2014. Type 2 diabetes in the child and adolescent. Pediatr Diabetes 2014; 15: 26–46, EK IV

[653] Zenlea IS, Mednick L, Rein J et al. Routine behavioral and mental health screening in young children with type 1 diabetes mellitus. Pediatr Diabetes 2014; 15: 384–388, EK III

[654] Ziegler AG, Rewers M, Simell O et al. Seroconversion to multiple islet autoantibodies and risk of progression to diabetes in children. JAMA 2013; 309(23): 2473–2479

[655] Ziegler AG, Schmid S, Huber D et al. Early infant feeding and risk of developing type 1 diabetesassociated autoantibodies. JAMA 2003; 290: 1721–1728, EK III

[656] Ziegler R, Heidtmann B, Hilgard D et al. Frequency of SMBG correlates with HbA1c and acute complications in children and adolescents with type 1 diabetes. Pediatr Diabetes 2011; 12: 11–17, EK III

[657] Ziegler R, Neu A. Diabetes in Childhood and Adolescence. Dtsch Arztebl Int. 2018; 115: 146–156

[658] Zung A, Glaser B, Nimri R et al. Glibenclamide treatment in permanent neonatal diabetes mellitus due to an activating mutation in Kir6.2. J Clin Endocrinol Metab 2004; 89: 5504–5507, EK III