

Diabetes Education
SERVICES

15 years

Advancing Your Career in Diabetes Education



New Horizons in the Prevention
of Type 1 and Type 2

DiabetesEd.net
DiabetesEducationUniversity.com

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Web Clinic Details

- ▶ To hear presentation, turn on your computer speaker or listen via your phone
- ▶ Questions? Will try and answer as we go along
- ▶ Handout – DiabetesEd.net – Resources > Free Webinars >> New Horizons
- ▶ Thank you for joining us!







**Special Discount on
“Deluxe Bundle”
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19 courses and 25.0 CE's, ~~\$199~~ Only \$169

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- ▶ Click and choose **“Deluxe Bundle”**
- ▶ After you hit the green button to purchase , register, then enter the coupon code **almond** and your \$30 discount applied.



Topics



- ▶ New findings in diabetes prevention and treatment
- ▶ Focus on Type 2
- ▶ Focus on Type 1
- ▶ Happiness



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CDC Announces



35% of
Americans will
have Diabetes
by 2050

Boyle, Thompson, Barker, Williamson
2010, Oct 22:8(1)29
www.pophealthmetrics.com

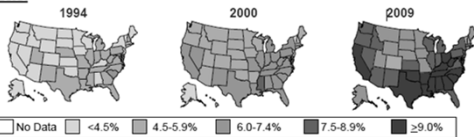


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Diabetes in America 2014

- ▶ 25.8 million or > 8.3%
- ▶ 12.6 million are women
- ▶ 79 million have pre diabetes

Diabetes

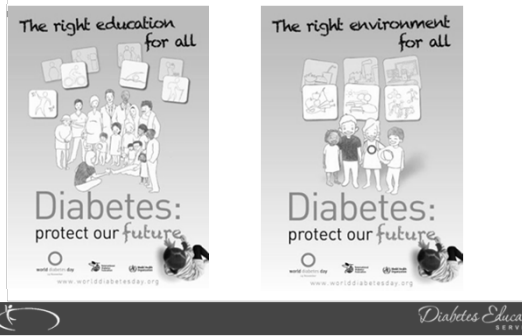


CDC's Division of Diabetes Translation, National Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/statistics>



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World diabetes day- November 14



Type 2 in Kids

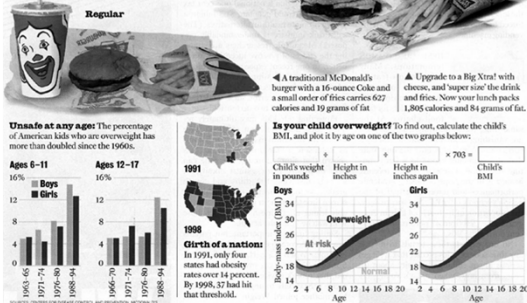


- ▶ 7 fold increase 1990
- ▶ 1 in 6 overwt kids (age 12- 19) have prediabetes.
- ▶ ~2,500 to 3,700 new cases in U.S. annually.
- ▶ Highest risk: very obese, minority, female, low socioeconomic status, limited education
- ▶ In age range 12-19, less than 1% have Type 2 – NHANES
- ▶ Environmental changes to urgently needed



Bigger Meals, Bigger Kids

It's hard for children to stay lean when portions keep growing. A look at what Americans are eating, and how it's changing the shape of our bodies:



Why Should Zip Code Determine Life Expectancy?



California Endowment – look up your zip code at www.measureofamerica.org



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Thoughts on Diabetes, Weight, Social Change

- ▶ “The only way on a societal basis to reduce the prevalence of obesity is through community action” –

Dr. Frieden, CDC

- ▶ Obesity (BMI 30+) prevalence 22% to 40%
- ▶ Poverty, Obesity, Diabetes inter-related



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Public Health Issue?

- ▶ 66% of our people are obese/overweight
- ▶ Rates of gestational diabetes on rise
- ▶ 30% of kids are obese/overweight



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Average American Consumes 22 teaspoons of sugar a day

- ▶ Warning label on sodas proposed
- ▶ One soda has 12 teaspoons of sugar
- ▶ On avg, 1 person consumes 40 gallons of soda each year
- ▶ ADA guidelines include avoid sodas and beverages with sugar, HFCS



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Engaging and supporting Kids to help slow the epidemic

