### Date: April 5, 2011

### Screening of hypertension in Pediatric Patients with Diabetes

### **Clinical Question**

- P (population/problem) In pediatric patients (ages 3 to 18 years) with diabetes
- I (intervention) what is the optimal screening of hypertension in children and adolescents
- O (outcome) to reduce the risk of cardiovascular complications

Target Population Pediatric patients (ages 3 to 18 years) with diabetes

**Recommendations** (See Table of Recommendation Strength following references)

- 1. It is recommended that patients with diabetes ≥ 3 years of age be screened for hypertension at each clinic visit (*Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b]*) and receive appropriate follow-up if the blood pressure is ≥ 90th percentile by sex, age and height (see below for management algorithms).
- 2. It is recommended to determine blood pressure percentile by sex, age and height percentile (*NHBPEPWG 2004 [5b]*). (See Appendix 1)
- 3. It is recommended that if blood pressure (systolic or diastolic) is:
  - a). < 90th percentile by sex, age and height (normal), no intervention is needed

b).  $\geq$  90-95th percentile by sex, age and height percentile (prehypertensive range), see Algorithm 1 for diagnosis and management.

c). between the 95th-99th percentile by sex, age and height percentile (stage 1 hypertension range), see Algorithm 2 for the diagnosis and management.

d).  $\geq$  the 99th percentile + 5mmHg by sex, age and height (stage 2 hypertension range), see Algorithm 3 for the diagnosis and management

Note: For any of the above hypertension diagnoses, you must have abnormal blood pressure readings on three separate occasions (See attached Algorithms for details).

(Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b])

- 4. It is recommended that treatment of blood pressure (systolic or diastolic blood pressure) ≥ the 90th percentile for age, sex, and height include dietary intervention (see Appendix 2) and exercise aimed at weight control and increased physical activity, as appropriate (*Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b]*).
- 5. It is recommended that if target blood pressure (< 130/80 or < the 90th percentile for age, sex, and height, whichever is lower) is not reached within 6 months of dietary intervention, pharmacologic treatment be initiated (*Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b]*).

- It is recommended that if blood pressure (systolic or diastolic) is ≥ the 95th percentile for age, sex and height or ≥ 130/80 mmHg, pharmacologic therapy be initiated as soon as the diagnosis is confirmed (*Local Consensus 2010 [5]*, ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b]).
- 7. It is recommended that if a diagnosis of prehypertension (≥ 90th percentile) or hypertension (≥95th percentile) is confirmed, the following screening labs be drawn to rule out secondary hypertension: basic metabolic panel, complete blood count and urinalysis (*NHBPEPWG 2004 [5b]*).

### Discussion/summary of evidence

Hypertension is an important cardiovascular disease risk factor, especially in high-risk patients, thus a search was performed to identify screening and management guidelines for children and adolescents with diabetes. Three main guidelines were identified 1) the American Heart Association (AHA) Scientific Statement entitled Cardiovascular Risk Reduction in High-Risk Pediatric Patients, 2) Treatment guidelines from the American Diabetes Association (ADA) regarding children and adolescents, and 3) Diagnosis, Evaluation and Treatment guidelines from the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents (The Fourth Report). These guidelines were appraised using the AGREE (Appraisal of Guidelines for Research and Evaluation) instrument and the results by domain were:

AGREE Domains	АНА	ADA	Fourth Report				
	(Kavey 2006 [5a])	(ADA 2010 [5a])	(NHBPEPWG 2004 [5b])				
Scope and Purpose	100%	52%	64%				
Stakeholder Involvement	53%	67%	33%				
Rigor of Development	59%	81%	39%				
Clarity and Presentation	81%	86%	77%				
Applicability	15%	56%	17%				
Editorial Independence	100%	72%	17%				

AHA = American Heart Association, ADA = American Diabetes Association, Fourth Report = Diagnosis, Evaluation and Treatment Guideline from the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents

These three guidelines have clear pediatric-focused recommendations that are not directly based on evidencebased outcome data but were generated by consensus expert opinion or extrapolation from adult evidence. The recommendations developed for this BESt are primarily based on a combination of local consensus and recommendations from the AHA guidelines, ADA guidelines and The Fourth Report.

