



# ADVANCES IN BIOMARKER RESEARCH FOR PARKINSON DISEASE

#### **What are Biomarkers?**

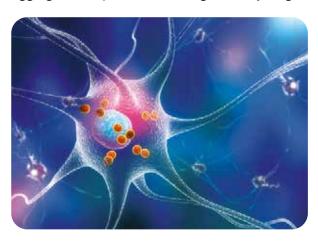
The term biomarker refers to something, usually biological, that we can measure to indicate a stage or characteristic associated with a medical condition. For example, in the brain of someone with Parkinson disease, a protein called alphasynuclein clumps together and forms Lewy bodies. Also, dopamine, a brain chemical used for communication between different neurons. decreases with Parkinson disease. A lot of research is focused on finding techniques to detect and measure different forms of alphasynuclein and dopamine levels to mark disease onset and progression. Finding biomarkers is especially important with Parkinson disease because there can be a long latency from when the disease starts to cause changes in the body to when people begin to experience symptoms. Furthermore, not everyone experiences the same symptoms or progresses at the same rate, so we need learn more about predicting certain symptoms before they occur.

In general, there are two types of biomarkers – those used to determine or diagnose a disease ("diagnostic biomarkers") and those used to predict something about a disease ("prognostic biomarkers"). Diagnostic biomarkers may help those at risk of developing Parkinson disease to determine if and when symptoms will develop. Prognostic biomarkers may help those who

already have been diagnosed with Parkinson to determine what specific symptoms they may develop or how fast certain symptoms may progress. Diagnostic and prognostic biomarkers may also be helpful to identify and evaluate novel treatments for Parkinson disease. Identifying biomarkers for Parkinson disease can have a big impact on those at risk for Parkinson, as well as people already diagnosed with Parkinson disease and their families.

#### **Diagnostic Biomarkers**

Recent research studies show promising results regarding novel diagnostic biomarkers. For example, a relatively new technique allows us to detect the formation of alpha-synuclein aggregates in spinal fluid during the early stage



# ADVANCES IN BIOMARKER RESEARCH FOR PARKINSON'S DISEASE (continued)

of the disease. Another exciting new area of research examines the potential role of the gut microbiome (e.g., the bacteria and other microorganisms in the gut) and the interactions between our gut and our brain (e.g., "gut-brain axis") in the development of Parkinson disease. Recently, it has been uncovered that people with REM sleep behavior disorder (RBD, in which a person unknowingly acts out their dreams), are at an increased risk of developing Parkinson disease. Several international studies are now following people with RBD to identify biomarkers that predict the onset of Parkinson symptoms. These studies on diagnostic biomarkers suggest new ways to confirm diagnosis or to identify people with Parkinson disease before symptoms begin. This might help to reduce delays between when symptoms begin and diagnosis, which will help people to start treatment sooner. It will also help to ensure that people have the correct diagnosis and receive the best treatment for their condition.

#### **Prognostic Biomarkers**

Currently, several research studies at Washington University in St. Louis (WashU) are focused on identifying prognostic biomarkers that may help to predict progression of certain features of Parkinson disease, such as changes in thinking and memory. This includes two large studies on Parkinson disease progression, one called Protein and Imaging Biomarker (PIB) study of Parkinson disease (also referred to as "Investigations of dementia in Parkinson disease") and the Protein Aggregation and Neurotransmitter Deficits (PAND) study. These studies found that MRI scans can detect differences in brain networks that relate to both the motor and the cognitive symptoms of Parkinson disease and that these functional brain networks change over time. It was also discovered that both the PET scan and cerebrospinal fluid measures of beta-amyloid, another protein that can aggregate to form plaques, indicate risk for future cognitive decline. Based on brain donations and brain autopsy data, these studies revealed that several neurotransmitters (e.g., brain chemicals), besides dopamine, are affected with Parkinson disease, including serotonin, norepinephrine, and acetylcholine. This prompted the use of new PET scans that measure norepinephrine and acetylcholine as potential novel biomarkers. And a brand new study just started, called Precision-Mapping of Parkinson disease, which aims to collect multiple MRI scans to determine individual differences in brain networks, which might help explain and predict certain symptoms of Parkinson disease.

