



什麼導致兒童癌病？*

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大多數成年癌症患者的惡性腫瘤皆因身體的細胞受化學或有毒物質破壞引致。吸煙尤為有關，但過量酒精及紅肉都是常見例子。兒童接觸到有害物質的時間相對短得多，為什麼兒童會患上癌症？

在1991年，超過三百五十位英國研究員分別在十個地區開始對五大兒童癌病成因的理論進行測試——英國兒童癌病研究（UKCCS）。我們的研究測試嬰兒出生前後及父母的胚種細胞（精子及卵子）暴露於輻射及化學物質，低電磁場（EMF）及身體對受感染的反應會否引致癌症。

近四千個有新兒童確診病例的家庭及近八千個對照家庭（兒童的性別、年齡及居住範圍皆吻合）接受測試。我們訪問父母，檢查懷孕及遺傳紀錄，量度電磁場及氫氣（一種天然放射性氣體）及輻射。此外我們亦抽查病患者及其家人的血液樣本，對照的除外。

研究指出兒童患上癌病跟以下情況沒有重要關係：

- 家中氫氣及伽瑪放射的程度
- 學校或居所暴露於電磁場
- 與高壓電纜鄰近
- 嬰兒曾服用維生素K 以防出血
- 父母職業及與化學物品接觸
- 接觸人口極度混雜的地方

人們對電力及電磁場與兒童癌病的關係一直有很多爭議，但我們在接受診斷的家庭的研究發現卻是負面的。而在整個研究中亦只有十七個家庭（九個對照，八個病患個案）接觸到高電磁場。另外九個相關的大型研究亦指出電磁場不到零點四的水平（micro Tessler EMF measure），致癌的機率也不會增加。這個水平比天然的磁場還弱。在英國，很少數有癌症病例的家庭接觸到高電磁場，即使如此，兩者的關係仍存疑，亦可能只是過度考究下的偶然例子。

引人注目的標題

在英國，一般學者認為在每年四百至四百二十個新白血病個案當中，最多有五個可能跟電磁場有關。我們也不知道電磁場怎樣引起細胞變化而成為癌症。最近一個研究一大串個案的出生家庭的報告有同一結論，卻成了引人注目的標題。

Geoff Watts 是《英國醫學雜誌》（BMJ）的科學編輯，他作出另一番評論：每年有三萬六千個兒童在交通意外中受傷，二百個死亡，當中大多數是可以避免的。他的意思是父母不必杞人憂天以至於丟掉家裡的日常電器用品或甚至搬家。在英國，電力供應帶來的危機是很少的。

在同一雜誌中，我們亦報導了兒童若於幼年在托兒所跟其他孩子相處，會減低患白血病的機會。這是因為兒童愈早接觸到感染的同時亦愈早提高了免疫力，減少日後患病的機會。



接觸疾病感染

於1988年，Mel Greaves 教授提出了一個關於兒童白血病的理論——兒童初期缺少受疾病感染的機會，以致後期對感染有不正常反應，繼而發展成白血病。有關托兒所的數據支持了他的論點。

Greaves 教授亦於一系列與國內外合作二十年的研究報告中發表同一理論——很多兒童白血病可能早於母體內醞釀。在母體內，血液的主要幹細胞的DNA藍本可能已受到初次破壞。這些細胞的變化最初未足以導致白血病，但加深的變化卻可將疾病的雛型變為完全的白血病。身體對受感染的反應亦可能在細胞分裂時助長進一步的細胞變化。

基因變體

身體受感染是否跟DNA的初次破壞有關仍欠缺清晰。直到現在，包括英國在內的幾項研究在癌症病患者體內仍找不到帶感染的證據。可是，對照研究顯示出一些控制人體對受感染的反應的基因變體（HLA系統）卻跟增加患白血病的機會有關。

其他生物研究亦顯示，一些影響我們身體分散及處理化學物或毒素的基因可增加或減低患癌的機會。雖然因白血病是常見的兒童癌病而成為研究焦點，但很多正面的研究發現，特別是身體對受感染的反應，亦能應用到一些實體瘤上。



兒童白血病及癌病都是較少見的，若能找到其成因，就可能及早預防。白血病明顯不是一個單一疾病，而是一連串不同的疾病，其成因亦有不同。現時已知可能的預防方法就是讓孩子早點與其他孩子多些接觸，接觸到多些感染——理想地這些感染只是輕微的咳嗽及傷風。這樣孩子對其他疾病如哮喘的免疫力亦能提高。

我們仍在繼續研究有關數據，若有進一步發現將發表新的報告。

* 文章取自 *Contact* 雜誌 2005 年秋季第 28 期

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至今的正面研究發現：

- 😊 兒童提早接觸其他孩子及受疾病感染可能減低患白血病或其他癌病的機會。
- 😬 我們的基因構造決定了我們的身體對受感染的反應。
- 😬 基因變異（因人而異）改變我們的身體怎樣處理化學物品、毒素及輻射等。



孩子在托兒所與其他孩子接觸可幫助預防某些癌症。
Driving a positive course. Daycare attendance appears to provide the kind of inter-child contact that can help prevent the development of some cancers.



