GLOBAL WELLNESS
SUMMIT 2019

# Forest Bathing 2.0:
## The Art and Science of Shinrin-Yoku

**Dr. Qing Li,** Author & President, Japanese Society of Forest Medicine; Nippon Medical School, Japan

2019 Global Wellness Summit, October 15-17, Singapore

Keynote presentation

# Forest Bathing and Forest Medicine
# The Impact of Shinrin-Yoku on Wellness

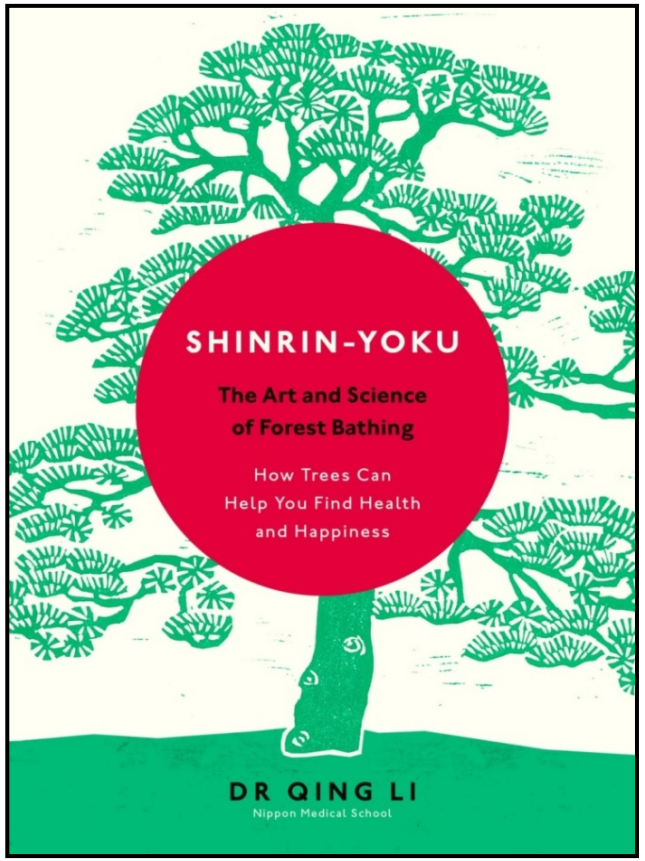

**Qing Li, MD, PhD**

**Nippon Medical School Hospital**

**President of Japanese Society of Forest Medicine**

**Vice-president and general secretary of International Society of Nature and Forest Medicine (INFOM)**

**Director of Forest Therapy Society in Japan**

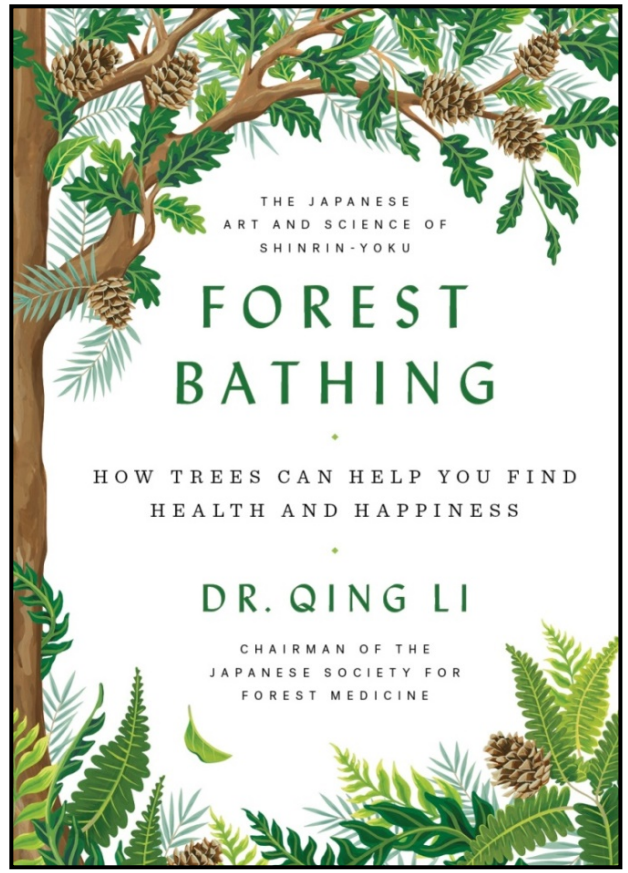



Penguin Random House UK

**On April 5, 2018, Penguin Random House UK published my book:**

# Shinrin-Yoku

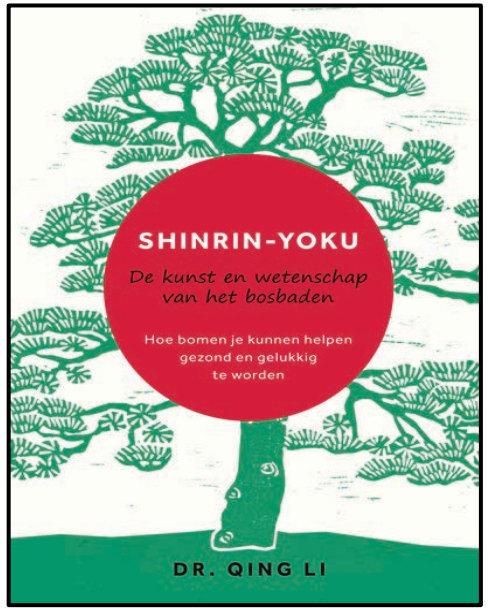