Advances in our understanding of the brain changes that contribute to the various symptoms of Parkinson disease, and identifying prognostic biomarkers that reflect these changes, could have a huge impact on people with Parkinson disease. Results from these studies could suggest new treatments for certain features of Parkinson disease (e.g., freezing episodes or dementia), identify people who may develop specific symptoms, determine the rate of progression, and monitor the biological effects of new treatments. This could greatly improve the quality of life for people with Parkinson disease and their families.



Dr. Meghan Campbell is an Associate Professor in Neurology and Radiology at Washington University School of Medicine. Her research focuses on the neuropsychological changes associated with Parkinson disease and aims to identify biomarkers to predict these changes.



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### **CURRENT RESEARCH**

Please visit our website for more information



## Improving Diversity in Parkinson's Research and Care Study

Contact Dominique Woodhouse woodhouse@wustl.edu
or 618-401-2328

#### Walking and Music Study

Contact Martha Hessler mjhessler@wustl.edu or 314-286-1478

#### **Walking Study**

Contact Martha Hessler mjhessler@wustl.edu
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#### Parkinson Disease of Exercise Phase 3 Clinical Trial: SPARX3

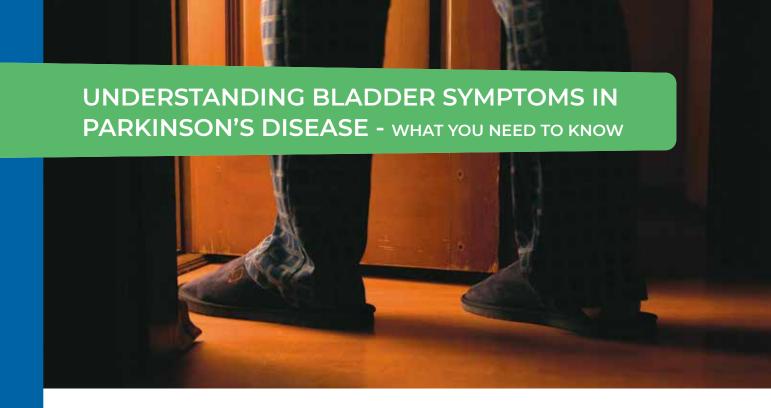
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#### Lower Back Pain Study

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#### Memory Intervention for PD Study

Contact Tasha Doty tdoty@wustl.edu or 785-865-8943



Up to 80 percent of people with PD experience bladder-related problems



Problems with urination due to bladder dysfunction are common in Parkinson's disease (PD). Studies indicate that up to 80 percent of people with PD experience bladder-related problems at some point in the disease. Bladder symptoms can impact general health, restrict daily activities and social interactions, and worsen quality of life. Understanding the cause of the problem and how to counteract the symptoms can help minimize the effects and improve outlook.

#### **About the Bladder**

Urine is made in the kidneys, and stored in the bladder before elimination. Urine flows out from the bladder through the urethra. The bladder is a muscular sac which can hold up to a pint of liquid. As it fills, stretching stimulates the bladder muscle (called the detrusor) to contract. At the same time, rings of muscle surrounding the urethra, called sphincters, relax. This allows urine to flow through the urethra. The brain can control this process by suppressing the contraction of the detrusor, and preventing the relaxation of the sphincter, until it is convenient to urinate.

#### **Types of Bladder Dysfunction**

The most common type of bladder dysfunction in PD is overactive contraction of the detrusor muscle, even when the bladder is not full. This leads to an increased sense of urgency, as well as increased frequency of urination, and nocturia — the need for frequent urination at night. Some people experience urinary incontinence. Incontinence occurs when urine is released involuntarily. When the activities of the detrusor and sphincter aren't coordinated, it can lead to incomplete elimination of urine. This causes a feeling that the bladder is not completely empty. When the sphincter is weak or the brain is unable to suppress sphincter relaxation, a person may experience urine leakage. This is especially common when the abdominal muscles contract, such as when you laugh, cough, or sneeze.

