HEALTH PEOPLE
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Unprevented Diabetes Means Unnecessary Alzheimer's

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Despite mounting research which underscores that having diabetes raises the risk for developing Alzheimer's disease by 40 to 70%, the major role of diabetes in Alzheimer's and dementia has received little public attention.[1,2] That role is so strong, however, that it is clear that feasible, evidence-based diabetes prevention is a singularly possible and potent path to slowing the Alzheimer's explosion. The impact of this prevention---focused on the Type 2 diabetes which generally doesn't appear until adulthood and which accounts for 90-95% of diabetes cases in adults age 18 and older--- would be especially beneficial for the low-income communities and populations where diabetes is concentrated.

In New York, diabetes disproportionately strikes black and Hispanic people, and those with low-income and/or who haven't completed high school. Selected other populations also have a high risk for diabetes; for example, people with HIV/AIDS have double the "normal" risk.

New York City already has 700,000 diagnosed diabetics and the state overall has 2 million!

Given the proven effectiveness of basic prevention strategies for Type 2 Diabetes, which include patient education, exercise, and incremental changes in diet, we make the modest assumption that both New York City and New York State could readily prevent 5% of annual new diabetes cases by making known and proven strategies accessible to pre-diabetics; pre-diabetics are people with measurably elevated blood sugar and known to be at high risk to develop diabetes, yet prevention is still generally effective for them.[3]

The "pool" of pre-diabetics is now so large in both the state and the city---a projected 1.3 million pre-diabetics in New York City and 5.4 million for the state overall---that modest prevention has truly major results.[4] Between 5 and 10% of pre-diabetics a year can be expected to convert to diabetes.[5] **A 5% annual reduction in new diabetes cases by prevention, however, would mean a 25% reduction over 5 years-----or 325,000 cases of diabetes prevented in New York City and 1.35 million cases prevented in New York State as a whole.**

In turn, over time, slashing these large new cohorts of patients whose diabetes at a minimum gives them at a 40% increased risk for Alzheimer's could prevent a projected 77,350 cases of Alzheimer's in New York City and 243,000Alzheimer's cases in New York State as a whole!

The benefits of prevention would be widely shared across the state; about two-thirds of diabetes cases in New York State occur outside New York City. Overall, both rural and urban areas upstate have notably higher rates than suburban areas.[6]

The interlocking risks of the diabetes and Alzheimer's epidemics are very well known in public health and medicine---so much so that medical commentators increasingly suggest that the majority of Alzheimer's disease could be called Diabetes Type 3.[7] Still, no coherent public action of a scale and urgency that addresses the known possibilities of prevention has followed.

It has to be said that, by any ordinary standard of public health, the large pre-diabetic populations of New York City and New York State have been abandoned. In fact, in New York City registered 63,000 known new cases of diabetes in only the years between 2014 and 2015 – the last year for which reporting is available.[8]

Background: The lack of coherent diabetes prevention in New York State and New York City has not only accompanied staggering increases in diabetes---from 7.5% of adults in New York City in 2002 to 11.3% in 2015 and from 7.1% of adults overall in New York State in 2002 to 10% in 2015 ---but fuels an increasing Alzheimer's epidemic.[8,9] Overall in the city, 17% of residents 65 and older already have Alzheimer's and in the state 13% do.

With Alzheimer's risks being highest for low-income people, minorities---and doubled for those who haven't graduated from high school--- added risks, like those for diabetes, have brought the Alzheimer's rate in many counties to overwhelming levels.[10] Bronx County, for example now has a 19.1 % Alzheimer's rate among those 65 and older; and Brooklyn has an 18.7% rate. Upstate, high rates can be seen in both low-income urban and rural counties. For example, Albany County has a 13.6 Alzheimer's rate and Seneca County has a 12% Alzheimer's rate.

Feasible Impact of Prevention: While comprehensive diabetes prevention involves a range of policy and practical issues, it does stand out that, despite the grip of this double epidemic, neither the state or city even bother to fund the best proven diabetes prevention that now exists ---namely the National Diabetes Prevention Program (NDPP). This program is a multi-session group "life style change" course which reduces the risk that participants with pre-diabetes (people who already have high blood sugar) will then develop diabetes by almost 60%.[11] That outcome, which is quite remarkable for any preventative strategy, has been proven over and over in research since the first major study was published in the New England Journal of Medicine in 2002; moreover, the NDPP works equally well for men and women and a range racial and ethnic groups.[12]

Given the proven effectiveness of basic strategies like education, exercise, and incremental changes in diet in preventing diabetes, the assumption that both New York State and City could readily prevent 5% of new annual diabetes cases is both modest and minimal. Throughout this report, the term "minimal prevention" refers to preventing 5% of new diabetes cases a year over five years thereby, in five years, preventing 25% of the conversions from pre-diabetes to diabetes which now occur.

Without that prevention, already alarming Alzheimer's rates can be expected to especially increase for those with diabetes as they age. As noted, multiple studies have documented at 40 to 70%, or higher, risk for Alzheimer's associated with diabetes. We use the more conservative 40% increase. The most recent meta-analysis, with 14 major studies, found diabetics had a 40% increased risk for Alzheimer's and 60% increased risk for dementia overall.