**The book also was published in USA under the title of Forest Bathing on April 17, 2018 by Viking Books.**




Penguin Random House USA

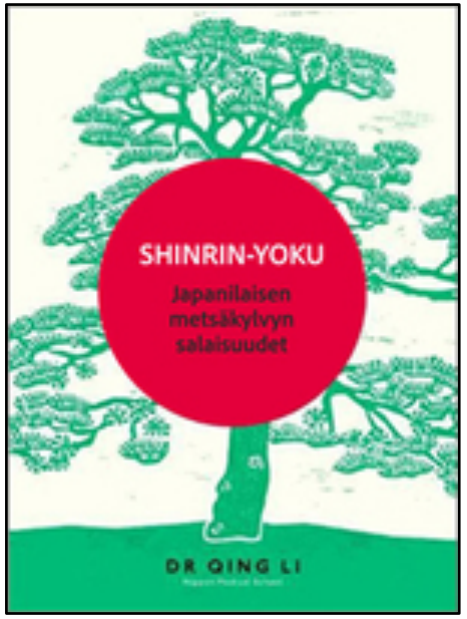
## The book has been translated into 25 languages

The book has been translated into 1.French, 2.Spanish, 3.Dutch, 4.German, 5.Italian, 6.Russian, 7.Portuguese, 8.Hungarian, 9.Czech, 10.Slovak, 11.Polish, 12.Bulgarian, 13.Finnish, 14.Chinese Complex, 15.Danish, 16.Swedish, 17.Estonian, 18.Thai, 19.Romania, 20.Simplified Chinese, 21.Korean, 22. Slovenia, 23.Lithuania, 24.Turkish, 25.Japanese



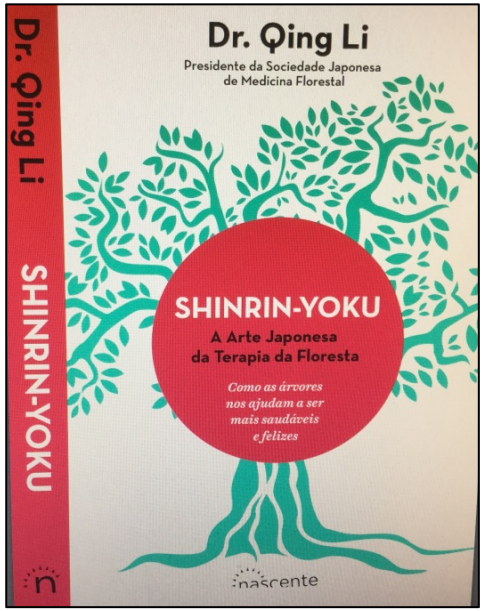

Dutch edition
(March 6, 2018)


French edition
(March 15, 2018)

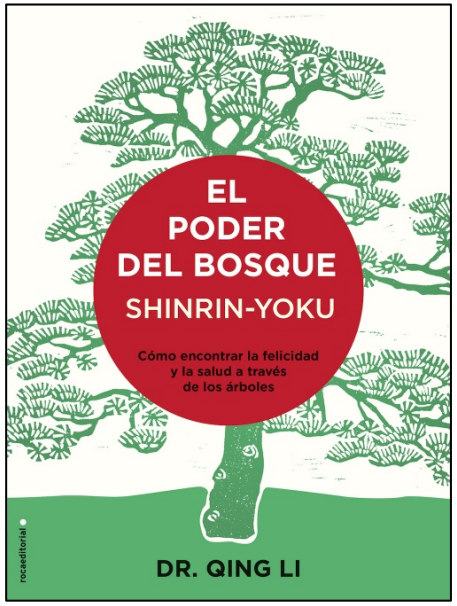



Finnish edition
(April 10, 2018)