### Health Benefits, Side Effects and Risks

The American Heart Association and the American Diabetes Association emphasize the importance of early recognition of hypertension in children with diabetes (*ADA 2010 [5a]*, *Kavey 2006 [5a]*). Cardiovascular disease is the major cause of morbidity and mortality for individuals with diabetes and the largest contributor to the direct and indirect costs of diabetes (*ADA 2010 [5a]*). Hypertension is a common comorbidity that coexists with diabetes and is a clear risk factor for the development of cardiovascular disease (*DeFronzo 1992 [5]*). Hypertension is common in youth with diabetes with prevalence reports documenting nearly 30% of youth between the age of 10-19 years having elevated blood pressure (*Rodriguez 2006 [4a]*). Early education regarding

cardiovascular health and early intervention in children with hypertension is critical to improving long term outcomes.

### **References** (evidence grade in []; see Table of Evidence Levels following references)

## Note: When using the electronic version of this document, $\Box$ indicates a hyperlink to the PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the CCHMC network.

- 1. ADA: Standards of medical care in diabetes--2010, American Diabetes Association. *Diabetes Care*, 33 Suppl 1: S11-61, 2010, [5a]
- 2. **DeFronzo, R. A.:** Insulin resistance, hyperinsulinemia, and coronary artery disease: a complex metabolic web. *Journal of Cardiovascular Pharmacology*, 20(Suppl 11): S1-16., 1992, [5] <sup>●</sup>
- 3. Kavey, R.-E. W. et al.: Cardiovascular risk reduction in high-risk pediatric patients: a scientific statement from the American Heart Association Expert Panel on Population and Prevention Science; the Councils on Cardiovascular Disease in the Young, Epidemiology and Prevention, Nutrition, Physical Activity and Metabolism, High Blood Pressure Research, Cardiovascular Nursing, and the Kidney in Heart Disease; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research: endorsed by the American Academy of Pediatrics. *Circulation*, 114(24): 2710-38, 2006, [5a] \_\_\_\_\_\_.
- 4. Local Consensus: During Best Evidence Statement development timeframe. 2010, [5] **•**.
- 5. **NHBPEPWG:** The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics.*, 114(2 Suppl 4th Report): 555-76., 2004, [5b] •
- 6. **Rodriguez, B. L. et al.:** Prevalence of cardiovascular disease risk factors in U.S. children and adolescents with diabetes: the SEARCH for diabetes in youth study. *Diabetes Care*, 29(8): 1891-6, 2006, [4a] \_\_\_\_\_ .
- 7. US Department of Health and Human Services, N. I. o. H., National Heart Lung and Blood Institutes: Your Guide to Lowering your Blood Pressure with DASH. *NIH PUb*, No. 06-4082, 2006, [5] \*.

#### Note: Full tables of evidence grading system available in separate document:

- <u>Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality</u> (abbreviated table below)
- Grading a Body of Evidence to Answer a Clinical Question
- Judging the Strength of a Recommendation (abbreviated table below)

Quality level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta- synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5 or 5a or 5b	Other: General review, expert opinion, case report, consensus report, or guideline

#### Table of Evidence Levels (see note above)

 $\dagger a = \text{good quality study}; b = \text{lesser quality study}$ 

Strength	Definition									
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens									
	(or visa-versa for negative recommendations).									
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.									
No recommendation made	There is lack of consensus to direct development of a recommendation.									
Dimensions: In determining f	the strength of a recommendation, the development group makes a considered judgment in a consensus process									
that incorporates critically app	praised evidence, clinical experience, and other dimensions as listed below.									
1. Grade of the Body of Evic	lence (see note above)									
2. Safety / Harm										
3. Health benefit to patient ( <i>direct benefit</i> )										
4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)										
5. Cost-effectiveness to healthcare system (balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis)										
6. Directness (the extent to w comparison, outcome])	6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])									
7. Impact on morbidity/mort	7. Impact on morbidity/mortality or quality of life									

### Table of Recommendation Strength (see note above)

**Supporting information** 

### Group/team members

Group/Team Leader Amy Sanghavi Shah, MD Endocrinology

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### Search strategy

1. Initial search

a.DATABASE: Ovid: MedLine

- b. OVID FILTERS
  - i. Publication dates: 1996 to May 21, 2010

ii. Limits: English language, all child (0 to 18 years)

c. SEARCH TERMS & MeSH TERMS exp \*Diabetes Mellitus/ AND exp blood pressure/ AND exp children / search results filtered for: diagnosis subheading OR treatment outcome.mp.

