



National  
Multiple Sclerosis  
Society

## MS Learn Online

### Feature Presentation

#### *To Repair and Protect: The Future of MS Treatments*

#### *Part Two*

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**Tom >>** Hi. I'm Tom Kimball.

**Tracey >>** and I'm Tracey Kimball and welcome to MS Learn Online. It's good to have you join us for our second segment of "To Repair & Protect: The Future of MS Treatments"

**Tom >>** Tracey, I'm looking forward to learning more about what specific research is going on to find treatments for MS. Let's take a look.

**>>EJ Levy** SAN DIEGO WAS SO AMAZING. TODAY I'M PACKING FOR CALGARY. I CAN'T WAIT TO GET UP THERE. IT'S SUPPOSED TO BE FREEZING THIS TIME OF YEAR.

HI, I'M HERE AT THE UNIVERSITY OF CALGARY WHERE WE'RE GOING TO BE INTERVIEWING TWO MORE FANTASTIC RESEARCHERS WHO WORK AT THE HOTCHKISS BRAIN INSTITUTE. DR. SAMUEL WEISS AND DR. WEE YONG, WHO ARE BOTH ON THE FOREFRONT OF RESEARCH AND REPAIR FOR MS. IT'S

FREEZING OUT HERE IN CANADA, SO WE'RE GOING TO HEAD ON IN AND MEET THEM RIGHT NOW!

DR. WEISS, THANK YOU SO MUCH FOR ALLOWING US INTO YOUR LAB; IT'S REALLY EXCITING TO BE HERE.

>> **Dr. Weiss** MY PLEASURE, THANKS FOR COMING.

>> **EJ Levy** WHAT ARE YOU WORKING ON NOW IN THE LAB?

>> **Dr. Weiss** WELL, WE'RE WORKING ON A VARIETY OF THINGS, BUT I THINK SPECIFICALLY IN RELATION TO MULTIPLE SCLEROSIS, WE'VE GOT TWO IMPORTANT PROJECTS. ONE OF THEM IS LOOKING AT ADULT HUMAN OLIGODENDROCYTE PROGENITOR CELLS. NOW THESE OLIGODENDROCYTE PROGENITOR CELLS ARE THE ONES THAT MAKE NEW OLIGODENDROCYTES, AND ONLY NEW OLIGODENDROCYTES CAN MAKE NEW MYELIN AND NEW MYELIN IS WHAT WE'RE TRYING TO GET TO REPAIR LESIONS IN MULTIPLE SCLEROSIS. SO WE'RE ABLE TO GET, THROUGH ADULT HUMAN NEUROSURGERIES, SOME OF THE TISSUE THAT HAS THESE ADULT HUMAN OLIGODENDROCYTE PRECURSORS, AND WE'RE TRYING TO IDENTIFY WHAT'S IT GOING TO TAKE TO TURN THEM ON, SO THEY START PRODUCING MORE CELLS AND MORE MYELIN?

THE SECOND THING THAT WE'RE FOCUSED ON IS EXTENDING AN OBSERVATION THAT WE'VE MADE RECENTLY, THAT PROLACTIN, A COMMON HORMONE THAT'S IN WOMEN AND MEN ACTUALLY, MAY BE A THERAPEUTIC WAY OF REPAIRING MS LESIONS. SO WE WERE ABLE TO SHOW THAT IN ANIMALS, WHEN WE DEMYELINATE -- AND THAT'S CHEMICALLY REMOVE THE MYELIN OF THE SPINAL CORD -- IF WE GIVE PROLACTIN, WE'RE ACTUALLY ABLE TO

ACCELERATE REPAIR. AND WE'RE TRYING TO TAKE THIS A STEP FURTHER IN STUDIES IN COLLABORATION WITH OTHER GROUPS, TO SEE WHETHER OR NOT PROLACTIN MAY BE A CANDIDATE MOLECULE TO TAKE INTO THE CLINIC FOR REPAIRING MULTIPLE SCLEROSIS LESIONS.

>>EJ Levy NOW A LOT OF RESEARCH WE HEAR IS OFTEN DONE A LITTLE BIT IN ISOLATION, BUT YOU'RE PART OF A BIG TEAM THAT HAS BEEN FUNDED TO DO THIS TYPE OF RESEARCH.

HOW IS BEING PART OF A TEAM HELPFUL TO YOU AS AN INDIVIDUAL, AND HOW DO YOU THINK IT'S HELPFUL TO THE OVERALL REPAIR PROGRAM?

