



# Headlines

Summer 06

A newsletter for brain tumour patients and their families

## MEDICAL UPDATE

### Stem Cell Research in Brain Tumours



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#### What is “Stem Cell Research?”

**A**S MOST OF YOU ARE AWARE, human stem cell research has caused a lot of controversy. Despite ethical concerns, research into stem cells may offer considerable hope for treatment of currently incurable diseases. So what are the real facts surrounding stem cells and their role in brain tumour research?

First of all, what is a “stem cell?” Basically, these are cells that have the capability to divide and replenish themselves, but, when directed to do so, they can develop into a mature adult cell. The best examples of stem cells are the cells that make up an embryo. These are a small population of cells will be directed to develop into a full-grown human adult. So each embryo cell must be able to reproduce and mature into many possible different cells including brain cells. Of course, humans only remain in the embryo

stage for a short time; so embryonic stem cells are not present in the adult human. But are there other stem cells present in adulthood?

Well it turns out that certain cells do remain in the adult with the potential to self-regenerate and then differentiate into a mature adult cell. We’ve known for years about these stem cell populations in the bone marrow that constantly regenerate our blood cells. Unfortunately these stem cells are not the same as embryonic stem cells and can only successfully become blood cells and not any other cell in the human body.

For years it was felt that there was no stem cell population for the brain. Recently, however, neural stem cells have been found in the brains of humans with the potential to produce all forms of brain cells. These cells hold potential for many nervous system disorders, from Parkinson’s disease and Alzheimer’s disease to brain tumours.

There are two ways that neural stem cells are being investigated in the brain tumour field. Firstly, neural stem cells may actually be the cells of origin for most pediatric and adult brain tumours. Secondly, neural stem cells have an affinity for glioma cells and may be used to track and target brain tumour cells, bringing

therapeutic agents directly to the “bad” brain tumour cells and sparing the normal healthy nerve cells. Both these avenues of research are exciting and warrant a little discussion.

#### Neural Stem Cells and the Origin of Brain Tumours

The origin of brain tumours has always been mysterious. Many have felt that brain tumours arose from normal healthy adult brain cells that mutated into cancer cells. However, recent research, largely led by Dr. Peter Dirks at Toronto’s Sick Children’s Hospital, has found that most brain tumours contain a population of cells that are typical of neural stem cells and seem to be responsible for the ongoing growth of the tumours. It is these stem cells that have mutated into cancer cells that reproduce themselves without heeding the normal growth control signals. By targeting and eradicating these cancerous stem cells in gliomas, we may be able to get much better results in brain tumour treatment. This research is in early stages and hopefully new insight into these glioma progenitor cells and ways to eliminate them is just around the corner.

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# The use of dexamethasone in brain tumour treatment

**What is it?**  
**Dexamethasone (Decadron) is a glucocorticoid, a steroid hormone produced naturally by the adrenal glands, two small organs which sit on top of the kidneys. Glucocorticoids make glucose (sugar) available to the brain as its primary source of energy.**

**What does it do for brain tumours?** Actively growing brain tumours require increased nourishment, so they develop a system of blood vessels to support their growth. Just as tumour cells are not like normal brain cells, these blood vessels are different from normal blood vessels, and tend to be poorly formed and leaky. The leaky vessels allow fluid to escape into the brain, causing swelling or "edema." Brain swelling can result in headache, nausea, vomiting, weakness on one side of the body, and/or decreased consciousness. Decadron is the most efficient treatment available at this time to reduce brain swelling, but it has many side effects.

**Effects on protein, bones and fat.** At high levels, glucocorticoids break down protein and fat in the body and redistribute them to make new glucose. Protein breakdown causes thinning of the skin and loss of muscle mass, leading to thin, weak arms and legs, and skin that is prone to bleeding, breakdown and stretch marks. Regular mild activity will help to ensure that your strength is conserved as much as possible. You may benefit from a consultation with a physiotherapist or occupational therapist regarding safety and mobility. Assistive devices such as a raised toilet seat, a walker or cane may also be helpful.

Glucocorticoids may also affect the strength of the bones through loss of calcium and promotion of bone breakdown, leading to osteoporosis and bone fractures – all the more reason to exercise caution when your legs are weak!

Your doctor may prescribe a calcium supplement such as Didrocal, which is specially designed to get calcium directly into the bone.

As fat is broken down and redistributed, it accumulates around the abdomen, face and upper back. Decadron also acts as an appetite stimulant,

with further increase in weight and fat accumulation. Reaching for low calorie, nutritious snacks will help to keep weight down.

**Effects on stomach.** Decadron irritates the stomach lining and can lead to stomach ulcers. Administer this medication with food and take daily antacids such as ranitidine (Zantac) to protect the stomach.