Hungarian
(April 8, 2018)

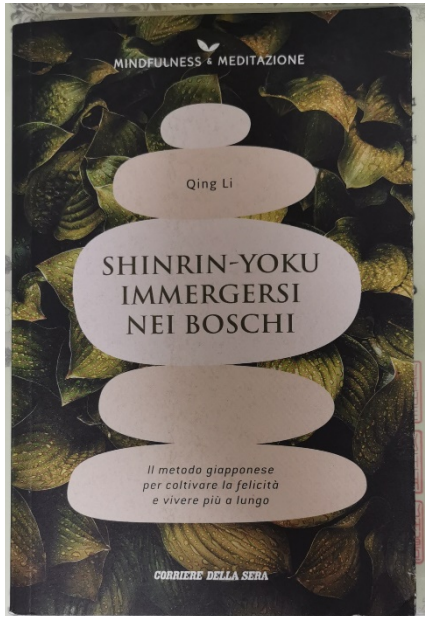



Portuguese edition
(April 10, 2018)

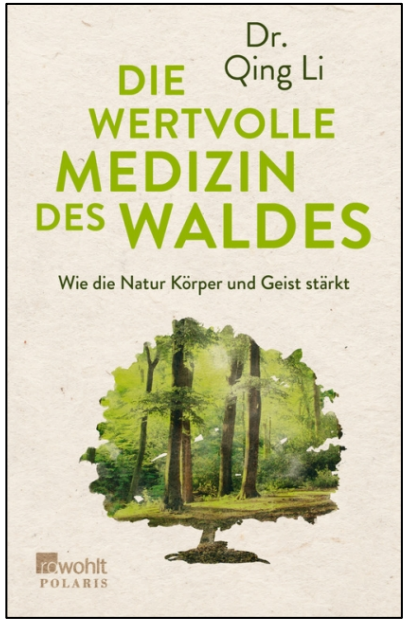



Spanish edition
(April 26, 2018)

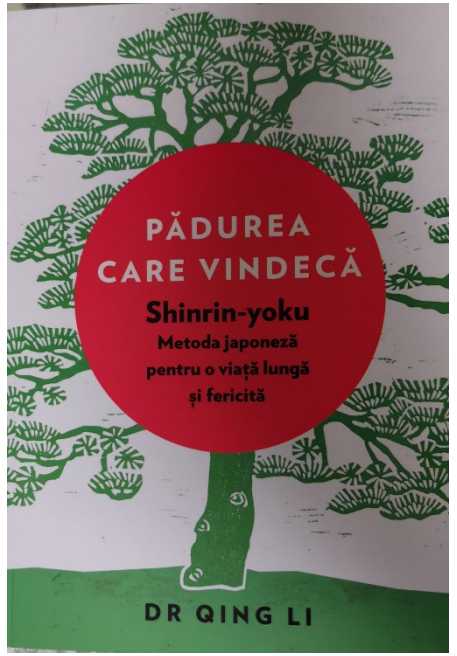

Italian edition
(April 10, 2018)



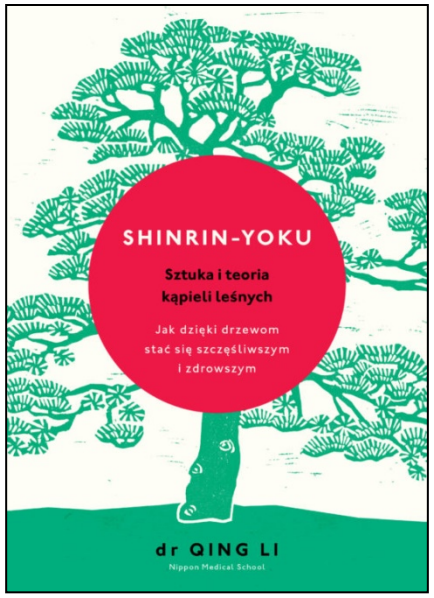

Italian paper edition




German edition
(July 24, 2018)