- ▶ Phases of Life
 - ▶ During Childhood



- ▶ Environment
 - ▶ Access to safe places to exercise
 - ▶ Access to healthy foods
 - ▶ Access to learning rich environments
 - ▶ Access to health care
- ▶ LifeStyle
 - ▶ Limit screen time to 2 hours a day
 - ▶ 1 hour a day of activity
 - ▶ Healthy Snacks
 - ▶ Limit junk food, sugary beverages
 - ▶ Fruits and Veggies

Move toward the Tomato



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10 SuperFoods to Enjoy

- ▶ Beans
- ▶ Dark Green Leafy Veggies
- ▶ Citrus Fruit
- ▶ Sweet Potatoes
- ▶ Berries
- ▶ Tomatoes
- ▶ Fish High in Omega-3 Fatty Acids
- ▶ Whole Grains
- ▶ Nuts
- ▶ Fat-Free Milk and Yogurt



Weight loss and Prevention

- ▶ For every 2.2 pounds of weight loss, risk of type 2 diabetes was reduced by 13%.



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Type 2



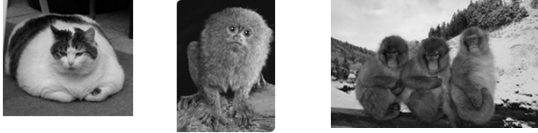
look BEYOND the obvious



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Obesity - other factors?

- ▶ Not only humans are gaining weight globally
- ▶ Animals are getting heavier too (and not just the domestic kind).
- ▶ Factors – sleep deprivation, AC, other?
 - ▶ Marmosets to macaques



Newsweek, Fat Canaries in a Coal Mine, Dec 10, 2010.. Begley



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Bacterial Cells Outnumber Human Cells 10 to 1



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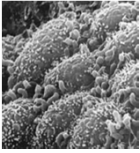
Getting to the Gut

- ▶ Gut bacteria and body weight
- ▶ Gut bacteria health influence on expression of type 1 and type 2
- ▶ Gut hormones



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The Work of Gut Flora



Electron micrograph of small intestine and bacterial inhabitants in green. Obesity and Gut Flora, Nature 2006



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Normal Gut Bacteria

- ▶ Diverse
- ▶ Collected over a life time through
 - ▶ Environmental exposure
 - ▶ Types of foods consumed
 - ▶ Breast or bottle fed?
 - ▶ Parents
 - ▶ Vaginal delivery or C-Section
- ▶ Help us
 - ▶ utilize energy
 - ▶ fight off invaders

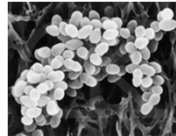


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Intestinal Health – A Balancing Act

▶ Major Groups

- ▶ Firmicutes
 - ▶ Bacteroidetes
- Plus thousands of others



Bacteroides



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Weight and Gut Bacteria New and Early Research



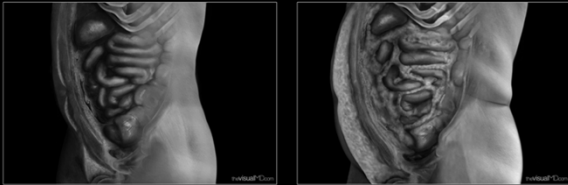
- ▶ Leaner people
 - ▶ more bacterial diversity
 - ▶ More **bacteroidetes**
 - ▶ Gut bacteria less efficient at converting food to calories
- ▶ Obese people
 - ▶ More **firmicutes**
 - ▶ Gut bacteria very efficient at calorie extraction
- ▶ Bacteria tend to run in families

Newsweek, July 6 2010



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Visceral Fat – “Endocrine Organ”



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Fatty Foods Trigger Leaky Gut?



With diabetes, a high fat meal appears to trigger:

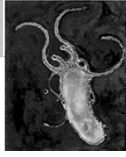
- Passage of bacterial endotoxins through intestinal wall
- Increase levels of inflammatory cytokines and triglycerides
- Seems to be worse if eat frequent fatty meals throughout the day – increases presence of lipopolysaccharide endotoxins

Research by Alison Harte, PhD - Clinical Endocrinology News- Nov 11, 2011



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H. Pylori a Gut Culprit?



▶ *Helicobacter pylori* infection doubled risk of DM among Latinos 60 yrs +

▶ Study details:

- ▶ 1,789 Latino men, women in Sacramento Area Latino Study on Aging (SALSA)
- ▶ During 10 yr study, 18% developed diabetes
- ▶ 2.7 times more likely to develop diabetes if seropositive for *H. pylori* (also assoc w/ higher BMI)
- ▶ Why? Inflammation?