>> Dr. Weiss WE'RE REALLY FORTUNATE TO BE PART OF THIS INTERNATIONAL TEAM THAT THE NATIONAL MULTIPLE SCLEROSIS SOCIETY HAS FUNDED, AND THE REASON IS, IT'S ACTUALLY QUITE SIMPLE: DISCOVERIES ARE MADE BY INDIVIDUALS. BUT TRYING TO TAKE DISCOVERIES AND MOVE THEM TOWARDS APPLICATIONS THAT ARE GOING TO IMPROVE PEOPLE'S LIVES REQUIRE TEAMS OF PEOPLE WHO PARK THEIR EGOS AT THE DOOR AND DECIDE WHAT'S REALLY IMPORTANT IS WHAT'S GOING TO MAKE A DIFFERENCE FOR PEOPLE, AND YOU CAN ONLY REALLY DO THAT WHEN YOU POOL YOUR INFORMATION, COME UP WITH STRATEGIES THAT ARE MEANINGFUL, TEST THEM TOGETHER, AND MORE RAPIDLY ACCELERATE DISCOVERY TOWARDS TREATMENT. AND THAT CAN ONLY BE DONE BY TEAMS OF PEOPLE WORKING TOGETHER, AND THAT'S PART OF WHAT THIS INTERNATIONAL EFFORT IS. AT THE SAME TIME, LOCALLY HERE IN

CALGARY, WE'VE ALSO GOT A VERY ACTIVE MS PROGRAM THAT BRINGS TOGETHER SCIENTISTS AND CLINICIANS WORKING ARM-IN-ARM TO TRY TO TAKE WHAT WE KNOW AND APPLY IT AS RAPIDLY AS POSSIBLE. SO TEAMS BOTH AT AN INTERNATIONAL LEVEL AND A LOCAL LEVEL REALLY MAKE A MASSIVE DIFFERENCE IN WHAT WE'RE TRYING TO DO.

>> **EJ Levy** I KNOW THAT A LOT OF TIMES WHEN DOCTORS ARE TALKING ABOUT THE DIFFERENT TYPES OF MS, WHETHER IT'S RELAPSING-REMITTING OR PROGRESSIVE, THEY OFTEN TALK ABOUT WITH PROGRESSIVE MS YOU GET PERMANENT DAMAGE, BUT YOU'RE WORKING TOWARDS THAT PERMANENT DAMAGE NOT REALLY BEING PERMANENT ANYMORE. WHEN DO YOU THINK THAT COULD BE SOMETHING THAT WE COULD ACTUALLY GET TO FEEL AND TRY?

>> **Dr. Weiss** WELL, I THINK THAT, YOU KNOW, TESTING IS A FEW YEARS AWAY. I MEAN WE WANT TO MAKE SURE ONCE AGAIN THAT THE ANIMAL EXPERIMENTATION IS TRULY CONVINCING ENOUGH THAT WE'RE READY TO THEN SAY OKAY, THIS WORKS IN THE SYSTEMS -- ANIMAL SYSTEMS THAT ARE CLOSEST TO HUMAN -- NOW LET'S TAKE THEM THROUGH TO SAFETY, TO MAKE SURE THAT THEY'RE GOING TO WORK AGAIN IN COMBINATION, FOR EXAMPLE, WITH IMMUNOMODULATORY DRUGS THAT ARE USED FOR MS. AND THAT IS A MATTER OF A FEW YEARS AWAY IN SOME CASES. THE QUESTION OF COURSE BECOMES EFFECTIVENESS. YOU START WITH A SMALL GROUP OF PATIENTS TO SEE WHETHER OR NOT IT'S EFFECTIVE, AND IF IT IS, THEN IT WOULD

BE POSSIBLE TO TRY TO TEST IT ON A LARGER GROUP.

>>EJ Levy WELL, I WANT TO PERSONALLY THANK YOU, AS SOMEBODY WHO'S BEEN LIVING WITH MS FOR SEVERAL YEARS, FOR ALL THE WORK THAT YOU DO AND ALL THE PEOPLE IN YOUR LAB THAT COME IN EVERY DAY AND TRY TO HELP US FIND A CURE AND HELP US REPAIR THE DAMAGE THAT'S BEEN DONE.

>> Dr. Weiss SO IT'S OUR PLEASURE, AND REALLY IT'S BECAUSE OF PEOPLE LIKE YOU THAT WE GET UP EVERY MORNING AND HAVE A SPRING IN OUR STEP TO TRY TO MAKE A DIFFERENCE.

>>EJ Levy THANK YOU SO MUCH FOR TAKING THE TIME TO SPEAK WITH ME. DO YOU HAVE ANOTHER FEW MINUTES TO SHOW ME AROUND YOUR LAB?

>> Dr. Weiss ABSOLUTELY, IT WOULD BE MY PLEASURE.

>>EJ Levy OH, TERRIFIC.