#### **Other Causes of Bladder Dysfunction in PD**

Bladder dysfunction may occur from causes unrelated to PD, including infection, an enlarged prostate in men, and weak pelvic muscles in women. Advancing age increases the risk for bladder dysfunction. The PD disease process may contribute to bladder dysfunction through its effect on the nerve cells that carry messages between the bladder and the brain, or the nerve cells within the brain that process these messages. Bladder dysfunction can also be affected by diet and medications: alcohol and caffeine irritate the bladder, increasing bladder muscle contractions, and some blood pressure medications may relax the sphincters.

#### **Evaluation of Urinary Problems**

Your treatment team may refer you to a urologist, a specialist in bladder problems. The urologist is likely to want you to keep a diary of frequency of urination and urinary symptoms in order to better understand your specific problems. The doctor will ask about medications you are taking, as well as use of alcohol, caffeine, and certain foods that may affect urinary symptoms.

There are several tests that provide important information about the causes of your symptoms. These include taking a urine sample to look for infection; urine flow tests to understand the rate and volume of urine flow; and imaging tests to determine residual volume in the bladder after urination. These are all usually performed in the urologist's office.

### **Treatment of Bladder Dysfunction**

Your doctor will review your findings and recommend a treatment plan. Treatments may include diet and lifestyle changes, exercises to strengthen muscles involved in controlling urination, and medications. Aids including absorbent pads may also be recommended. Be sure to inform your healthcare team of any new treatments, especially new medications, as some treatments may impact your PD symptoms.

## Resources for those with bladder dysfunction include:

Stanford APDA Information and Referral Center http://parkinsons.stanford.edu/incontinence.html Offers links to several informative publications specific to incontinence in PD

National Association for Continence

#### https://www.nafc.org/

Provides self-help information to supplement strategies from your treatment team

Neurogenic Bladder

#### http://emedicine.medscape.com/article/453539overview#a1

For those who want to learn more, a detailed discussion of bladder dysfunction due to a variety of neurologic conditions, including PD.

Editor: Cathi A. Thomas, RN, MS, CNRN Assistant Clinical Professor of Neurology Program Director, Parkinson's Disease and Movement Disorders Center, Boston University Medical Campus Coordinator, American Parkinson Disease Association Information & Referral Center at BUM



## **IN-PERSON EXERCISE CLASS SCHEDULE**

Contact individual location to register. For more information please call 636.778.3377 or apdastlouis@apdaparkinson.org