Reported at Annual Meeting of Infectious Disease Society of America – Research led by Dr. Christine Y. Jeon of Columbia University - Clinical Endocrinology News- Nov 11, 2011



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Type 1 Diabetes Facts

- As many as **3 million Americans** may have type 1 diabetes.
- Each year, approximately **80 people per day** are diagnosed with type 1 diabetes in the U.S.
- Approximately **85 percent** of people living with type 1 diabetes are adults, and **15 percent** are children.
- The rate of type 1 diabetes incidence among children under age 14 is estimated to **increase by 3 percent annually** worldwide.
- Type 1 diabetes accounts for **\$14.9 billion** in healthcare costs in the U.S. each year.



Source: JDRF

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The Miracle of Insulin



Patient J.L., December 15, 1922



February 15, 1923



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The Nobel Prize in Physiology or Medicine 1923



Frederick G. Banting

Born: 14 November 1891, Alliston, Canada
Died: 21 February 1941, Newfoundland, Canada
Affiliation at the time of the award: University of Toronto, Toronto, Canada
Prize motivation: "for the discovery of insulin"
Field: endocrinology, metabolism



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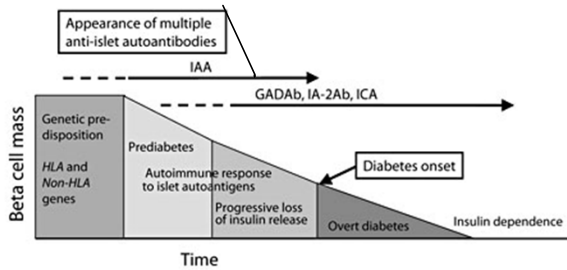
Images shows insulin (blue) molecules binding with insulin receptors (yellow) Jan 2013

The international research team was led by scientists from the Walter and Eliza Hall Institute (WEHI) in Melbourne, with collaborators from La Trobe University, the University of Melbourne, Case Western Reserve University, the University of Chicago, the University of York and the Institute of Organic Chemistry and Biochemistry in Prague.



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Natural History of Type 1



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Autoantibodies Assoc w/ Type 1

Panel of autoantibodies –

- ▶ GAD65 - Glutamic acid decarboxylase –
- ▶ ZnT8 - Zinc Co-Transporter 8
- ▶ ICA - Islet Cell Cytoplasmic Autoantibodies
- ▶ IA-2A - Insulinoma-Associated-2 Autoantibodies
- ▶ IAA - Insulin Autoantibodies



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The Honeymoon

- **By diagnosis, 15-40% of beta cell function remains**
- ▶ **Length of honeymoon varies**
 - ▶ 10-15% of teens and adults still have clinically significant insulin production > 5 yrs after DM onset (DCCT, NEJM 1993)
- ▶ **Rate of beta cell loss is correlated with age**
- ▶ **Younger pts tend to have shorter honeymoons**



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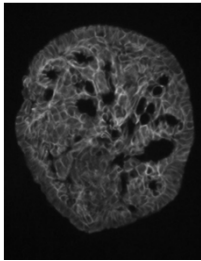
Medalist Study – Harvard Joslin Diabetes Center

- ▶ After 50 years with diabetes
 - ▶ Many still produced some insulin
 - ▶ Many had no eye disease



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Remaining Beta Cells



- ▶ Can serve one well while it lasts...even if on supplemental insulin.
- ▶ Better overall glucose control lower A1C, less glycemic excursion, lower risk for severe hypoglycemia



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Research on Type 1

- ▶ Pathophysiology
- ▶ Primary Prevention – what triggers type 1?
 - ▶ Viruses
 - ▶ Lack of breastfeeding
 - ▶ Early exposure to foods?
 - ▶ Hygiene (too much?)
- ▶ Intervention – Secondary and Tertiary
- ▶ Cure




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Primary Prevention of Type 1

- ▶ Strategy – Find those at highest risk of Type 1 diabetes and see if early intervention to protect beta cells prevents or delays onset.
- ▶ Identify through genetic testing
- ▶ 1 million currently at risk




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TEDDY
The Environmental Determinants of Diabetes in the Young

Funded by NIDDK, the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute of Child Health and Human Development (NICHD), the National Institute of Environmental Health Sciences, the CDC, the JDRF, and the ADA.



TEDDY – to determine if...

