

פלסטיקים כמשבשים אנדוקריניים Endocrine Disrupting Chemicals-EDCs

קרן תורגמן

המכון לאנדוקרינולוגיה, מטבוליזם ויל"ד

מרכז רפואי תל אביב סוראסקי



Endocrine Disrupting Chemicals-EDCs



- “An exogenous [non-natural] chemical, or mixture of chemicals, that interferes with any aspect of hormone action”
- ~ 350,000 man-made chemicals or mixtures of chemicals registered
- ~1,400 with proven EDC activity
- Many of which are plastics or plastic additives (but leach out from plastics)
- **Bisphenols, phthalates**, brominated flame retardants, PFAS
- We are all exposed (oral, respiratory, dermal, transplacental access)
- Many of them can be monitored in body fluids and tissues





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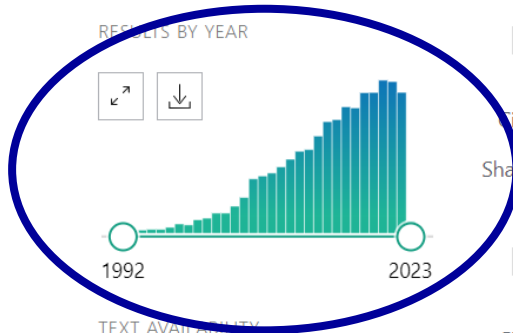
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TEXT AVAILABILITY

- Abstract
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ARTICLE ATTRIBUTE