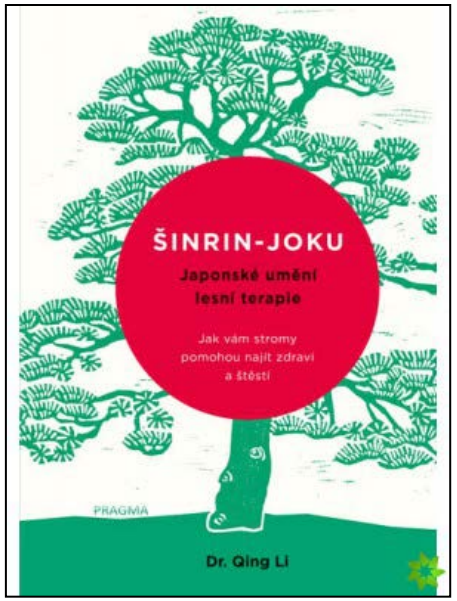



Romanian edition

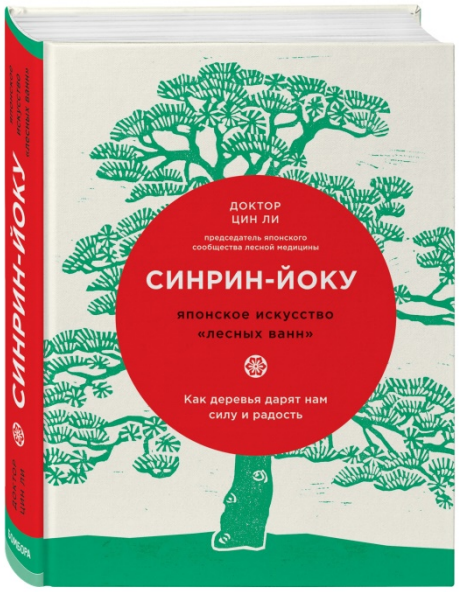



Polish edition
(April 18, 2018)

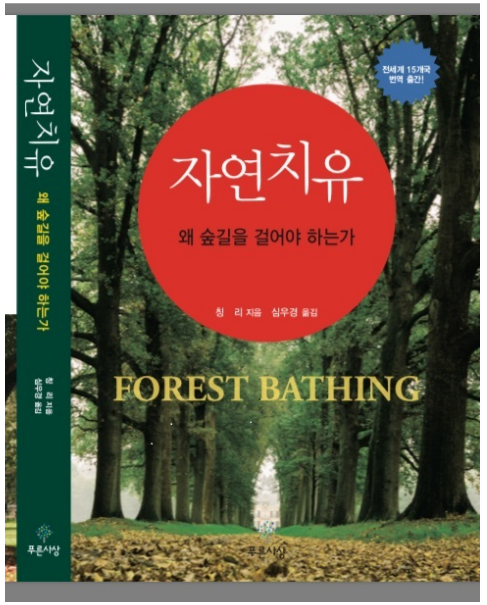

Slovak edition
(May 1, 2018)




Czech edition
(May 23, 2018)



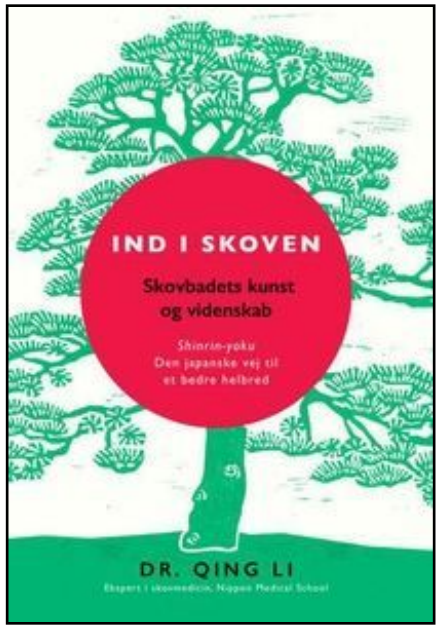

Russian edition
(October 10, 2018)



