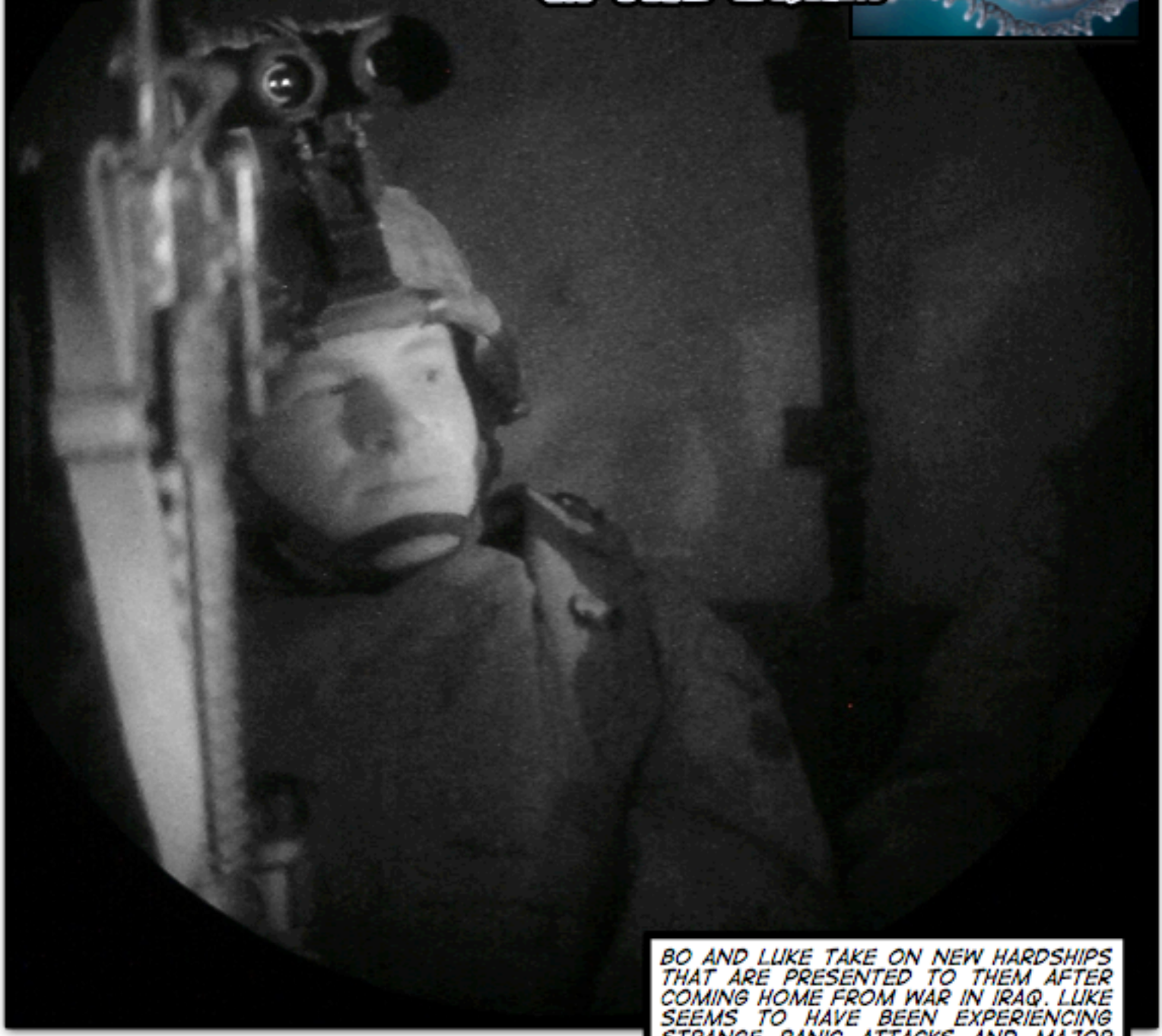
TRAUMA IN THE BRAIN



BO AND LUKE TAKE ON NEW HARDSHIPS THAT ARE PRESENTED TO THEM AFTER COMING HOME FROM WAR IN IRAQ. LUKE SEEMS TO HAVE BEEN EXPERIENCING STRANGE PANIC ATTACKS AND MAJOR DEPRESSION WHILE BO SEEMS TO BE ADJUSTING TO LIFE AT HOME MUCH BETTER. LET'S TAKE A DEEPER LOOK AT WHAT'S GOING ON WITH BO AND LUKE.