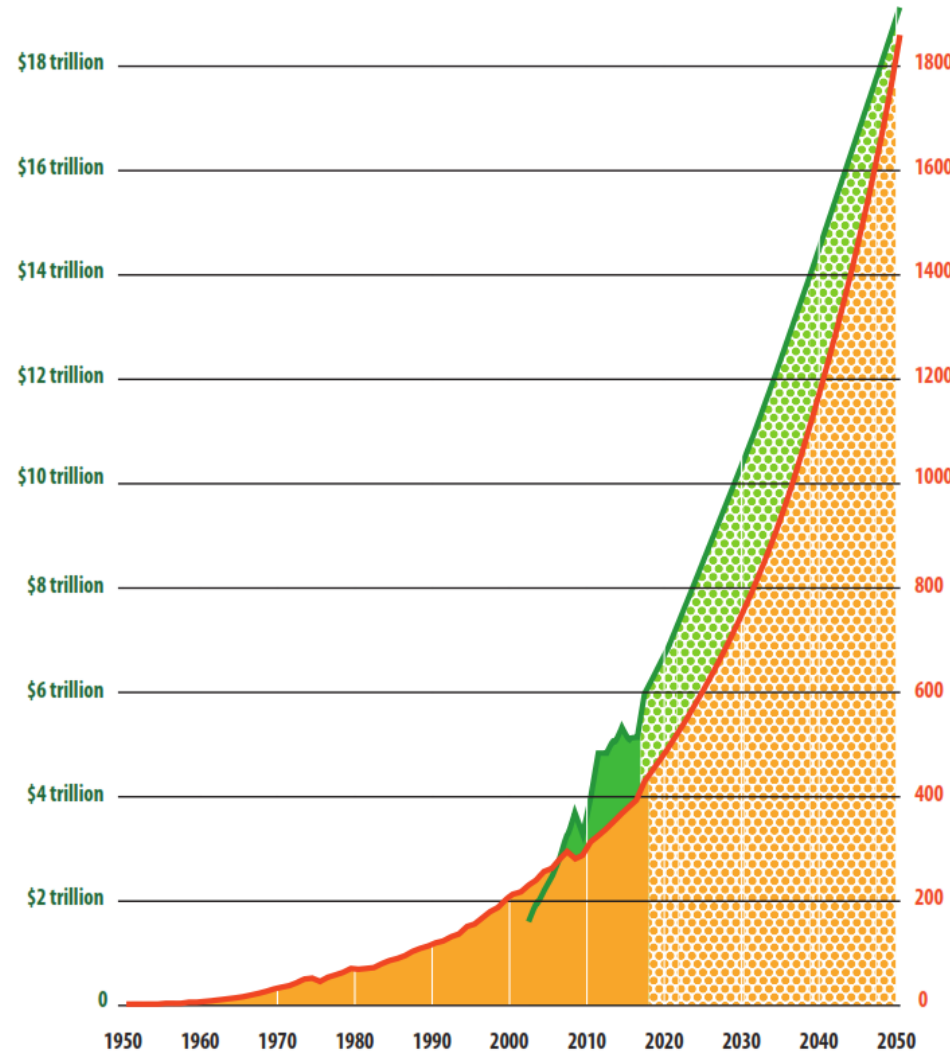
- Associated data

ARTICLE TYPE

- Books and Documents
- Clinical Trial
- Meta-Analysis
- Randomized Controlled Trial
- Review
- Systematic Review

- 1 [The Comparison of the Influence of Bisphenol A \(BPA\) and Its Analogue Bisphenol S \(BPS\) on the Enteric Nervous System of the Distal Colon in Mice.](#)
 Makowska K, Lepiarczyk E, Gonkowski S.
 Nutrients. 2022 Dec 30;15(1):200. doi: 10.3390/nu15010200.
 PMID: 36615857
- 2 [The Association between the Bisphenols Residues in Amniotic Fluid and Fetal Abnormalities in Polish Pregnant Women-Its Potential Clinical Application.](#)
 Tuzimski T, Szubartowski S, Stupak A, Kwaśniewski W, Szultka-Młyńska M, Kwaśniewska A, Buszewski B.
 Int J Mol Sci. 2023 Jan 1;24(1):730. doi: 10.3390/ijms24010730.
 PMID: 36614173
 Finally, the proposed method was applied in the simultaneous determination of several **endocrine-disrupting chemicals** from bisphenol group in 33 human AF samples. ...
- 3 [Impact of Nanoparticles on Male Fertility: What Do We Really Know? A Systematic Review.](#)
 Klein JP, Mery L, Boudard D, Ravel C, Cottier M, Bitounis D.
 Int J Mol Sci. 2022 Dec 29;24(1):576. doi: 10.3390/ijms24010576.
 PMID: 36614018 Review.
 Of note, the majority of nanoparticles have low direct toxicity to the testis, but there are indications that some might act as **endocrine disruptors**. Overall, the impact on spermatogenesis in adults is generally weak and reversible, but exceptions exist and merit in ...
- 4 [Screening of Metabolism-Disrupting Chemicals on Pancreatic \$\alpha\$ -Cells Using In Vitro Methods.](#)
 Dos Santos RS, Babiloni-Chust I, Marroqui L, Nadal A.
 Int J Mol Sci. 2022 Dec 23;24(1):231. doi: 10.3390/ijms24010231.

Global Chemical Industry Sales (USD)