#### **MISSOURI CLASS SCHEDULE**

LOCATION	DAY	TIME	LEADER	LEVEL	CLASS	
	Tuesday	10:00am	Jen Berger	Level 3	Circuit Training	
	Tuesday	11:00am	Jen Berger	Level 2	Strength and Cardio	
	Wednesday	10:00am	Michelle Valenti	Level 2	Movement Training	
	Wednesday	11:00am	Michelle Valenti	Level 1	Seated Exercise	
Chesterfield ADPA Office	Thursday	11:00am	Craig Miller	Level 1 & 2	Tai Chi	
ABI A Office	<b>NEW</b> Thursday	12:00pm	Jen Berger	Level 3	Parkinsons Boxing	
	Thursday	1:00pm	Michelle Valenti	Level 2	Strength and Cardio	
	Friday	10:00am	Craig Miller	Level 1	Tai Chi and Meditation	
	Friday	11:15am	Craig Miller	Level 2	Tai Chi	
Chesterfield YMCA	Mon/Wed	12:30pm	Michelle Valenti	All Levels	Parkinsons Pedalers	
Jefferson Co. YMCA	Mon/Thurs	10:00am	Linda Thompson	All Levels	Exercise for Parkinsons	
Kirkwood YMCA	Monday	11:45am	Stephanie Scimemi	Level 2	Parkinsons Pedalers	
Maryland Hts. YMCA	Tuesday	11:00am	Joan Paul	Level 2	Exercise for Parkinsons	
South County YMCA	Tues/Thurs	3:30pm	Peggy Higgins	Levels 1 & 2	Exercise for Parkinsons	
St. Louis City	Thursday	12:00pm	Annie Morrow	Level 1	Interval Training	
Stephen A Orthwein Ctr.	Friday	2:00pm	Mike Scheller	Levels 1 & 2	Fit and Fun	
St. Peters, BJC	Thursday	11:00am	Vicky Frazier	Level 1 & 2	Strength and Cardio	
Ste. Genevieve	Wednesday	11:00	Becky Baumann	Level 2	Exercise for Parkinsons	
Sunset Hills	Thursday	1:00pm	Colleen Pratt	Level 2	Movement Training	
Washington YMCA	Mon/Wed/Fri	1:00pm	Lynn/Kindall/Linda	Level 1 & 2	Exercise for Parkinsons	
ZOOM	Tuesday	9:00am	Jen Berger	Level 1	Seated Exercise	
ZOOM	Thursday	2:00pm	Michelle Valenti	Level 1	Seated Exercise	

#### **ILLINOIS CLASS SCHEDULE**

LOCATION	DAY	TIME	LEADER	CLASS
Breese/Clinton Co. YMCA	Tues/Thurs	12:30pm	Jack S.	Exercise for Parkinsons
Carlinville	Thursday	10:00am	Amy M.	Exercise for Parkinsons
	Monday	1:00pm	Jessica B.	Strength and Balance
	Tuesday	1:00pm	Lindsey R	Functional Chair Fitness
Champaign YMCA	Wednesday	1:00pm	Jessica B	Seated Yoga
	Thursday	1:00pm	Tesha S.	Functional Chair Fitness
	Friday	1:00pm	Lindsey R.	Standing Functional Fitness
Decatur YMCA	Tues/Thurs	9:00am	Michelle P. & Margie	Pedaling for Parkinsons
Edwardsville YMCA	Tues/Thurs	11:00am	Mary T. / Lara C.	Exercise for Parkinsons
Highland Korte Rec Ctr.	M/W/Th	11:00am	Hilary Held	Cycle and Strength
O'Fallon YMCA	Tues/Thurs	12:00pm	Victoria W. / Stefanie M.	Exercise for Parkinsons
Quincy YMCA	Tues/Fri	10:30am	Cathy Schluckebier	Fit to Fight PD Boxing
Springfield First Presb. Church	Tues/Thurs	1:30pm	Eva Fischberg	The Joy of Movement
VIRTUAL	Wednesday	10:30am		

## SUPPORT GROUP SCHEDULE

For more information, please call 636.778.3377 or email apdastlouis@apdaparkinson.org

#### **MISSOURI SUPPORT GROUPS**

LOCATION	DAY	TIME	LEADER	MEETING SITE
Ballwin	4th Tuesday	2:30pm	Chaplain Carla Schmidt	Meramec Bluffs Care Center
Cape Girardeau	2nd Monday	5:30pm	Jayanti Ray	Cape Girardeau Library
Chesterfield	2nd Monday	10:30am	Lynda W. / Jay B.	APDA Office - Caregivers ONLY
<b>NEW!</b> Chesterfield	2nd Tuesday	1:00pm		APDA Office - Newly Diagnosed
<b>NEW!</b> Chesterfield	3rd Thursday	2:00pm	Michele Dain	Friendship Village Chesterfield
<b>NEW!</b> Florissant	1st Tuesday	10:00am	Sharon Wells	Garden Villas North
<b>NEW!</b> Kansas City	2nd Wednesday	4:00pm	Stephanie Valente	Johnson Co Rehab Hospital
NEW! Olivette	3rd Tuesday	11:00am	Diana Tucker	Private Home Care
Rolla	3rd Tuesday	2:30pm	Julie Riggs	Phelps Health Cancer Inst.
Ste. Genevieve	2nd Wednesday	10:00am	Teddy R. / Maria R.	Ste. Gen. Community Center
St. Peters	1st Tuesday	1:00pm	Amanda S. / Whitney M.	Spencer Road Library
South County	4th Wednesday	10:00am	Melissa Mann	Cedarhurst of Tesson Heights
Washington	2nd Monday	3:00pm	Teresa V. / Chris H.	Washington Public Library
VIRTUAL	4th Tuesday	6:30pm	Terri Hosto	PD VIRTUAL
VIRTUAL	3rd Monday	1:00pm	Kathy Schroeder	VIRTUAL - STL Caregivers ONLY
VIRTUAL	Every Thursday	6:00pm	Karen F. / Mike M.	VIRTUAL - Young Onset ONLY