- 2. Search for synthesized evidence
  - a. DATABASE: Ovid: MedLine
  - b. OVID FILTERS
    - i. Publication dates: 1996 to Mar 3, 2010
    - ii. Limits: English language, All child (0 to 18 years)

iii. Publication type: (guideline or meta analysis or practice guidelines or systematic review).pt. or "the cochrane library".jn. or "cochrane database of systematic reviews".jn.

c. SEARCH TERMS & MeSH TERMS exp Diabetes Mellitus/ or Diabetes Mellitus, Experimental/ or Diabetes, Gestational/ or Diabetes Insipidus, Neurogenic/ or Diabetes Complications/ or Diabetes Insipidus, Nephrogenic/ or Diabetes Mellitus, Lipoatrophic/ or "National Institute of Diabetes and Digestive and Kidney Diseases (U.S.)"/ or Diabetes Insipidus/

### **Applicability issues**

Outcome measure being considered:

1). Number of patients referred to Cardiology for blood pressure evaluation or management (based on Algorithm 3)?

Copies of this Best Evidence Statement (BESt) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <u>http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm</u> Examples of approved uses of the BESt include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at <u>HPCEInfo@cchmc.org</u> for any BESt adopted, adapted, implemented or hyperlinked by the organization is appreciated.

For more information about CCHMC Best Evidence Statements and the development process contact. The Diabetes Center at 513-636-2444; http://www.cincinnatichildrens.org/svc/alpha/d/diabetes/contact.htm.

### Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Reviewed against quality criteria by 2 independent reviewers.