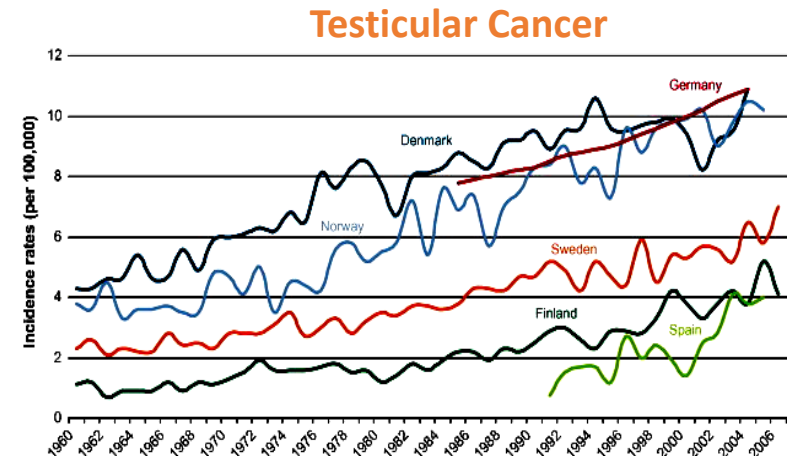
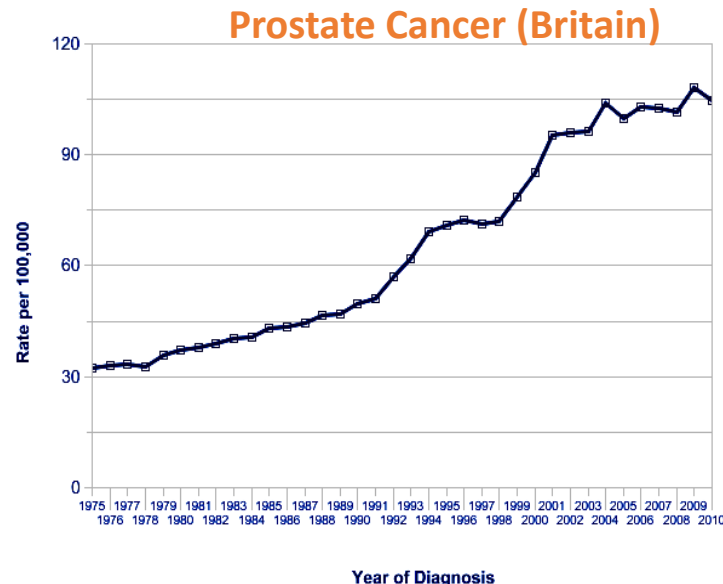
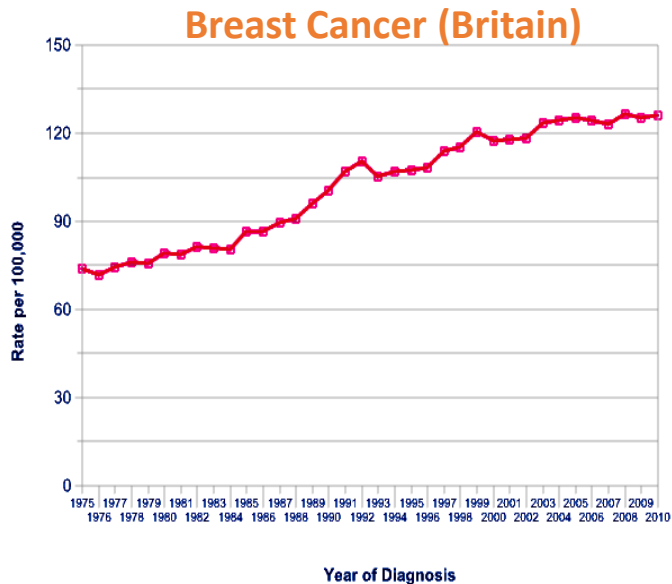