THIS WEEK ON TRAUMA

TRAUMA IN THE BRAIN:

A CONCEPTIONAL COMIC BOOK ABOUT PSYCHIATRIC DISEASES AND OUR GENES

DESIGNED AND WRITTEN BY
DAVID WALKER
&
PRODUCED FOR
COMPARATIVE GENOMICS 497B

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THE DAYS CREEP BY FOR BO AND LUKE. THEIR UNIT, THE ALPHA COMPANY ASSASSINS, HAVE BEEN FIGHTING NEARLY NON-STOP FOR 3 MONTHS. SO FAR THEY HAVE LOST 1 FRIEND TO ENEMY FIRE AND HAVE SEEN 3 MORE LEAVE THE BATTLEFIELD AFTER HITTING AN AMBUSH COMPLETE WITH ROADSIDE BOMBS AND RPG'S.

BOTH BO AND LUKE HAVE BEEN LUCKY SO FAR NOT TO BE SERIOUSLY WOUNDED...

BO AND LUKE GET HIT BY A ROADSIDE BOMB AND SUSTAIN MANY INJURIES. THEIR HUMVEE IS DESTROYED AND THEY ARE EVACUATED TO GERMANY TO RECEIVE MEDICAL TREATMENT. BO SHATTERS HIS LEG AND A BROKEN ARM THAT NEEDS A CAST. LUKE NEEDS TO HAVE PINS INSERTED INTO HIS FOOT AND SUFFERS BROKEN RIBS. BOTH RETURN HOME AFTER A FEW WEEKS RECOVERING IN GERMANY.

I HOPE BO AND LUKE ARE DOING ALRIGHT.

5 MONTHS LATER...

BO AND LUKE HAVE RECOVERED FROM THEIR TRAUMATIC EXPERIENCES IN IRAQ.

LUKE IS ATTENDING A FOOTBALL GAME AT NOTRE DAME WHEN SOMETHING TRIGGERS A DISTURBING CHANGE IN HIM.

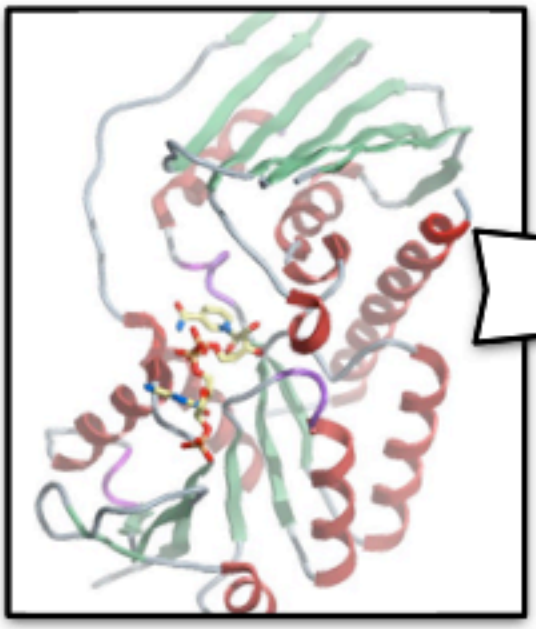
LOOK MOM I'M MOSES!

OH MY! I DON'T FEEL SO WELL...WHY AM I SHAKING? I FEEL LIKE A PANIC ATTACK COMING ON.