# Appendix 1 Blood Pressure for Boys by Age and Height Percentile (*NHBPEPWG 2004* [5b])

Age, y	BP Percentile		SBP, mm Hg						DBP, mm Hg							
			Percentile of Height						Percentile of Height							
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th	
1	50th	80	81	83	85	87	88	89	34	35	36	37	38	39	39	
	90th	94	95	97	99	100	102	103	49	50	51	52	53	53	54	
	95th	98	99	101	103	104	106	106	54	54	55	56	57	58	58	
	99th	105	106	108	110	112	113	114	61	62	63	64	65	66	66	
2	50th	84	85	87	88	90	92	92	39	40	41	42	43	44	44	
	90th	97	99	100	102	104	105	106	54	55	56	57	58	58	59	
	95th	101	102	104	106	108	109	110	59	59	60	61	62	63	63	
	99th	109	110	111	113	115	117	117	66	67	68	69	70	71	71	
3	50th	86	87	89	91	93	94	95	44	44	45	46	47	48	48	
	90th	100	101	103	105	107	108	109	59	59	60	61	62	63	63	
	95th	104	105	107	109	110	112	113	63	63	64	65	66	67	67	
	99th	111	112	114	116	118	119	120	71	71	72	73	74	75	75	
4	50th	88	89	91	93	95	96	97	47	48	49	50	51	51	52	
	90th	102	103	105	107	109	110	111	62	63	64	65	66	66	67	
	95th	106	107	109	111	112	114	115	66	67	68	69	70	71	71	
	99th	113	114	116	118	120	121	122	74	75	76	77	78	78	79	
5	50th	90	91	93	95	96	98	98	50	51	52	53	54	55	55	
	90th	104	105	106	108	110	111	112	65	66	67	68	69	69	70	
	95th	108	109	110	112	114	115	116	69	70	71	72	73	74	74	
	99th	115	116	118	120	121	123	123	77	78	79	80	81	81	82	
6	50th	91	92	94	96	98	99	100	53	53	54	55	56	57	57	
	90th	105	106	108	110	111	113	113	68	68	69	70	71	72	72	
	95th	109	110	112	114	115	117	117	72	72	73	74	75	76	76	
	99th	116	117	119	121	123	124	125	80	80	81	82	83	84	84	
7	50th	92	94	95	97	99	100	101	55	55	56	57	58	59	59	
	90th	106	107	109	111	113	114	115	70	70	71	72	73	74	74	
	95th	110	111	113	115	117	118	119	74	74	75	76	77	78	78	
	99th	117	118	120	122	124	125	126	82	82	83	84	85	86	86	
8	50th	94	95	97	99	100	102	102	56	57	58	59	60	60	61	
	90th	107	109	110	112	114	115	116	71	72	72	73	74	75	76	
	95th	111	112	114	116	118	119	120	75	76	77	78	79	79	80	
	99th	119	120	122	123	125	127	127	83	84	85	86	87	87	88	
9	50th	95	96	98	100	102	103	104	57	58	59	60	61	61	62	
	90th	109	110	112	114	115	117	118	72	73	74	75	76	76	77	
	95th	113	114	116	118	119	121	121	76	77	78	79	80	81	81	
	99th	120	121	123	125	127	128	129	84	85	86	87	88	88	89	
10	50th	97	98	100	102	103	105	106	58	59	60	61	61	62	63	
	90th	111	112	114	115	117	119	119	73	73	74	75	76	77	78	
	95th	115	116	117	119	121	122	123	77	78	79	80	81	81	82	
	99th	122	123	125	127	128	130	130	85	86	86	88	88	89	90	
11	50th	99	100	102	104	105	107	107	59	59	60	61	62	63	63	
	90th	113	114	115	117	119	120	121	74	74	75	76	77	78	78	
	95th	117	118	119	121	123	124	125	78	78	79	80	81	82	82	
	99th	124	125	127	129	130	132	132	86	86	87	88	89	90	90	
12	50th	101	102	104	106	108	109	110	59	60	61	62	63	63	64	
	90th	115	116	118	120	121	123	123	74	75	75	76	77	78	79	
	95th	119	120	122	123	125	127	127	78	79	80	81	82	82	83	
	99th	126	127	129	131	133	134	135	86	87	88	89	90	90	91	
13	50th	104	105	106	108	110	111	112	60	60	61	62	63	64	64	
	90th	117	118	120	122	124	125	126	75	75	76	77	78	79	79	
	95th	121	122	124	126	128	129	130	79	79	80	81	82	83	83	
	99th	128	130	131	133	135	136	137	87	87	88	89	90	91	91	
14	50th	106	107	109	111	113	114	115	60	61	62	63	64	65	65	
	90th	120	121	123	125	126	128	128	75	76	77	78	79	79	80	
	95th	124	125	127	128	130	132	132	80	80	81	82	83	84	84	
	99th	131	132	134	136	138	139	140	87	88	89	90	91	92	92	
15	50th	109	110	112	113	115	117	117	61	62	63	64	65	66	66	
	90th	122	124	125	127	129	130	131	76	77	78	79	80	80	81	
	95th	126	127	129	131	133	134	135	81	81	82	83	84	85	85	
	99th	134	135	136	138	140	142	142	88	89	90	91	92	93	93	
16	50th	111	112	114	116	118	119	120	63	63	64	65	66	67	67	
	90th	125	126	128	130	131	133	134	78	78	79	80	81	82	82	
	95th	129	130	132	134	135	137	137	82	83	83	84	85	86	87	
	99th	136	137	139	141	143	144	145	90	90	91	92	93	94	94	
17	50th	114	115	116	118	120	121	122	65	66	66	67	68	69	70	
	90th	127	128	130	132	134	135	136	80	80	81	82	83	84	84	
	95th	131	132	134	136	138	139	140	84	85	86	87	87	88	89	
	99th	139	140	141	143	145	146	147	92	93	93	94	95	96	97	

The 90th percentile is 1.28 SD, the 95th percentile is 1.645 SD, and the 99th percentile is 2.326 SD over the mean.