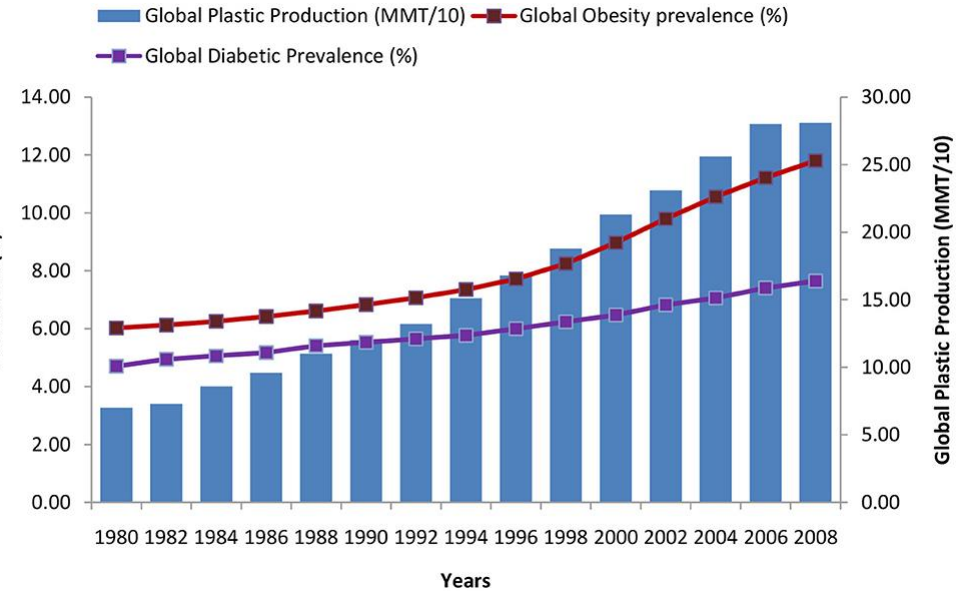
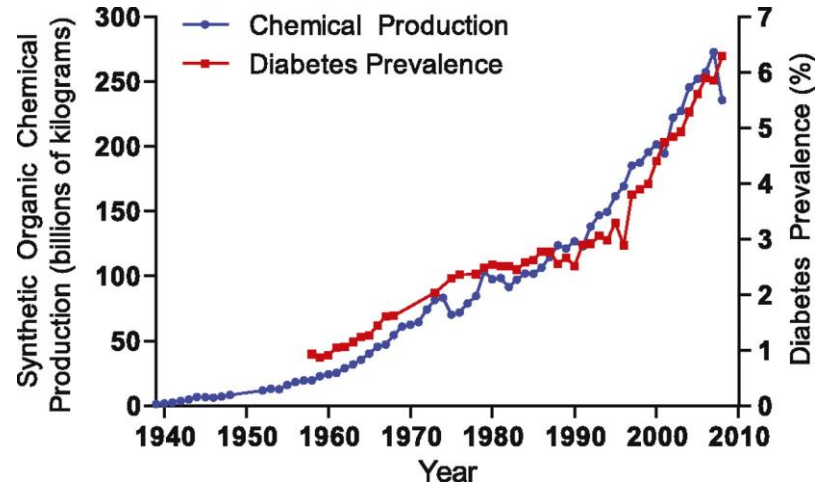
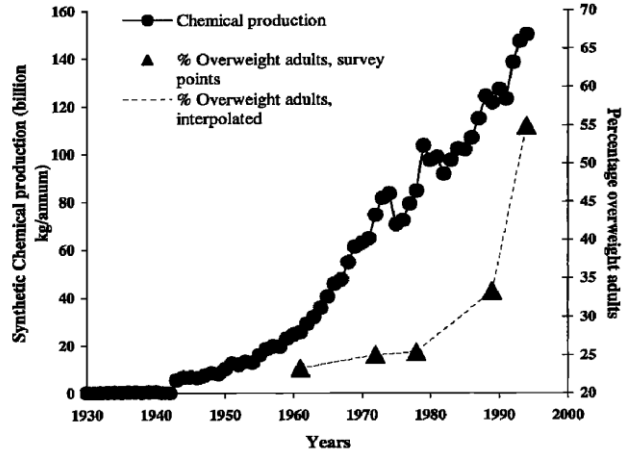