BACKFIRE

LUKES VIEW

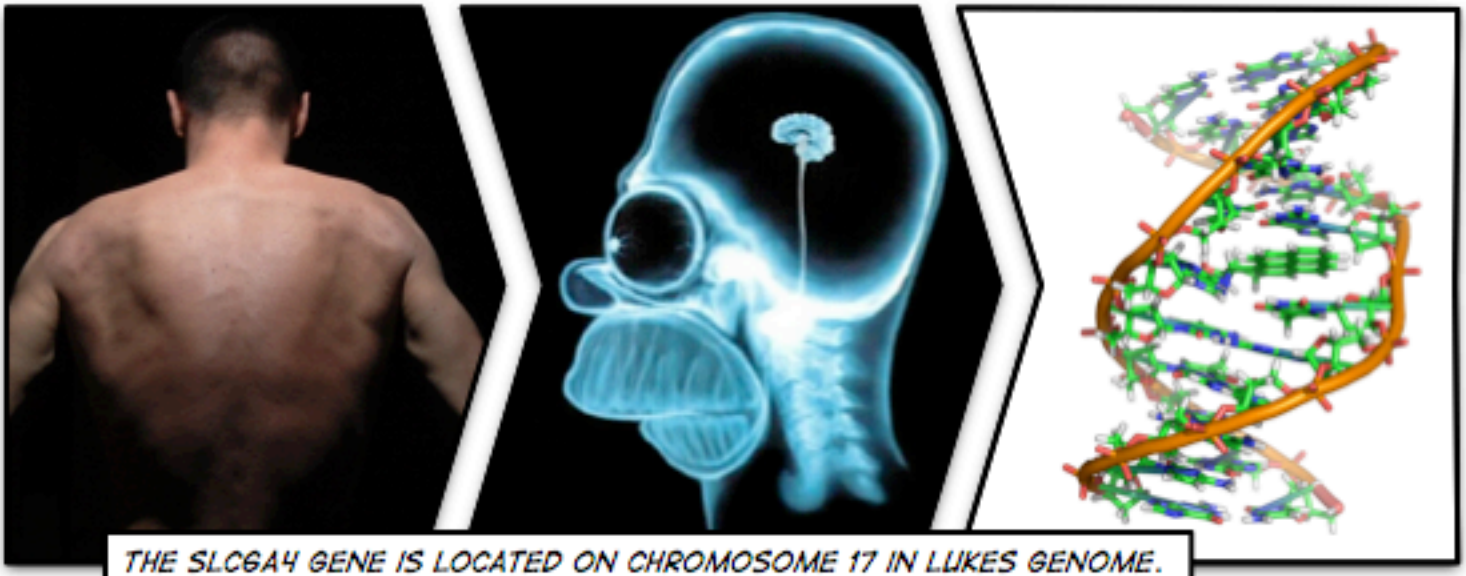
IT SEEMS LIKE OUR WAR HERO IS SUFFERING A PANIC ATTACK. COULD IT POSSIBLY BE THE FIRST SIGN OF PTSD? LETS TAKE A DEEPER LOOK INTO PTSD AND LUKE...A MUCH DEEPER LOOK.



INSIDE LUKE...

IN LUKE'S BRAIN, THERE IS SEROTONIN, A NEUROTRANSMITTER IN THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. WHEN RELEASED, SEROTONIN IS ACTIVELY CLEARED FROM SYNAPTIC SPACES BY THE SLC6A4 PROTEIN. THIS PROTEIN IS A HIGH-AFFINITY TRANSPORTER RESTRISCTED IN PRESYNAPTIC NEURONAL MEMBRANES. THIS PROTEIN IS TRANSCRIBED BY THE SLC6A4 GENE.

THE SLC6A4 GENE



THE SLC6A4 GENE IS LOCATED ON CHROMOSOME 17 IN LUKES GENOME.

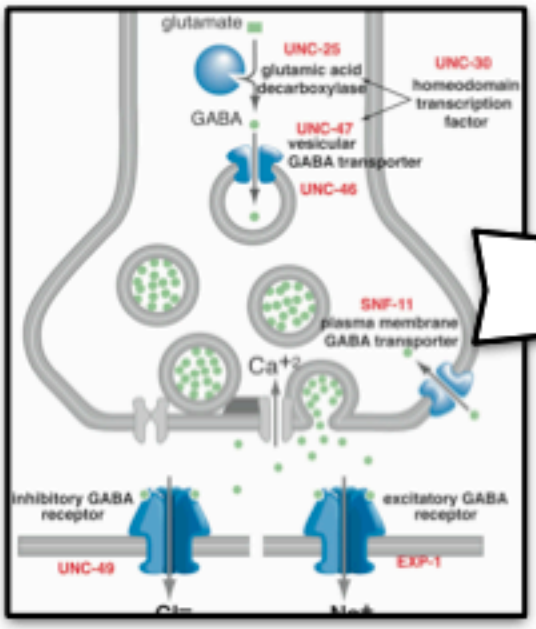
THERE IS A POLYMORPHISM IN THE TRANSCRIPTIONAL CONTROL REGION UPSTREAM OF THE 5-HTT CODING SEQUENCE. THIS POLYMORPHISM IS LOCATED APPROXIMATELY 1 KB UPSTREAM OF THE TRANSCRIPTION INITIATION SITE OF THE SLC6A4 GENE AND IS COMPOSED OF 16 REPEAT ELEMENTS. THE POLYMORPHISM CONSISTS OF A 44-BP INSERTION OR DELETION INVOLVING REPEAT ELEMENTS 6 TO 8.