#### **ILLINOIS SUPPORT GROUPS**

LOCATION	DAY	TIME	LEADER	MEETING SITE	
	2nd Wednesday	1:00pm	Connor Schobernd	SSP Main Bldg, The Meeting Rm	
Alton	2nd Tuesday	2:00pm	Connor Schobernd	SSP Wellness Center CarePartners ONLY	
Belleville	3rd Monday	1:30pm	Jodi Gardner	SW Illinois College's Programs and Services for Older Persons	
Belleville	3rd Tuesday	11:00am	Jodi Gardner	Belleville Health and Sport Center  Caregivers ONLY	
Carbondale	1st Wednesday	1:00pm	Gayla Lockwood	Prairie Living at Chautauqua	
Carlinville	4th Tuesday	11:00am	Amy Murphy	Carlinville Area Hospital	
Champaign	Every Monday	10:00am	Dave M. / Diane K.	Savoy United Methodist Church	
Decatur	3rd Thursday	1:30pm	John Kileen	Westminister Presbyterian Church	
Edwardsville	1st Tuesday	2:00pm	Pam P. / Sara H.	Edwardsville YMCA	
Greenville	2nd Tuesday	1:00pm	Robbie Mueth	Bond County Senior Citizens	
Highland	4th Tuesday	2:00pm	Kayla Deerhake	St. Joseph Hospital Sullivan Conference Room	
Quincy	2nd Saturday	10:00am	Terri & Dave May	Quincy Public Library	
VIRTUAL	1st Wednesday	1:00pm	Jim & Fran Ringle	PD VIRTUAL	

## Games of Strategy to

## **ENTERTAIN YOUR BRAIN**

Want to keep your brain entertained and challenged, and have some fun too? Research studies have shown that strategy games can improve mental acuity, critical thinking and decision making skills. They can also improve observation, concentration, memory, logic and reasoning (source: memoryhealthmadeeasy.com).

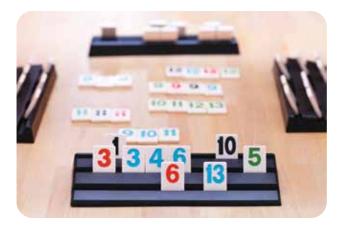
Here are some games of strategy to consider for a friends or family game night.

#### **Games for Two or More Players:**

**Scrabble** is a Mattel word game in which two to four players score points by placing tiles, each bearing a single letter, onto a game board divided into a 15×15 grid of squares. The tiles must form words that, in crossword fashion, read left to right in rows or downward in columns, and be included in a standard dictionary or lexicon.

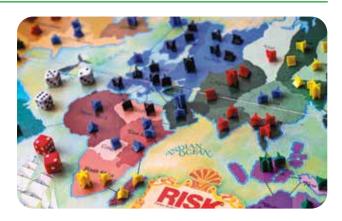
The board is marked with "premium" squares, which multiply the number of points awarded: eight "tripleword" squares, 17 "double-word" squares, 12 "tripleletter" squares, and 24 "double-letter" squares.