- ▶ Can reduce the risk of type 1 diabetes w/
 - ▶ Avoid early cows milk exposure
 - ▶ Avoid introduction of gluten grains < 6mo
 - ▶ Adequate vitamin D
 - ▶ Reduce nitrate exposure
 - ▶ Others

JOURNAL CLUB

Removal of Bovine Insulin From Cow's Milk Formula and Early Initiation of Beta-Cell Autoimmunity in the FINDIA Pilot Study

Outi Vaarala, MD, DMSc; Jorma Hosen, MD, DMSc; Terhi Ruohotalo, MA; Jouani Pesola, MD; Savi M. Virinen, MD, DMSc; Taina Härkönen, PhD; Matti Koski, MA; Harri Kallioinen, MSc (Tech); Olli Tossavainen, DSc (Tech); Tuuja Poussa, MSc; Anna-Liisa Järvenpää, MD, DMSc; Jorma Komulainen, MD, DMSc; Raiisa Lounamaa, MD, DMSc; Hans K. Åkerblom, MD, DMSc; Mikael Knip, MD, DMSc

Objective: To test whether weaning to a bovine insulin-free cow's milk formula (CMF) reduces type 1 diabetes mellitus-associated autoantibodies in children at genetic risk.

Design: Randomized, double-blind pilot trial (Finnish Dietary Intervention Trial for the Prevention of Type 1 Diabetes [FINDIA]).

Setting: Three pediatric hospitals in Finland from May 15, 2002, to November 22, 2005.

Participants: A total of 1113 infants with HLA-conferred susceptibility to type 1 diabetes were randomly assigned to receive study infant formulas; 908 children provided at least 1 follow-up blood sample (last follow-up, June 2009).


Intervention: The CMF (n=389), whey-based hydrolyzed formula (WHF) (n=350), or whey-based FINDIA formula essentially free of bovine insulin (n=365) during the first 6 months of life whenever breast milk was not available.

insulin, the 65-kDa isoform of glutamic acid decarboxylase, and the tyrosine phosphatase-related IA-2 molecule were screened, and islet cell autoantibodies and autoantibodies to zinc transporter 8 were analyzed in infants whose primary screening test results were positive.

Results: In the intention-to-treat analysis, 6.3% of children in the CMF group, 4.9% of those in the WHF group, and 2.6% of children in the FINDIA group were positive for at least 1 autoantibody by age 3 years. The odds ratios were 0.75 (95% CI, 0.37-1.54) in the WHF group and 0.39 (0.17-0.91) in the FINDIA group when compared with the CMF group. In the treatment-received analysis, the corresponding odds ratios were 0.81 (95% CI, 0.37-1.76) and 0.23 (0.08-0.69).

Conclusion: In comparison with ordinary CMF, weaning to an insulin-free CMF reduced the cumulative incidence of autoantibodies by age 3 years in children at genetic risk of type 1 diabetes mellitus.

Trial Registration: clinicaltrials.gov Identifier: NCT01055080



TEDDY Update

▶ No news yet on causes yet, but researchers have developed a reliable system of identifying who is at risk for type 1 diabetes based on autoimmune markers.

▶ TEDDY approach offers “appropriate and effective public health model for screening for type 1 diabetes in the general population”,

William Hagopian, MD, PhD,



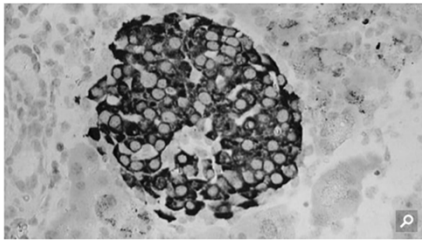
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News 21.10.2013 18:56 | updated 22.10.2013 15:43

Finnish team makes diabetes vaccine breakthrough

Researchers in Finland could be close to a breakthrough in the search for a vaccine against Type 1 diabetes. Clinical trials could start soon.

Recommend 10,395 people recommend this

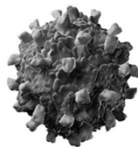


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Coxsackie Virus Vaccine?

▶ Opens up novel possibilities for future research aimed at developing vaccines against these viruses to prevent type 1 diabetes.

▶ Since the group B coxsackieviruses includes only six enterovirus types it may be possible to include all of them in the same vaccine.



SCIENCEPHOTOLIBRARY



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The Hygiene Hypothesis

- In studies, mouse raised in clean environment is higher risk for DM than one raised in dirty one
- ▶ “Clean living” may increase risk for autoimmune diseases
- ▶ Risk is higher in urban than rural settings
- ▶ •Daycare, other early exposures, lower risk for DM



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Take Home Message

- ▶ Get Dirty
- ▶ Breastfeed if possible.
- ▶ Avoid early exposure to cows milk and cows milk based formula and gluten?
– year of life for those at high risk
- ▶ Keep an eye on new research results



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Get Involved – Get Screened
DiabetesTrialNet.org

www.DiabetesTrialNet.org

1-800-HALT-DM1

(1-800-425-8361)

North America

1-800-425-8361

United Kingdom

+44-117-959 5337

Australia and New Zealand

+61-3-93452555

Italy

39-02-2643 2818

Finland

358-2-313 0000

[contact label]



If Someone In Your Family Has

Type 1 Diabetes

You May Be At Risk



Can Type 1 Diabetes Be Prevented?