Global Plastics Production (millions of metric tons)

IT IS ESTIMATED THAT HALF OF ALL PLASTIC PRODUCED IS DESIGNED TO BE USED ONLY ONCE AND THEN THROWN AWAY.



The Secular Trend

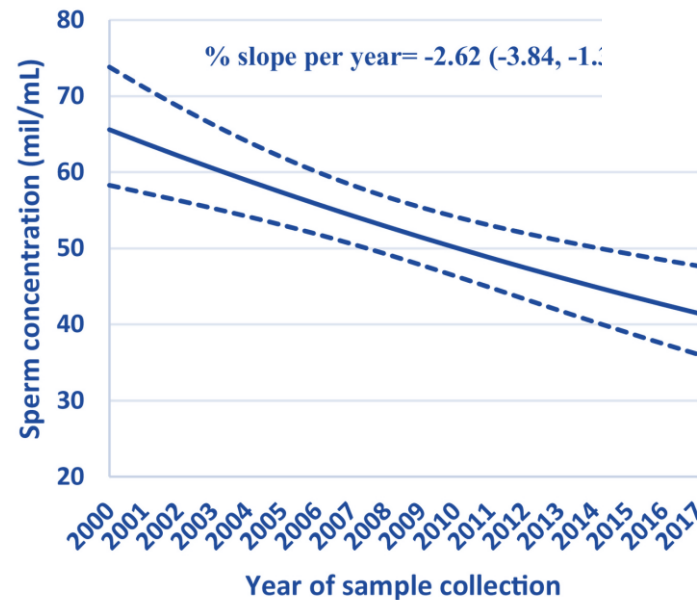
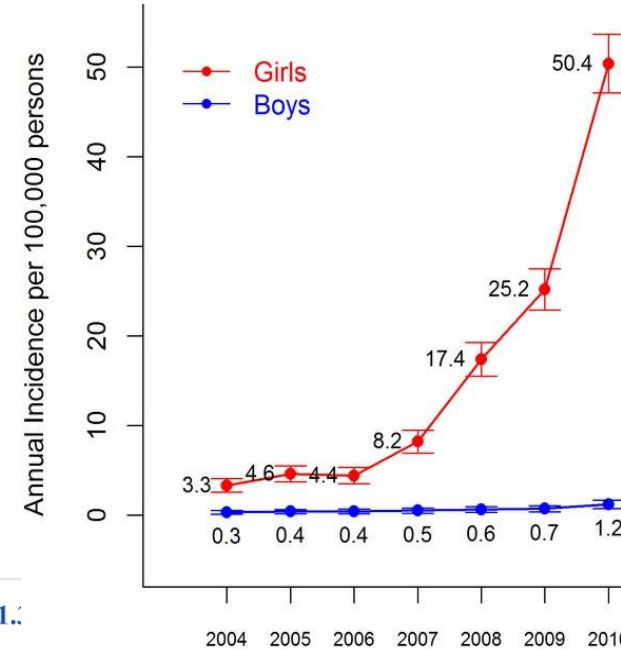
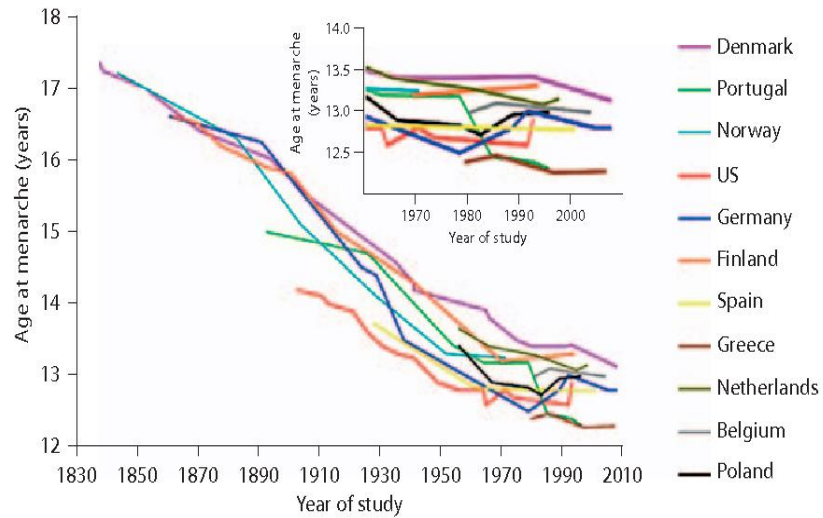