POLYMORPHISM

BAM POW

PTSD

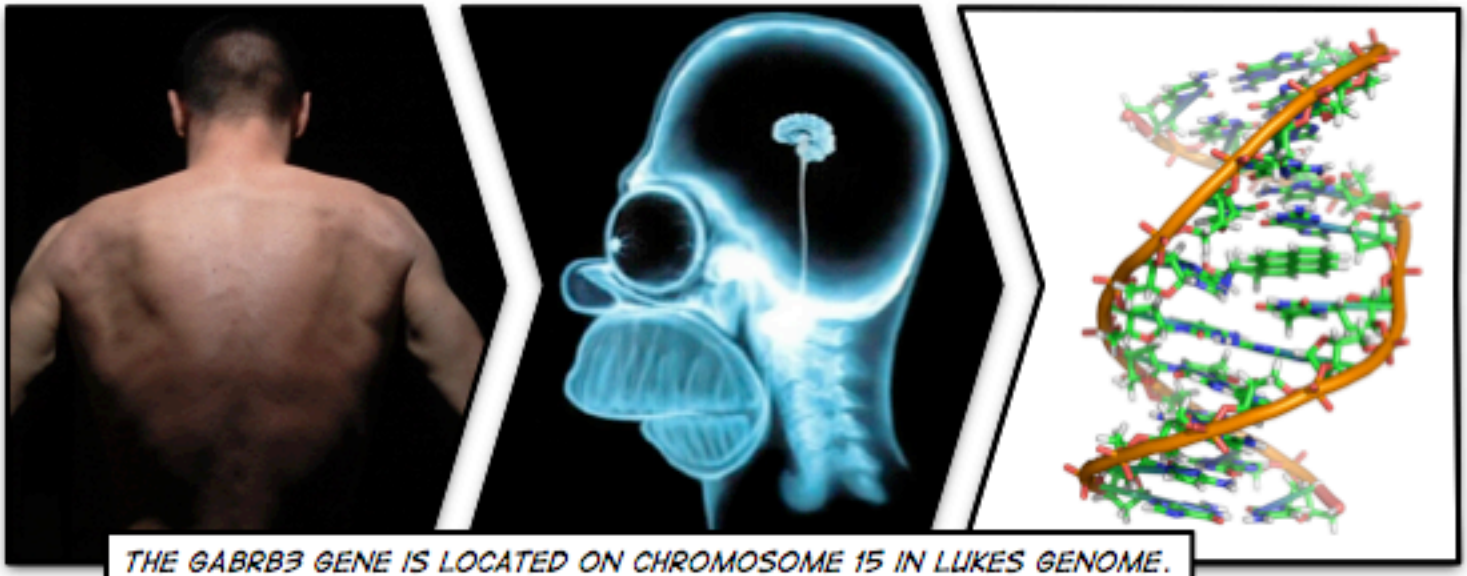
THE LOW-EXPRESSION VARIANT OF 5-HTTLPR POLYMORPHISM HAS INCREASED THE RISK OF PTSD AND MAJOR DEPRESSION BY 4.5 TIMES IN LUKE. SIMILAR EFFECTS HAVE BEEN FOUND FOR MAJOR DEPRESSION PATIENTS. A LOOK AT LUKE'S SLC6A4 GENE SHOWS THAT HE HAS THIS DISPOSITION AND IS A PROBABLE CAUSE THAT IS AILING OUR HERO.



INSIDE LUKE...

LUKE HAS A MAJOR INHIBITORY NEUROTRANSMITTER IN THE BRAIN CALLED GABA, WHERE IT ACTS AT GABA-A RECEPTORS, WHICH ARE LIGAND-GATED CHLORIDE CHANNELS. FUNCTIONAL GABA-A RECEPTORS APPEAR TO BE COMPOSED OF 5 HOMOLOGOUS, VARIABLE SUBUNITS ARRANGED TO FORM A CENTRAL CHANNEL THAT CONTROLS THE FLOW OF CHLORIDE IONS THROUGH THE CELL MEMBRANE.