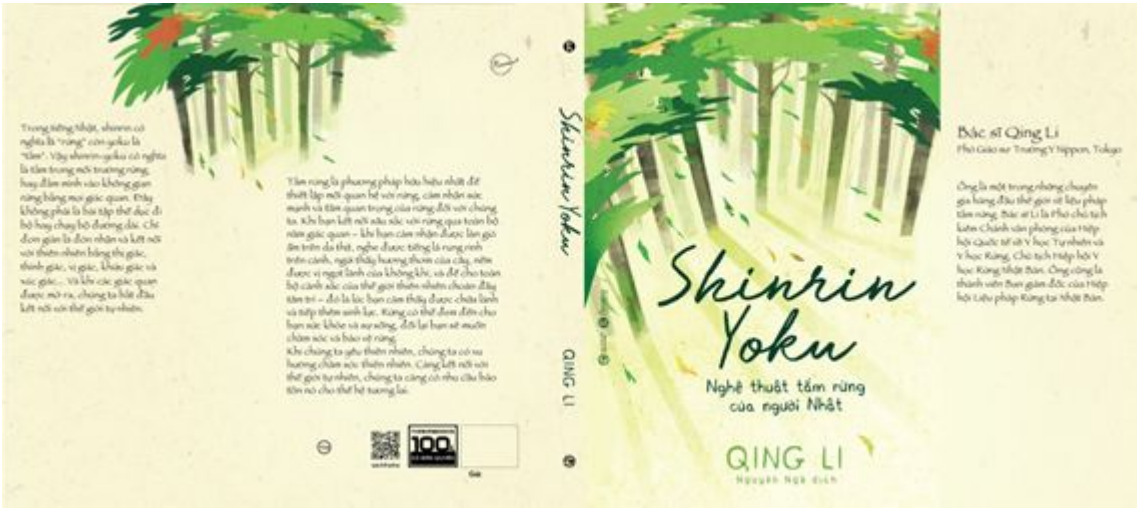

Korean edition
(March 1, 2019)


Swedish edition
(Sept 19, 2018)

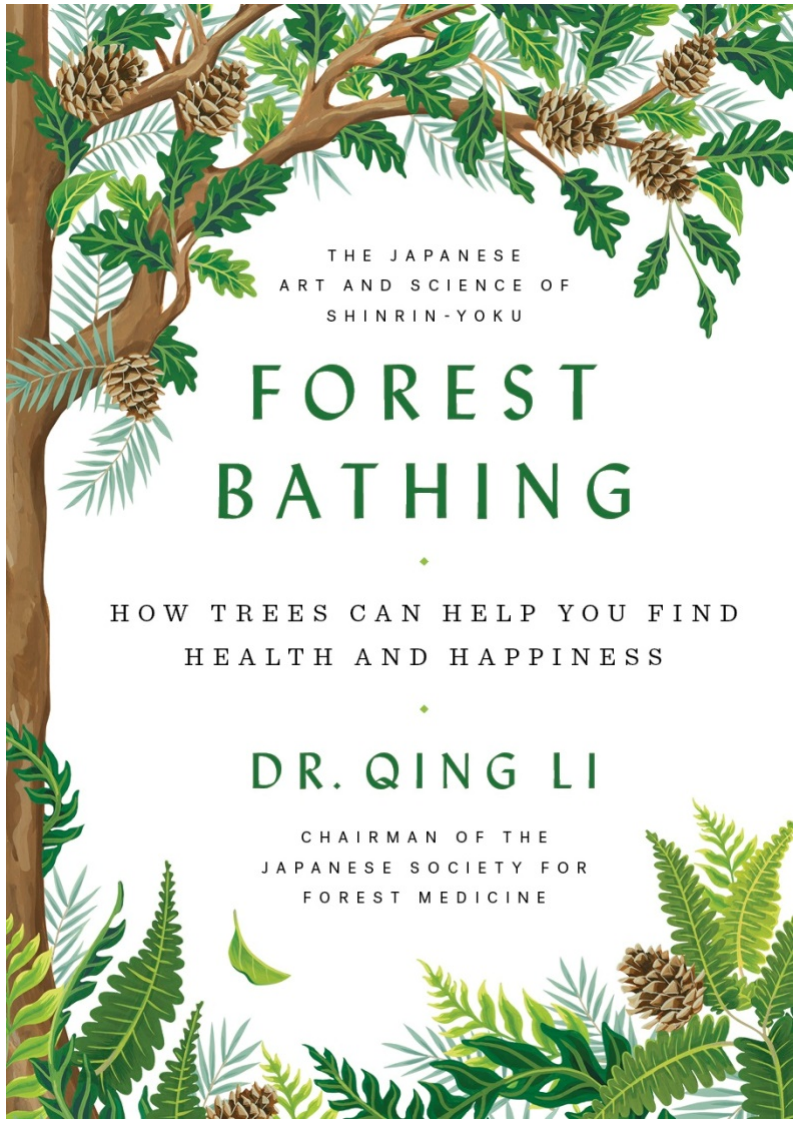

Traditional Chinese edition
(June 26, 2019)