You Can Help Answer This Question

Type 1 Diabetes TrialNet



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Why participate in Screening?

- ▶ Contribute to understanding
- ▶ Prevent DKA – Earlier diagnosis safer
- ▶ Start insulin sooner, may prolong honeymoon
- ▶ Early education and transitions
- ▶ Eligible for intervention studies

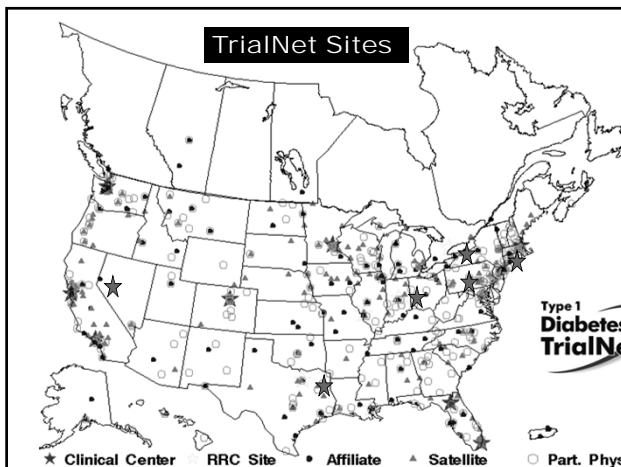


TrialNet Natural History Study

- Who is eligible for screening?
 - Ages 1-45 & immediate family member w/ DM
 - Ages 1-20 for extended family
- What is the screening test?
 - Single blood test for panel of autoantibodies
 - ▶ Those < 18 & Ab neg rescreened yearly
- ▶ What happens if they have 1 or > Abs?
 - ▶ Monitoring and on-going surveillance Genetic screen: HLA class II
 - ▶ Metabolic screen: Oral glucose tolerance test



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Type 1 – Intervention Studies

- ▶ Trial Net – Oral insulin, delay onset 4 yrs
- ▶ Vaccine (glutamic acid decarboxylase)- Start earlier
- ▶ START Trial – Thymoglobulin – still enrolling
- ▶ CD3 Monoclonal Antibodies
- ▶ Stem Cell



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CD3 – Teplizumab

Stops Autoimmune Destruction

- ▶ 52 participants
- ▶ Most less than 14 years old, with “new-onset type 1 diabetes” within 8 wks of trial’s start.
- ▶ All 52 were treated with the experimental drug for two weeks at diagnosis and again one year later,
- ▶ About ½ of the participants on Teplizumab maintained insulin production

▶ The clinical trial was led by Kevan Herold, MD, PhD, a professor of immunobiology and deputy director for translational science at Yale University.



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Living with Diabetes Can Be Tough



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Get Active and Keep Mind and Body Healthy

- ▶ Exercise –
 - ▶ Walking or weights 3 times a week
 - ▶ Dancing
 - ▶ Yoga and Mindfulness
- ▶ Engage – Get Social
- ▶ Lose weight: 5-10%



Moving to a Happier Life ActionforHappiness.org

HAPPINESS FACTS



Our happiness is not set in stone

Although our genes influence about 50% of the variation in our personal happiness, our circumstances (like income and environment) affect only about 10%.

As much as 40% is accounted for by our daily activities and the conscious choices we make. So the good news is that our actions really can make a difference.



GREAT DREAM

Ten keys to happier living

- GIVING Do things for others
- RELATING Connect with people
- EXERCISING Take care of your body
- APPRECIATING Notice the world around
- TRYING OUT Keep learning new things
- DIRECTION Have goals to look forward to
- RESILIENCE Find ways to bounce back
- EMOTION Take a positive approach
- ACCEPTANCE Be comfortable with who you are
- MEANING Be part of something bigger



ACTION FOR HAPPINESS

www.actionforhappiness.org



What Makes You Happy?



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In Conclusion

“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.”

—Margaret Mead



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We would love an Invitation to Present
in Your Town – DiabetesEd.net



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Thank You



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bev@diabetesed.net
- ▶ Web
www.diabetesed.net



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