>> Dr. Weiss SO HERE'S WHERE WE WILL GET THE SAMPLES OF THE ADULT WHITE MATTER. WE WILL THEN BREAK THE TISSUE APART AND WE WILL PUT THEM INTO CULTURE AND STUDY THE TYPES OF PROTEINS AND HORMONES THAT ARE GOING TO MAKE THEM DIVIDE REPEATEDLY, AND THEN ONCE THEY'VE GROWN UP TO A CERTAIN EXTENT, WE WILL TAKE THEM OUT AND STUDY THEIR ABILITY TO MAKE THE NEW MYELIN, AND THIS IS WHAT TELLS US WHAT WE WILL ULTIMATELY TRY TO USE IN PEOPLE TO GET THEIR RESIDENT OLIGODENDROCYTE PROGENITOR CELLS TO DIVIDE REPEATEDLY.

>>EJ Levy AND THEREFORE MAKE NEW CELLS AND MAKE NEW MYELIN.

>> Dr. Weiss AND THEREFORE MAKE NEW MYELIN AND SO ON AND SO FORTH. SO THEY'RE NOW ANALYZING HOW SOME OF THESE NEW PROTEINS THAT WE'VE BEEN TESTING, TO WHAT EXTENT THEY'VE BEEN ABLE TO INCREASE THE NUMBERS OF NEW OLIGODENDROCYTE PROGENITOR CELLS --

>>EJ Levy THE PROLACTIN YOU WERE TELLING US ABOUT. SO YOU'RE INTRODUCING THE PROLACTIN INTO --

>> Dr. Weiss THAT'S RIGHT. WE WOULD INTRODUCE IT INTO OUR TISSUE CULTURE DISHES, AND AFTER A PERIOD OF TIME, ONCE THE HORMONES HAVE HAD A CHANCE TO INCREASE THE PRODUCTION OF THE NEW CELLS THAT MAKE MYELIN, WE WILL BE ABLE TO ANALYZE THAT WITH THE ANALYSIS SYSTEMS THAT WE HAVE. THEN ULTIMATELY WE WOULD TAKE THAT INFORMATION AND BEGIN TO TEST IT IN EXPERIMENTAL ANIMALS, WHERE THEY ALSO HAVE THOSE RESIDENT OLIGODENDROCYTE PROGENITOR CELLS. IF IT WORKS IN THE ANIMALS, THEN WE'RE BEGINNING, WITH OUR COLLEAGUES IN THE CLINICS, TO PLAN WHAT THE CLINICAL TRIALS WILL LOOK LIKE.

>>EJ Levy SO THIS IS JUST ONE AREA THAT YOU WORK IN?

>> Dr. Weiss NOW THIS IS ONE OF THE ROOMS THAT WE HAVE. WE'VE GOT THREE OR FOUR OTHER ROOMS WHERE WE DO MORE CELL OR MOLECULAR WORK AND

WE'RE ONE OF ABOUT FIVE LABS THAT ARE WORKING AND INTERESTED IN REPAIR IN MS, RIGHT HERE IN CALGARY.

>>EJ Levy GREAT.

>>EJ Levy DR. YONG, THANK YOU SO MUCH FOR TAKING TIME OUT OF YOUR VERY BUSY DAY TO SPEAK WITH ME.

>> Dr. Yong MY PLEASURE.

>>EJ Levy SO WE JUST SPOKE WITH DR. WEISS AND HE WAS TELLING ME THAT YOU ARE DOING SOME COLLABORATIVE WORK WITH HIM ON PROLACTIN, BUT I KNOW YOU'RE ALSO DOING SOME OTHER REALLY INTERESTING WORK ON REPAIR IN CONJUNCTION WITH THE INFLAMMATORY PROCESS. COULD YOU TELL ME A LITTLE BIT ABOUT THAT?

>> Dr. Yong SURE. WE KNOW THAT IN MS THERE IS AN INFLAMMATORY RESPONSE THAT STARTS IN THE CIRCULATION AND THEN GOES INTO THE CNS -- CENTRAL NERVOUS SYSTEM -- WHICH IS THE BRAIN AND SPINAL CORD, TO INFLICT INJURY. BUT WE ARE ALSO NOW RECOGNIZING THAT IN THAT MIDST OF INFLAMMATORY CELLS THAT GO INTO THE BRAIN AND SPINAL CORD, THERE ARE SOME THAT BRING WITH THEM BENEFICIAL PROPERTIES. SOME OF THOSE BENEFICIAL PROPERTIES INCLUDE THOSE LYMPHOCYTES COMING TO THE NERVOUS SYSTEM AND RELEASING THE GROWTH FACTORS THAT LYMPHOCYTES ARE NOW KNOWN TO MAKE. SOME OF THESE GROWTH FACTORS ARE RELEVANT AND HELPFUL FOR THE SURVIVAL OF CELLS WITHIN THE NERVOUS SYSTEM, SO THAT WOULD BE ONE ASPECT OF BENEFICIAL INFLAMMATION. ANOTHER ASPECT IS THAT THESE INFLAMMATORY CELLS COME IN AND CAN HELP CLEAR SOME OF THE DEBRIS THAT FORM