**Rummikub** is a tile-based game by Pressman Toy, combining elements of the card game rummy and mahjong. There are 106 tiles in the game, including 104 numbered tiles and two jokers. Players have 14 or 16 tiles initially and take turns putting down tiles from their racks into sets of at least three, drawing a tile if they cannot play. The first player to use all their tiles scores a positive score based on the total of the other players' hands, while the losers get negative scores. An important feature of the game is that players can work with the tiles that have already been played.

**Risk** by Hasbro is a strategy board game of diplomacy, conflict and conquest for two to six players. It is played on a board depicting a map of the world, divided into forty-two territories, which are grouped into six continents. Turns rotate among players who control armies of playing pieces with which they attempt to capture territories from other players, with results determined by dice rolls. The goal of the game is to occupy every territory on the board and, in doing so, eliminate the other players. The game can be lengthy, requiring several hours to multiple days to finish.



### Games for Kids of All Ages:

**UNO** is the classic family card game by Mattel. Players take turns matching a card in their hand with the current card shown on top of the deck, either by color or number. Special action cards, like Skips, Reverses, Draw Twos, color-changing Wild and Draw Four Wild cards, deliver game-changing moments as they each perform a function to help you defeat your opponents. If you can't make a match, you must draw from the center pile. And when you're down to one card, don't forget to shout 'UNO!' The first player to get rid of all the cards in their hand wins.





**Dominoes** is a family of tile-based games played with gaming pieces, commonly known as dominoes. Each domino is a rectangular tile with a line dividing its face into two square ends. Each end is marked with a number of spots or is blank. The gaming pieces make up a domino set, sometimes called a deck or pack. The traditional domino set consists of 28 tiles, featuring all combinations of spot counts between zero and six. A domino set is a generic gaming device, similar to playing cards or dice, in that a variety of games can be played with a set.

Monopoly by Hasbro is a multi-player economics-themed board game. In the game, players roll two dice to move around the game board, buying and trading properties, and developing them with houses and hotels. Players collect rent from their opponents, with the goal being to drive them into bankruptcy. Money can also be gained or lost through Chance and Community Chest cards, and tax squares. Players receive a stipend every time they pass "Go," and can end up in jail, from which they cannot move until they have met one of three conditions.



#### Just You? Games for One:

**Sudoku** is a logic-based, combinatorial number-placement puzzle. It can be found in booklets or on a smart phone. In classic Sudoku, the objective is to fill a 9 × 9 grid with digits so that each column, each row, and each of the nine 3 × 3 subgrids that compose the grid contain all of the digits

			6	5	8	3	
8	5						7
		2		8			4
5				1			
	7	8	5			1	2
	2		4			9	2
	8	6					
1	3	5			9		
9	6		3				

from 1 to 9. The puzzle setter provides a partially completed grid, which for a well-posed puzzle has a single solution.

Wordle is a word game played online or on a smart phone. Each day has a new five-letter word. Players have six attempts to guess the word, with feedback given for each guess in the form of colored tiles

W	0	R	D	S
R	Ε	A	C	Н
C	R	A	T	E
С	R	A	N	E

indicating when letters match the daily word, and if the letters occupy the correct position in the daily word. All players attempt to guess the same word of the day.

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Kodner Gallery

Nalini & Kirti Mehta

Stephen Meyer

Annette Owings Monica & Joel Perlmutter

Dennis Redel

Kirk Werseman

## \$1,000 - \$2,499

Jean Cody

Barry Kessler

Peggy Lashley

Heather & Matthew Mikula

Terese & Bob Mitchusson

Sherrol & Donald Nicklas

Rotonda Foundation

Bethany Sleckman

## \$2,500 to \$4,999

Rich Schumacher Linda & David Wicks

## \$5,000 to \$9,999

**Bob Tarrant** 

## \$10,000 and over

A Storage Inn Paula & Rodger Riney



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**Lefton Family Foundation** in Honor of David Dankmeyer

## **APDA Missouri Chapter**

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