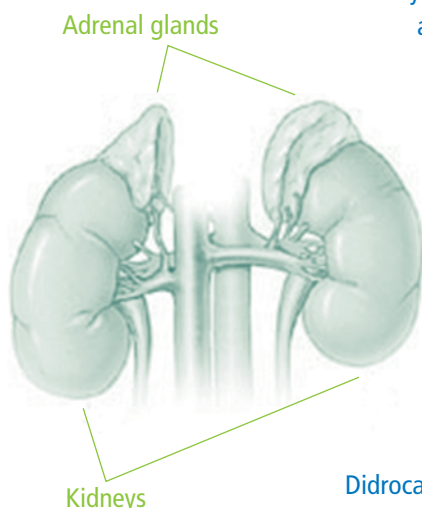
**Effects on mood and energy.** Decadron can affect mood and excitability, leading people to feel surges of energy, but also irritability and sleeplessness. If your sleep is affected, avoid taking this medication near your bedtime. It may be taken in a single dose in the morning with breakfast or two daily doses, with the last dose at lunchtime. You may also wish to discuss using a sleeping medication with your doctor. Rarely, the effects on the central nervous system can be extreme, causing severe agitation or even psychosis. Contact your health care team immediately should this occur.

**Effects on ability to fight infection.** Infection-fighting white blood cells may be decreased by Decadron, making people on longterm treatment more at risk for infection and slowing healing of wounds. Sensible measures to restrict exposure to illness should be instituted, such as regular handwashing and avoiding those with fevers or other illnesses. Your doctor may also prescribe an antibiotic to prevent some infections.

**Effects on sex hormones.** Glucocorticoids may suppress the synthesis and secretion of sex hormones such as testosterone and estrogen. For women, this can lead to changes in menstrual periods and temporary infertility.

**Other Decadron side effects** include lowered glucose tolerance leading to diabetes; fluid retention, especially in the legs and feet; and an acne-like rash.

**Never stop this medication abruptly.** When synthetic glucocorticoids, such as Decadron, are taken by mouth, the adrenal glands stop producing natural glucocorticoids because the body senses that there is ample supply already. If Decadron is discontinued abruptly, the adrenals do not have time to manufacture this hormone in sufficient quantity to prevent glucocorticoid withdrawal or depletion. Signs include headache, nausea, muscle aches and dizziness. Your health care team can advise you about how and when you can gradually reduce your Decadron dose.



Kidneys

# Blood Building Nutrients

**C**HEMOTHERAPY AND RADIATION THERAPY may temporarily affect your blood cells. The blood cells will recover on their own in time. The following nutrients play an important role in blood formation. Try to include some of the foods listed at every meal.

## Protein, Folate, Iron, Vitamin B12

### 1. High protein foods

- Meat, poultry, fish
- Eggs – omelettes, quiche, etc
- Milk products – yogurt, cheese, custard, etc.
- Peanut butter, seeds, nuts
- Dried peas, beans – split peas, kidney bean, lentils, etc.
- Soy products – soy beverages, tofu

### 2. High iron foods

- Organ meats like liver, kidney, red meat, poultry
  - Eggs
  - Dried fruit – figs, prunes, raisins
  - Whole grain and enriched breads, cereals, pasta
  - Soybeans, firm tofu, lentils, kidney beans, chick peas
  - Baked potato with skin
  - Blackstrap molasses
- \* To improve absorption of iron through iron-rich foods, have a vitamin C-rich food at the same meal (such as orange, grapefruit, tomato, kiwi, strawberry, red pepper, cantaloupe, or papaya)

### 3. High folate foods

- Organ meats
- Beans – lentils, navy beans, kidney beans, chick peas, lima beans
- Green leafy vegetables – spinach, Romaine lettuce, broccoli, brussel sprouts
- Beets
- Green peas

### 4. High Vitamin B12 foods

- Organ meats, beef, lamb, pork
- Eggs (yolks)
- Milk and milk products



## Moroccan Vegetable Stew

Easy, quick, delicious – and good for you – and your blood!

- 2 tsp olive oil
- 1 cup chopped onions
- ½ cup each diced celery and chopped green, red, orange or yellow pepper
- 1 clove garlic, minced
- 3 cups vegetable broth
- 3 cups peeled, chopped sweet potatoes
- 1 can (19 oz) tomatoes, drained and cut up



- 1 can (19 oz) chick peas, drained and rinsed
- 1 tsp each ground cumin, curry powder, coriander, and chili powder
- 1 tbsp lemon juice
- ½ tsp salt
- ¼ tsp black pepper
- 2 tsp ginger (powder) or finely chopped fresh ginger to taste
- ¼ cup raisins
- 2 tsp peanut butter
- 2 tsp cilantro, chopped

- 1) Heat oil in a large pan over medium heat. Add onions, celery, peppers, garlic and cook until vegetables begin to soften
- 2) Add all remaining ingredients except raisins, peanut butter and cilantro.
- 3) Bring to a boil, then reduce heat and simmer, covered, for 20 minutes.
- 4) Stir in raisins, peanut butter and cilantro. Mix well and simmer for 5 minutes.