What Causes Childhood

For most adults who develop cancer, exposure to chemicals or toxins play a huge part in damaging cells leading to tumours. Smoking especially, but excess alcohol and red meat are good examples of such factors. Children do not have the exposure time, and so why do they ever develop cancer?

In 1991 over 350 UK researchers started working in 10 regional teams to test five main theories on why children develop cancer — the UK Childhood Cancer Study (UKCCS). We tested whether radiation and chemical exposure before or after birth, the same factors working on the parents' germ cells (sperm, eggs), exposure to low level electro magnetic fields (EMF) and reaction to infection might lead to cancer.

Nearly 4,000 families with a newly diagnosed child and nearly 8,000 control families (matched by the child's sex, age and area of living) were recruited. Parents were interviewed, maternity and GP notes were examined and measurements taken of EMF, radon gas (a naturally occurring radioactive gas), and radiation. Blood samples were taken from the patients, and their families, but not controls.

No significant association was found in this study between a child developing cancer and:

- Household levels of radon gas or gamma irradiation.
- House/School exposure to electro magnetic fields.
- Adjacency to high voltage power lines.
- Vitamin K given to babies to prevent bleeding.
- Parental occupation and chemical exposures.
- Any association with extremes of population mixing.

There has been a lot of controversy about electricity and EMF. Our negative findings relate to the house lived in at diagnosis. We found that only 17 houses (nine in controls, eight in cases) had high-level EMF exposure. Results from nine large studies on this topic showed no increased risk of developing any cancer until exposures were at a level of 0.4 micro Tessler EMF measure. This is still a weak magnetic field compared to the earth's magnetic field. In the UK this occurs in a very few houses. Even then, there is a question as to whether there is a real effect or whether it is due to a chance finding resulting from over-analysis.

Glaring Headlines

It is considered that, at most, five of the 400-420 new cases of leukaemia seen each year in the UK might have any connection to EMF. We also do not know the way in which EMF might cause the cell changes that lead to cancer. A recent study looking at the house of birth in a very large series of cases came to the same conclusion, but received 'glaring' headlines.

Geoff Watts, Science Editor of the BMJ, put it into perspective commenting that 36,000 children were hurt and 200 killed each year in road accidents, most of which could have been prevented. So his message to parents was not to throw out your life-assisting electrical goods or move house. The electricity supply in the UK gives little risk.

In the same journal we reported that when a child attended daycare early in childhood, and exposed to other children, it reduced the risk of developing childhood leukaemia.

The protection increased with amount of exposure. Failure to prime the immature system early in life increased later risk.

Cancer?*

Professor Tim Eden**



研究指出兒童提早與其他孩子接觸某程度上可保護孩子以免患上白血病及其他癌症。
Research suggests that early childhood contact with other children provides some protection against leukaemia and some other cancers.

Exposure to Infection

In 1988, Professor Mel Greaves had proposed a theory that for childhood leukaemia, a lack of early exposure to infection, and then exposure later in childhood led to an abnormal response to infection, which drove the leukaemic process. The daycare finding supports this hypothesis.

What Professor Greaves has also shown in a series of clever studies with many national and international collaborators over the last two decades, is that most childhood leukaemia may be 'initiated' when the baby is still in the womb. The first damaging effects on the DNA blueprints within key stem cells of the blood occur then. These changes by themselves may not be enough to cause leukaemia, but further changes may be required to convert a pre-leukaemia into the full-blown disease. The reaction to infection probably works to cause secondary changes as the cells multiply.

Variants of Some Genes

Whether infection is related to the first DNA damage as well is less clear. So far several studies, including some here in the UK, have found no evidence of infectious particles within tumour patients. However, the case control study also showed that variants of some of the genes responsible for how each of us respond to infection, called the HLA system, were associated with increased risk of developing leukaemia.

Other biological studies performed showed that other genes which influence how we breakdown and deal with chemicals/toxins can increase or decrease risk. Although leukaemia has been the focus of most investigations because it is the commonest childhood cancer, many of the positive findings, especially the reaction to infection, seem to apply equally to at least some solid tumours.

The positive findings to date:

- 😊 Early childhood contact with other children and infections appears to provide some protection against leukaemia and some other cancers.
- 😞 Our genetic 'make-up' determines how we respond to infection.
- 😞 Genetic variation (individual to individual differences) alters how we handle e.g. Chemicals/toxins/radiation etc.

Childhood leukaemia and cancer is relatively rare. That is no consolation for those who do get it. If we can find what causes it, we might be able to prevent it. Leukaemia is clearly not one disease, but a series of different ones, possibly with various causes. The closest thing to prevention so far is to let our children have early and frequent contact with other children. They will have more infections — in an ideal world these infections should be mild coughs and colds and not serious ones. This pattern of early infectious exposure reducing later problems has been seen in other conditions like childhood asthma.

Analysis of all the data is continuing and we will give you further updates as our findings come out.

* The article is from issue 28 (Autum 2005) of *Contact* magazine.

** Professor Tim Eden, Cancer Research UK Professor of Paediatric Oncology in Manchester, provides an update on the largest study on this topic.