Populations and Outcomes:

Chart 1: Outcome Summary New York City and New York State

Projected New Diabetes Cases Over Five Years for New York City and State without Minimal Prevention

Total Pre-diabetic Population			Minimal Conversion Rate (5% x 5 Years = 25%)		Estimated New Diabetes Cases in 5 Years
New York City	1.3 million	X	25%	=	325,000
New York State	5.4 million				1.35 million

Estimated Added Alzheimer's Cases as New Diabetes Cases Reach Age 65+ Years

Current Alzheimer's Rate (%)			40% Extra Risk for New Diabetes Cases (%)		Projected New Diabetes Cases in 5 Years		Estimated Added Alzheimer's Cases as Projected New Diabetes Cases Reach Age 65+
New York City	17	X 1.4	23.8	X	325,000	=	77,350
New York State	13		18		1.35 million		243,000

Conversion to Diabetes: Various studies place the conversion (progression) rate from pre-diabetes to outright Type 2 diabetes at 5% to 10% a year. For this report, we use the more conservative assumption of a 5% annual conversion to diabetes for pre-diabetics---or a 25% conversion in 5 years. New York City estimates that it has 1.3 million pre-diabetics; a 25% increase (based on a 5% annual conversion rate for 5 years) would mean 325,000 new diabetics. In New York State, with overall estimated 5.4 million pre-diabetics; a minimal a 25% increase over five years would result in 1.35 million new diabetics statewide.

Chart 2 presents diabetes increases for the five boroughs and selected upstate counties resulting only from a 5% annual conversion rate over five years; this, of course, is the same as the number of cases that could be prevented by a minimal public health effort and response. While obviously numbers of cases are far higher in the five boroughs, it is important to realize that many rural counties have diabetes rates that equal or exceed rates found in low-income urban communities. Chemung, Niagara and Seneca Counties, in fact, have 3 of the 5 highest county diabetes hospitalization rates in New York State, the other two highest being the Bronx and Brooklyn.[13]

Chart 2: Projected New Diabetes Cases in Five Years by Borough and selected upstate counties *Without* Minimal Prevention

New York City Borough	Percentage of New York City Population		Total Pre-diabetic Population in NYC		Number of Current Pre-diabetics in Borough (estimated)		Projected Conversion Rate (5% x 5 Years = 25%)		Estimated New Diabetes Cases in 5 Years
All 5 NYC	*100%*				*1.3 million*				*325,000*
Bronx	17%				221,000				55,250
Brooklyn	31%	**X**	1.3 million	**=**	403,000	**X**	25%	**=**	100,750
Manhattan	19%				247,000				61,750
Queens	27%				351,000				87,750
Staten Island	5.5%				71,500				17,875

Upstate County	Percentage of New York State Population		Total Pre-diabetic Population in NYS		Number of Current Pre-diabetics in County (estimated)		Projected Conversion Rate (5% x 5 Years = 25%)		Estimated New Diabetes Cases in 5 Years
All NYS	*100%*				*5.4 million*				*1.35 million*
Albany	1.6%				86,400				21,600
Chemung	.4%	**X**	5.4 million	**=**	21,600	**X**	25%	**=**	5,400
Niagara	1.1%				59,400				14,850
Seneca	.2%				10,800				2,700

*Data may not reflect 100% due to rounding.

Estimated pre-diabetics by borough determined based on each borough's portion of the city's population and assigning the borough that portion of the city's 1.3 million pre-diabetics.[14] Pre-diabetics in upstate counties determined based on each county's portion of the New York State population and assigning the county that portion of the state's estimated 5.4 million pre-diabetics.

Chart 3 presents the projected Alzheimer's cases that will occur in the five boroughs and selected upstate counties SOLELY from the failure to prevent a minimum of 5% new diabetes cases a year over five years. While most of Type 2 diabetes is diagnosed in middle-age, Alzheimer's rates are conventionally expressed as the rate for those 65 and older since most Alzheimer's is diagnosed in later life.

Chart 3: Added Alzheimer's Cases Over Time as New Diabetes Cases Age to 65 and Older

New York City Borough	Current Alzheimer's Cases (65+ Years)		Current Alzheimer's Rate (%)		40% Extra Risk for New Diabetes Cases (%)		Projected New Diabetes Cases in 5 Years		Estimated Added Alzheimer's Cases as Projected New Diabetes Cases Reach Age 65+
All 5 NYC	*183,376*		*17*		*23.8*		*325,000*		*77,350*
Bronx	31,690		19.1		26.7		55,250		14,752
Brooklyn	60,647		18.7	**X**	26		100,750		26,195
Manhattan	31,233		13	**1.4**	18.2	**X**	61,750	**=**	11,239
Queens	51,326		15.9		22		87,750		19,305
Staten Island	8,400		11.9		16.7		17,875		2,985

Upstate County	Current Alzheimer's Cases (65+ Years)[15]		Current Alzheimer's Rate (%)		40% Extra Risk for New Diabetes Cases (%)		Projected New Diabetes Cases in 5 Years		Estimated Added Alzheimer's Cases as Projected New Diabetes Cases Reach Age 65+
All NYS	*390,000*		*13*		*18*		*1.35 million*		*243,000*
Albany	6,563		13.6	**X**	19		21,600		4,104
Chemung	1,777		11.8	**1.4**	16.5	**X**	5,400	**=**	891
Niagara	4,253		11.3		16		14,850		2,450
Seneca	734		12		16.8		2,700		454

**Note: Alzheimer's rates are from 2012, the most recent CDC study available; however, all population numbers are based on 2015 Census estimates.