AS A RESULT OF DEGENERATION OF MYELIN IN THE NERVOUS SYSTEM, AND A THIRD BENEFICIAL OUTCOME OF THESE INFLAMMATORY CELLS IS THAT THEY BRING WITH THEM MOLECULES THAT CAN HELP NEUTRALIZE SOME OF THE INHIBITORY MOLECULES THAT ARE BARRIERS FOR POTENTIAL REPAIR IN THE NERVOUS SYSTEM.

>> **EJ Levy** SO IN A NORMAL PERSON, THE INFLAMMATORY RESPONSE IS SOMETIMES POSITIVE? HOW DOES THAT...

>> **Dr. Yong** WELL, NORMALLY, AN INFLAMMATORY RESPONSE IS A POSITIVE THING. IF ONE HAS A CUT TO THE SKIN, IT IS ACTUALLY A WELL-ORGANIZED, WELL-DIRECTED INFLAMMATORY RESPONSE TO THAT CUT THAT ENABLES THAT CUT TO HEAL. IF ONE HAS A BACTERIAL OR VIRAL INFECTION, IT IS AN INFLAMMATORY RESPONSE THAT WILL HELP FIGHT OFF -- HELP US RECOVER FROM THOSE INFECTIONS. SO WITH THAT IN MIND, IT IS NOT SO FAR-FETCHED TO THINK THAT WITHIN THE MIDST OF ALL THE DETRIMENTAL IMMUNE CELLS IN THE NERVOUS SYSTEM, THAT SOME OF THESE ARE THERE TO EXERT BENEFICIAL PROPERTIES.

>> **EJ Levy** SO YOUR RESEARCH IS TARGETED ON MAKING THE BENEFICIAL ASPECTS OF THE INFLAMMATORY RESPONSE STRONGER. SO WHAT ARE YOU DOING IN THE LAB RIGHT NOW TO FURTHER THAT?

>> **Dr. Yong** WELL, WE ARE TRYING TO DEFINE BETTER THE BALANCE BETWEEN DETRIMENTAL AND BENEFICIAL INFLAMMATION. WE ARE TRYING TO DEFINE BETTER SOME OF THE CELL TYPES THAT CONFER BENEFICIAL INFLAMMATION ON THE NERVOUS SYSTEM, AND WE ARE TRYING TO HARNESS THOSE

BENEFICIAL CELLS.

NOW I KNOW THIS IS A LOADED QUESTION WE OFTEN ASK, BUT FOR SOMEONE WITH MS WHO HAS DAMAGE AND YOU'RE WORKING ON REPAIR, WHAT IN YOUR MIND IS KIND OF THE TIMELINE WHERE WE ACTUALLY MIGHT SEE SOME REPAIR, AND ACTUALLY SEE PEOPLE'S FUNCTION IMPROVE?

WELL, OFTEN HARD TO PREDICT TIMELINES. WE DO KNOW THAT LABORATORY DISCOVERIES OFTEN TAKE A FEW YEARS BEFORE THEY REACH THE STAGE OF CLINICAL TESTING.

WHAT I CAN SAY IS THAT THIS YEAR ALONE, THERE HAVE BEEN THREE DIFFERENT STRATEGIES ON PROMOTING REMYELINATION IN ANIMAL MODELS OF MS. ONE OF THEM IS PROLACTIN THAT WE HAVE DESCRIBED. THERE IS A NEW MEANS TO INHIBIT A MOLECULE CALLED LINGO THAT HAS ALSO RESULTED IN REMYELINATION IN AN ANIMAL MODEL OF MS. AND AS A THIRD APPROACH, USING NEUTRALIZING ANTIBODIES. SO THIS YEAR ALONE, THE RESEARCH HAS ARRIVED AT A POINT

IN WHICH FORMAL PUBLICATIONS ARE OUT, THEN THE LITERATURE FOR FELLOW SCIENTISTS TO VIEW. WITH OUR OWN WORK HERE, WE ARE TRYING TO MOVE

TO THE NEXT STAGE OF TRYING TO WORK THROUGH SOME ISSUES OF HOW TO BRING SOME OF THESE TO THE CLINIC.

**Tracey>>**There really is a tremendous amount of research happening for MS.

**Tom** >> That's right Tracey. In our final web-cast we'll learn even more as EJ Levy talks with researchers who are trying to better understand the types of damage that is caused by MS.

**Tracey** >> Great! To our MS Learn Online audience, thank you for joining us. We look forward to having you back for part three.