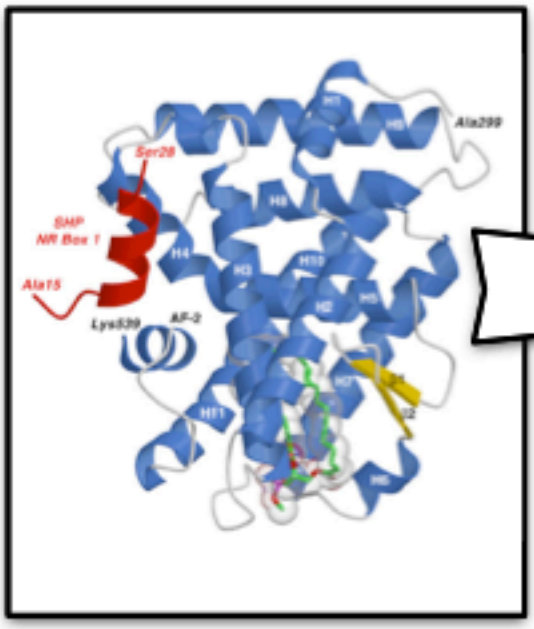
THE GABRB3 GENE



THE GABRB3 GENE IS LOCATED ON CHROMOSOME 15 IN LUKES GENOME.

REDUCED GABA FUNCTION RELATED TO HETEROZYGOSITY IS LIKELY TO HAVE A WIDE RANGE OF IMPACT ON LUKE'S BRAIN FUNCTION. THE MONOAMINES, ESPECIALLY SEROTONIN AND NOREPINEPHRINE, HAVE LONG BEEN THE PRIMARY NEUROTRANSMITTERS IMPLICATED IN MOOD AND ANXIETY REGULATION. THERE IS EVIDENCE THAT GABA FACILITATES SEROTONIN RELEASE IN THE PREFRONTAL CORTEX AND THAT ITS ACTIONS AT SEROTONIN TERMINALS ARE POSSIBLY CATALYTIC. SEROTONIN IN TURN INCREASES THE SENSITIVITY OF THE GABAA RECEPTOR. THIS IS LIKELY TO BE MEDIATED PRESYNAPTICALLY THROUGH GABAA RECEPTORS.

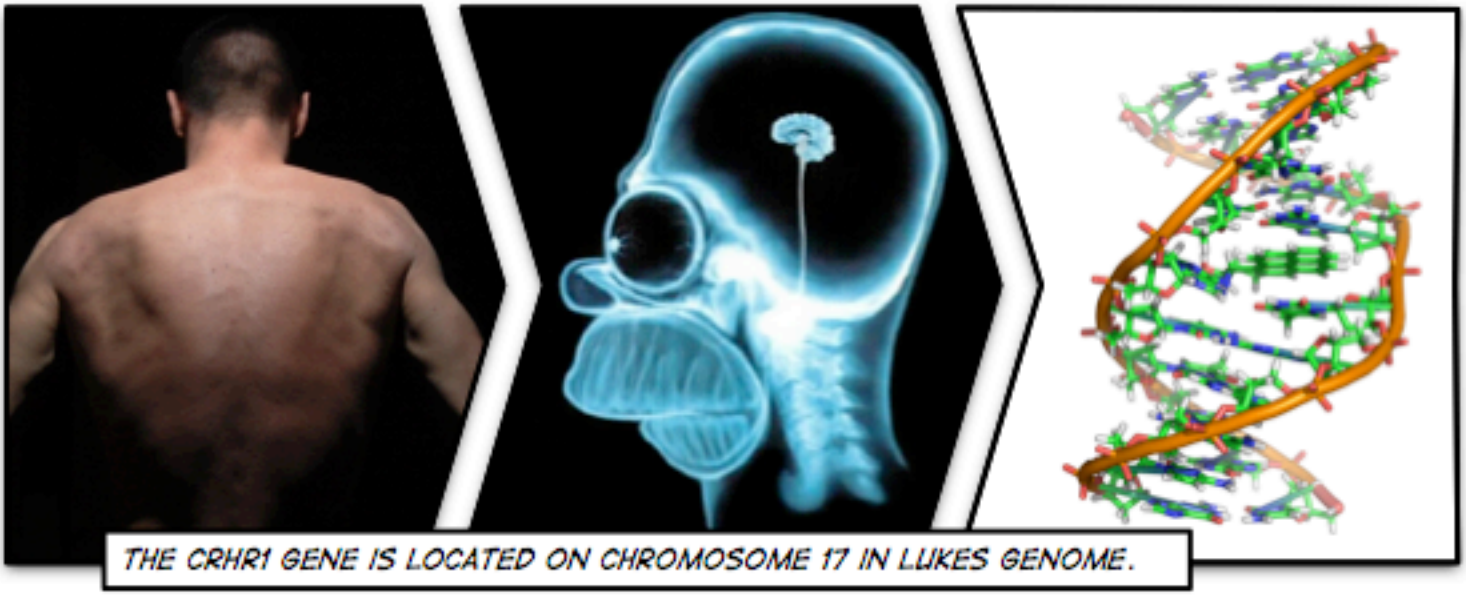
REGIONAL REDUCTION OF LIGAND BINDING TO THESE RECEPTORS HAVE BEEN SHOWN, THROUGH IMAGING STUDIES, TO PLAY SOME TYPE OF ROLE IN PANIC DISORDERS. HAS THIS BEEN PLAYING A ROLE IN LUKE?