# Appendix 1 Blood Pressure Levels for Girls by Age and Height Percentile

Age, y	BP Percentile		SBP, mm Hg						DBP, mm Hg							
			Percentile of Height						Percentile of Height							
2		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th	
1	50th	83	84	85	86	88	89	90	38	39	39	40	41	41	42	
	90th	97	97	98	100	101	102	103	52	53	53	54	55	55	56	
	95th	100	101	102	104	105	106	107	56	57	57	58	59	59	60	
	99th	108	108	109	111	112	113	114	64	64	65	65	66	67	67	
2	50th	85	85	87	88	89	91	91	43	44	44	45	46	46	47	
	90th	98	99	100	101	103	104	105	57	58	58	59	60	61	61	
	95th	102	103	104	105	107	108	109	61	62	62	63	64	65	65	
	99th	109	110	111	112	114	115	116	69	69	70	70	71	72	72	
3	50th	86	87	88	89	91	92	93	47	48	48	49	50	50	51	
	90th	100	100	102	103	104	106	106	61	62	62	63	64	64	65	
	95th	104	104	105	107	108	109	110	65	66	66	67	68	68	69	
	99th	111	111	113	114	115	116	117	73	73	74	74	75	76	76	
4	50th	88	88	90	91	92	94	94	50	50	51	52	52	53	54	
	90th	101	102	103	104	106	107	108	64	64	65	66	67	67	68	
	95th	105	106	107	108	110	111	112	68	68	69	70	71	71	72	
	99th	112	113	114	115	117	118	119	76	76	76	77	78	79	79	
5	50th	89	90	91	93	94	95	96	52	53	53	54	55	55	56	
	90th	103	103	105	106	107	109	109	66	67	67	68	69	69	70	
	95th	107	107	108	110	111	112	113	70	71	71	72	73	73	74	
	99th	114	114	116	117	118	120	120	78	78	79	79	80	81	81	
6	50th	91	92	93	94	96	97	98	54	54	55	56	56	57	58	
	90th	104	105	106	108	109	110	111	68	68	69	70	70	71	72	
	95th	108	109	110	111	113	114	115	72	72	73	74	74	75	76	
	99th	115	116	117	119	120	121	122	80	80	80	81	82	83	83	
7	50th	93	93	95	96	97	99	99	55	56	56	57	58	58	59	
	90th	106	107	108	109	111	112	113	69	70	70	71	72	72	73	
	95th	110	111	112	113	115	116	116	73	74	74	75	76	76	77	
	99th	117	118	119	120	122	123	124	81	81	82	82	83	84	84	
8	50th	95	95	96	98	99	100	101	57	57	57	58	59	60	60	
	90th	108	109	110	111	113	114	114	71	71	71	72	73	74	74	
	95th	112	112	114	115	116	118	118	75	75	75	76	77	78	78	
	99th	119	120	121	122	123	125	125	82	82	83	83	84	85	86	
9	50th	96	97	98	100	101	102	103	58	58	58	59	60	61	61	
	90th	110	110	112	113	114	116	116	72	72	72	73	74	75	75	
	95th	114	114	115	117	118	119	120	76	76	76	77	78	79	79	
	99th	121	121	123	124	125	127	127	83	83	84	84	85	86	87	
10	50th	98	99	100	102	103	104	105	59	59	59	60	61	62	62	
	90th	112	112	114	115	116	118	118	73	73	73	74	75	76	76	
	95th	116	116	117	119	120	121	122	77	77	77	78	79	80	80	
	99th	123	123	125	126	127	129	129	84	84	85	86	86	87	88	
11	50th	100	101	102	103	105	106	107	60	60	60	61	62	63	63	
	90th	114	114	116	117	118	119	120	74	74	74	75	76	77	77	
	95th	118	118	119	121	122	123	124	78	78	78	79	80	81	81	
	99th	125	125	126	128	129	130	131	85	85	86	87	87	88	89	
12	50th	102	103	104	105	107	108	109	61	61	61	62	63	64	64	
	90th	116	116	117	119	120	121	122	75	75	75	76	77	78	78	
	95th	119	120	121	123	124	125	126	79	79	79	80	81	82	82	
	99th	127	127	128	130	131	132	133	86	86	87	88	88	89	90	
13	50th	104	105	106	107	109	110	110	62	62	62	63	64	65	65	
	90th	117	118	119	121	122	123	124	76	76	76	77	78	79	79	
	95th	121	122	123	124	126	127	128	80	80	80	81	82	83	83	
	99th	128	129	130	132	133	134	135	87	87	88	89	89	90	91	
14	50th	106	106	107	109	110	111	112	63	63	63	64	65	66	66	
	90th	119	120	121	122	124	125	125	77	77	77	78	79	80	80	
	95th	123	123	125	126	127	129	129	81	81	81	82	83	84	84	
	99th	130	131	132	133	135	136	136	88	88	89	90	90	91	92	
15	50th	107	108	109	110	111	113	113	64	64	64	65	66	67	67	
	90th	120	121	122	123	125	126	127	78	78	78	79	80	81	81	
	95th	124	125	126	127	129	130	131	82	82	82	83	84	85	85	
	99th	131	132	133	134	136	137	138	89	89	90	91	91	92	93	
16	50th	108	108	110	111	112	114	114	64	64	65	66	66	67	68	
	90th	121	122	123	124	126	127	128	78	78	79	80	81	81	82	
	95th	125	126	127	128	130	131	132	82	82	83	84	85	85	86	
	99th	132	133	134	135	137	138	139	90	90	90	91	92	93	93	
17	50th	108	109	110	111	113	114	115	64	65	65	66	67	67	68	
	90th	122	122	123	125	126	127	128	78	79	79	80	81	81	82	
	95th	125	126	127	129	130	131	132	82	83	83	84	85	85	86	
	99th	133	133	134	136	137	138	139	90	90	91	91	92	93	93	