Serve hot over rice. 6 servings.

**Stem Cell Research in Brain Tumours**  
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### Neural Stem Cells and “Smart Bomb” Therapy

There is also active research activity into using neural stem cells as brain tumour therapy. When healthy neural stem cells are injected into a brain containing a tumour, they will track down and group with the tumour cells. If these stem cells can be engineered to carry a toxic agent with them, we would have new targeted treatment approaches.

This “smart bomb”-type strategy is exciting in that it has potential to spare the rest of the healthy brain from side effects of our current treatments and direct the treatment directly onto the “bad” tumour cells.

### Stem Cells and the Future

A major limitation in this research is the availability of neural stem cells. While these cells can be easily harvested from animals and used in animal research, obtaining human neural stem cells is far more difficult. The major source currently

is human embryonic and fetal tissue which is in limited supply and fraught with political and ethical hurdles. Developing a stable and ethically-responsible source for these cells, such as umbilical cord blood, will be a major effort if this research is to proceed to its potential.

Neural stem cells, in the end, may be both the cause and the cure for brain tumours and research into these areas needs to advance. If you are interested in more information about Canadian efforts in this field, visit the Stem Cell Network website, [www.stemcellnetwork.ca](http://www.stemcellnetwork.ca).



## How You Can Help

The BC Cancer Foundation welcomes donations which support brain tumour research at the BC Cancer Agency. To discuss how you can make a difference – by contributing to the Hershey & Yvette Porte Endowment Fund for Neuro-oncology, by establishing a similarly named fund, or by contributing directly to brain tumour research and patient comfort initiatives – please contact Sharon Kennedy at 604.877.6160.

Tax receipts are issued for gifts of any amount. Donations should be directed to BC Cancer Foundation at 200 - 601 West Broadway, Vancouver, BC V5Z 4C2

**Together we can make a difference!**

## Question + answer



**Q** I have a grade 4 brain tumour. I had surgery when I was first diagnosed in January and I was told the tumour had been removed. I had chemotherapy and radiation and did really well, but when I had my last MRI in June I was told the tumour was back. I feel fine, but my doctors say that I can't have more surgery. Instead they just want to give me chemotherapy. I know someone who had surgery three times when his tumour grew.

Why did my doctors say I couldn't have more surgery? And why can't you just have surgery whenever the tumour grows? I went home the day after my surgery and recovered very quickly, so it seems like a good treatment to me.

**A** Two concepts will help you understand what is meant when we say that a brain tumour (also known as a glioma) is "non-operable."

The first has to do with a glioma's growth patterns, especially a higher grade glioma such as yours. A glioma has a central area where most of the tumour cell mass resides. This is the area readily seen on a CT scan or MRI scan. However, beyond the central mass there are microscopic infiltrating cells that spread into the brain. People sometimes refer to these infiltrating cells as "roots" or "fingers." These spreading cells cannot be seen by any imaging studies, not even by MRI or PET scan. They also cannot be seen at the time of surgery. Surgery can remove the central mass of tumor cells, but it can never remove all the infiltrating cells.

Therefore, when a surgeon says he or she has removed "all of the tumour," this does not include the infiltrating cells of a glioma. If a surgeon were to attempt to remove all these infiltrating cells, a

vast amount of normal brain would also need to be removed, leading to significant neurological injury. In the 1940's they actually tried to do this. They removed half the patient's brain hoping to capture these invading cells. Despite this aggressive surgery, the patients still ended up with recurrent tumour on the other side of the brain. It is the infiltrating cells that are the source of a tumour recurrence.

The second concept is that currently there are many options in the battle to cure a grade 4 glioma. While we generally feel that surgical removal of the central mass of the tumour is beneficial, we now know that in order to try to control the infiltrating tumour cells we must use other methods, including radiation therapy and chemotherapy. These methods are not only less invasive, but they are also much better at attacking the infiltrating cells. Studies from the last two years have shown us that a new chemotherapy drug can dramatically improve a patient's survival if used in combination with surgery and radiation therapy. Many new investigations are under way, all looking at improving our ability to control the invading cells of a glioma.

The most important point I would make is this: the main reason most tumours are not operated on these days is not because the surgery is "impossible." Instead the reason is that there are more effective and less risky ways than surgery to control brain tumours. Furthermore, while surgery is not the best option at one point in time, it is still possible that it may be a good solution at a later date.

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[www.bccancer.bc.ca/HPI/CancerManagementGuidelines/NeuroOncology/PatientResources.htm](http://www.bccancer.bc.ca/HPI/CancerManagementGuidelines/NeuroOncology/PatientResources.htm)

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