INSIDE LUKE...

LUKE'S BODY ENCODES A CORTICOTROPIN-RELEASING HORMONE RECEPTOR THAT BINDS TO, WHAT ELSE, CORTICOTROPIN-RELEASING HORMONE. THIS HORMONE IS A POTENT MEDIATOR OF ENDOCRINE, AUTONOMIC, BEHAVIORAL, AND IMMUNE RESPONSES TO STRESS.

THE CRHR1 GENE



THE CRHR1 GENE IS LOCATED ON CHROMOSOME 17 IN LUKES GENOME.

A STUDY WAS CONDUCTED THAT COMPARED THE CRHR1 GENE WITH 206 PATIENTS SUFFERING FROM MAJOR DEPRESSION AND 195 HEALTHY CONTROLS. AN ANALYSIS OF THREE SNPS WITHIN THE CRHR1 GENE WERE COMPARED TO ALLELE, GENOTYPE AND HAPLOTYPE FREQUENCIES OF THE THREE SNPS IN MAJOR DEPRESSION PATIENTS AND HEALTHY CONTROLS.

POLYMORPHISM

Zing Zang

PTSD

IN THE SINGLE SNP EVALUATION, IT WAS FOUND THAT THE G ALLELE IS MORE FREQUENT IN MAJOR DEPRESSED PATIENTS THAN IN CONTROLS, WHICH SHOWED A STATISTICALLY SIGNIFICANT UNION OF SNP RS242939 WITH MAJOR DEPRESSION.

A FEW WEEKS LATER...

I FEEL SO ALONE. I WONDER IF ANYONE FEELS THE SAME WAY AS I DO?

I CAN'T SEEM TO GET THESE HORRIBLE IMAGES TO STOP ATTACKING MY MIND.

LUKE'S CONDITION CONTINUED TO DECLINE WITH MORE FREQUENT PANIC ATTACKS AND SLIPS INTO A DEEP DEPRESSION. OUR HERO DID NOT SEEK HELP AND ENDED UP TAKING HIS OWN LIFE.

IF ONLY LUKE KNEW THAT HIS GENETIC MAKE-UP WAS CAUSING MUCH OF HIS ILLNESS, HE MIGHT HAVE WENT AND SEEN A DOCTOR FOR HELP. IF ONLY HE KNEW...

BOOM

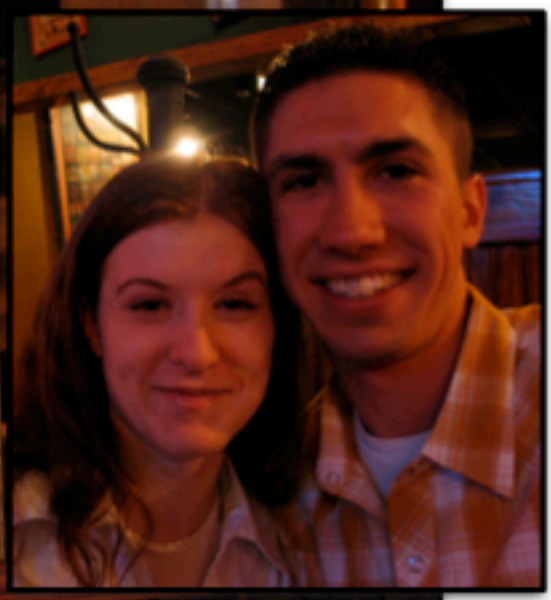
RIP LUKE

SO HOW HAS BO BEEN SINCE HE RETURNED HOME? IT DEFINITELY LOOKS LIKE HE HAS BEEN BUSY!

SO MANY GIRLS AND SO LITTLE TIME.

LEVI

APPARENTLY BO HAS GOOD JEANS SINCE HE HASN'T SHOWN ANY SIGNS OF PTSD.



THE END