\* The 90th percentile is 1.28 SD, the 95th percentile is 1.645 SD, and the 99th percentile is 2.326 SD over the mean.

(NHBPEPWG 2004 [5b])



## <u>Pre Hypertension</u> Algorithm 1 (BP ≥ 90-95<sup>th</sup> %ile) - T1DM or T2DM

(Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b])





(Local Consensus 2010 [5], ADA 2010 [5a], Kavey 2006 [5a], NHBPEPWG 2004 [5b])

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## Stage 2 Hypertension (greater than ≥99<sup>th %</sup>ile+ 5mmHg) Algorithm 3- T1DM and T2DM



## Appendix 2: Dietary Treatment for Blood Pressure and a Healthy Heart

High blood pressure is dangerous because it makes the heart work too hard. The high force of the blood flow can harm arteries and organs such as the heart, kidneys, brain, and eyes. By becoming more active and eating healthier, you can improve your health and lower your blood pressure. High blood pressure can be controlled if you take these steps:

## Decrease salt intake:

- ♥ Add no salt at the table and use half the usual amount (or less) when cooking.
- ♥ Buy fresh, plain frozen or vegetables canned with "no added salt".
- ♥ Use fresh poultry, fish & lean meats, rather than canned, smoked, or processed types.
- ♥ Limit cured foods (such as bacon or ham), foods packed in brine (such as pickles and

sauerkraut), and condiments (such as MSG, mustard, catsup, and barbecue sauce).

### Increase intake of fruits & vegetables

- Keep fruits and vegetables on hand. Fresh fruits require little or no preparation. Dried fruits are a good choice to carry with you.
- ♥ Use fruits canned in their own juice.

## Increase intake of low-fat dairy

- Drink milk with lunch or dinner instead of soda, sugar-sweetened tea, or other sugared beverages.
- Choose low fat (1%) or fat free (skim) milk to reduce your intake of saturated fat, total fat, cholesterol and calories.

## Eat more whole grains

Substitute whole-grain products for refined products – such as eating whole-wheat bread instead of white bread or brown rice instead of white rice. Make sure to *substitute* the whole-grain product for the refined one, rather than *adding* the whole-grain product.

♥ Snack on ready-to-eat, whole grain cereals such as toasted oat cereal.

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## Dietary Treatment for Blood Pressure and a Healthy Heart (cont)

## Decrease your intake of saturated fats

- ♥ Read food labels on margarines and salad dressings to choose those lowest in saturated fat.
- ♥ Use olive or canola oil for cooking rather than shortening, butter, or lard.
- ♥ Choose leaner cuts of meat.
- ♥ Treat meat as one part of the whole meal, instead of the focus.
  - Include two or more vegetarian-style (meatless) meals each week.
  - Increase servings of fruit and vegetables, whole grain rice, pasta and dry beans in meals to get full without lots of meat.
  - Try casseroles and pasta, stir-fry dishes, which have less meat and more vegetables, grains and dry beans.

## Get regular physical activity

- ♥ Be active most days of the week. Exercise enough so that the heart is pumping, but you feel comfortable. Aim for 30-60 minutes per time of moderate physical activity.
- ♥ Choose activities that you enjoy and can do regularly.
- ♥ Get the whole family involved!

## Maintain a healthy weight

- ♥ Watch portion sizes/eat sensible portions of food
- ♥ Drink plenty of water.
- ♥ Start the day with breakfast.
- ♥ Eat out less often.

(Local Consensus 2010 [5], US Department of Health and Human Services 2006 [5], ADA 2010 [5a], NHBPEPWG 2004 [5b])