Alzheimer's Increase Associated with Diabetes Increase: Alzheimer's rates by county are from a CDC study based on Medicare billing in counties throughout the United States in 2012; these rates were multiplied by the county's population age 65 and older to obtain number of current Alzheimer's cases.[10] Reflecting the increased Alzheimer's risk associated with diabetes, current county Alzheimer's rates were increased by 40% to then project the estimated increase in Alzheimer's cases as the new diabetes cases reach age 65 and older. These "extra risk" cases in each locality estimates the number of people at risk to develop Alzheimer's solely because effective minimal prevention does not occur for pre-diabetics.

Discussion:

The situation with diabetes in the United States---a relentless increase and an abandonment of focused, evidence-based public health response to fight that increase is almost beyond comment.

Some key preventive measures are, of course, politically difficult; a major example is the so far failed effort to stop the currently approved use of food stamps to pay for the sugary beverages. These purchases now account for 10% of money spent through this federal "supplemental nutrition" program.[16]

Diabetes Prevention: At the same time, the now massive research into exercise and diet have confirmed many strategies for diabetes prevention. As stated, the best proven is the National Diabetes Prevention Program (NDPP), a 22 session group "lifestyle change" course, which has the goal of helping participants reduce their body weight by 5 to 7% (10 to14 pounds for a 200 pound person) and start to exercise, even walk, 30 minutes a day 5 days a week. For pre-diabetics, the NDPP reliably produces an average 59% reduction in diabetes risk. Not incidentally, that is twice the reduction obtained by prescribing standard medication to regulate insulin, so not only does the Lifestyle Course obtain better results than medication, but avoids launching pre-diabetics on potential years of medication.

While, of course, not everyone will join a 22-session course, it is absolutely clear the NDPP should be available for anyone who wishes to participate. While the Centers for Disease Control makes the course available for download for free for any group who wishes to implement it, few groups or clinical centers can currently obtain funding to provide the required CDC training for the course facilitators (known as Lifestyle Coaches) and other unavoidable implementation costs.

Both New York City and New York State, amazingly, refuse to spend one penny on the NDPP; the New York State Department of Health could request a federal waiver to have the NDPP included in its Medicaid services, but has for years refused to do even that.

Alzheimer's Prevention: Although the research on Alzheimer's prevention is not as extensive or precise as that for diabetes prevention, certainly diabetes is now defined as a major, preventable risk for Alzheimer's. Like diabetes, Alzheimer's shows severe disparities in incidence. Minorities and low-income populations have significantly higher Alzheimer's rates; those without high school degrees have at least a doubled Alzheimer's risk across racial groups.

Recent studies have raised new hopes for the possibilities of the mass prevention of dementia. Decreased incidence of new dementia cases has been seen in some studies-- most clearly, in the United States, in the famed Framingham Heart Study which has followed 5,205 residents of Framingham, Massachusetts since 1948, as well as more than 5,000 of their descendants, with detailed health monitoring. The incidence of new vascular dementia cases---but not Alzheimer's---- has significantly decreased in this closely monitored population over three decades. This strongly suggests that various public health initiatives---smoking cessation and better management of high blood pressure are obvious candidates---have led to better brain health for many people as they age. The decrease was only recorded, however, for those with a high school degree or more years of education. Still, this strong suggestion of the potential for mass prevention only makes it more unsettling that the public health failures in diabetes continue to create unnecessary Alzheimer's risks.[17]

That so much ill-health---and community-wide misery in the neighborhoods where diabetes concentrates---could be prevented, and is not, is the saddest aspect of public health in the United States today. Diabetes is also a major cause of heart disease, dialysis (45% of cases), amputation, increasing maternal morbidity and death, and depression. Nineteen percent of adults with diabetes age 18 and older already have vision impairment.

As if any more reasons for prevention were needed, recent research showing that people with early diabetes (within five years of diagnosis) routinely have brain abnormalities visible through MRI associated with the later development of Alzheimer's, underscores the absolute urgency of not letting people get diabetes at all. The brain abnormalities are more pronounced for diabetics who are overweight.[18]

That this failure of public health and medical priority has occurred in New York is even more striking. From tobacco cessation to AIDS, New York State and New York City have traditionally been leaders in preventive success. Yet, both have watched the diabetes epidemic sicken community after community, getting worse and worse for 20 years without any effective action.

It seems the public health and medical establishment of the city and state can't see the modest, ordinary people so disproportionately injured by diabetes. And it's quite clear that the slow, patient, but effective work of educating these men and women to improve their own health doesn't interest the health powers at all.

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