The Secular Trend

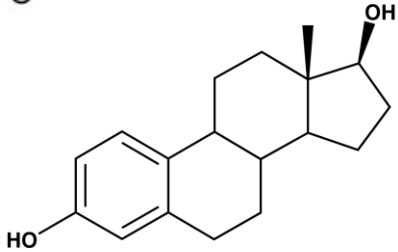
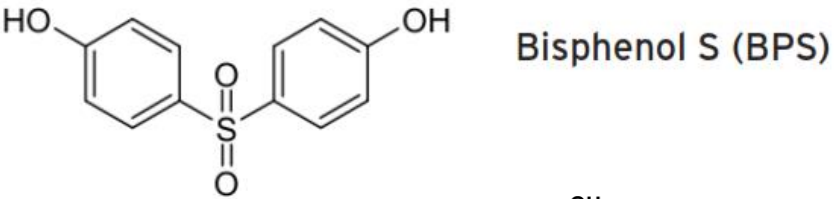
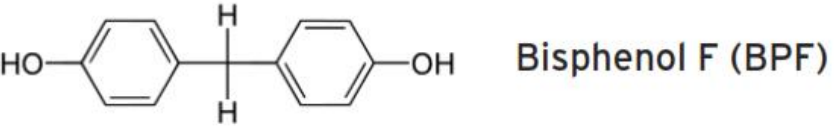
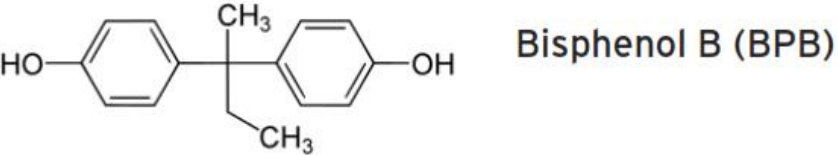
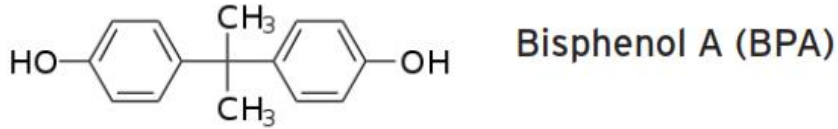


ירידה בגיל הווסת הראשונה

עליה במקרי התבגרות מינית מוקדמת



Bisphenols (A to S)



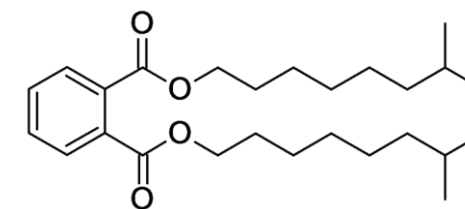
Bisphenols (A to S)



- עליה בהשמנה
- קשור בסוכרת דרך גם דרך פגיעה בתפקוד תאי לבלב (beta cell)
- כבד שומני
- ירידה בפוריות האישה, כולל ירידה בהצלחת IVF
- שכיחות יתר של שחלות פוליציסטיות PCOD
- ירידה באיכות הזרע
- עליה בשכיחות סרטן הערמונית
- הפרעות התפתחויות, קשב וריכוז, חרדה וכו'.
- רוב העדויות מצביעות על כך שכל הביספנולים משפיעים בצורה דומה



Phthalates



- מפעילים את הקולטן לאסטרוגן
- משבשים את פעילות הקולטן לאנדרוגן
- מפעילים PPARgamma



Phthalates



- קשורים בהשמנה ותנגודת לאינסולין
- פגיעה ביצור זקיקים בשחלות
- מנופאזזה מוקדמת
- פגיעה באשך, ביצור הזרע וברמות טסטוסטרון (testicular dysgenesis)
- סיכון יתר לאשך טמיר, והיפוספדיאס
- קיצור AGD
- סיכון יתר לסרטן האשך
- פגיעה בתיירואיד

פתרון?

- היכולת להפחית אישית משמעותית את החשיפה ל-EDCs, מוגבלת מאד
- הפתרון חייב לבוא ברמה הרגולטורית הגלובאלית

"EU policymakers need to protect citizens from harmful chemical exposures, and they rely on scientific experts to help them determine how best to do this."

- זה בדיוק התפקיד שלנו, ואין להרפות!