Danish edition (May 8, 2019)




Thai edition




**Penguin Random House USA**

**2018.4.17**

# Bestseller list in USA

PNBA
PACIFIC NORTHWEST BOOKSELLERS ASSOCIATION

## Pacific Northwest Independent Bestseller List - April 29, 2018

INDIE BOUND

### Hardcover Non-Fiction

1. **A Higher Loyalty**
   James B. Comey, Flatiron, $29.99, 9781250192455
2. **Fascism: A Warning**
   Madeleine Albright, Harper, $27.99, 9780062802187
3. **Educated**
   Tara Westover, Random House, $28, 9780399590504
4. **I'll Be Gone in the Dark**
   Michelle McNamara, Harper, $27.99, 9780062319784
5. **The Subtle Art of Not Giving A F*ck**
   Mark Manson, Harper, $24.99, 9780062457714
6. **Astrophysics for People in a Hurry**
   Neil deGrasse Tyson, Norton, $18.95, 9780393609394
7. **Natural Causes**
   Barbara Ehrenreich, Twelve, $27, 9781455535910

*8. **In Praise of Difficult Women**: Life Lessons from 29 Heroines Who Dared to Break the Rules
Karen Karbo, National Geographic Society, $26, 9781426217746

*9. **Born a Crime**
Trevor Noah, Spiegel & Grau, $28, 9780399588174

*10. **BirdNote**: Chirps, Quirks, and Stories of 100 Birds from the Popular Public Radio Show
BirdNote, Emily Poole (Illus.), Sasquatch Books, $22.95, 9781632171696

*11. **Forest Bathing**: How Trees Can Help You Find Health and Happiness
Qing Li, Viking, $20, 9780525559856

12. **12 Rules for Life**
Jordan B. Peterson, Random House, $25.95, 9780345816023

*13. **The Gentle Art of Swedish Death Cleaning**
Margareta Magnusson, Scribner, $18.99, 9781501173240

*14. **So You Want to Talk about Race**
Ijeoma Oluo, Seal Press, $27, 9781580056779

*15. **Braving the Wilderness**
Brene Brown, Random House, $28, 9780812995848

Titles marked with an asterisk (*) are Northwest bestsellers that are not on the national IndieBound bestseller list.

# Why is Shinrin-Yoku so popular in the world?

## Because Shinrin-Yoku has changed

## From a Feeling to a Science

# What is forest bathing (Shinrin-yoku)?

- *Shinrin* in Japanese means ‘forest’, and *yoku* means ‘bath’. So *shinrin-yoku* means bathing in the forest atmosphere, or taking in the forest through our senses. This is not exercise, or hiking, or jogging. It is simply being in nature, connecting with it through our sense of sight, hearing, taste, smell and touch.
- Shinrin-yoku is like a **bridge**. By opening our senses, it bridges the gap between us and the natural world.

# Why do people love (like) forests?

- The forest environment has been enjoyed by humans for a long time because of
- The quiet atmosphere
- The beautiful scenery
- The mild climate
- The clean fresh air in the forest
- The special good smell

# How to enjoy forest bathing

- **People can enjoy forest bathing through five senses:**
- **Sense of sight: green color, forest landscape**
- **Sense of smell: special good smell, fragrance, phytoncides**
- **Sense of hearing: forest sounds, birds song**
- **Sense of touch: Touching trees, put your whole body in the forest atmosphere,**
- **Sense of taste: Eating  foods from forest, taste the fresh air in forest.**

# Why Shinrin-yoku?
# and the background

# **Stress** and **Shinrin-yoku**

- **Stress** can induce almost all lifestyle-related diseases, such as:
- cancers,
- hypertension,
- depression,
- cardiovascular diseases (myocardial infarction),
- stroke (cerebral haemorrhage),
- gastric ulcer,
- obesity,
- alcoholism,
- panic disorder,
- eating disorder,
- You name it.
- On the other hand, **Shinrin-yoku** can reduce **stress**.

# Why Shinrin-yoku? and the background

- Based on the above background, in Japan, a national health programme for forest-bathing was proposed by the Forest Agency of Japan in 1982 for reducing stress in workers.
- In 2004, the Forest Agency of Japan organized the project team to investigate the effect of shinrin-yoku on human health (about 1.5 million dollars).
- I was invited as a main member of the project team.
- Some people study forest, some people study medicine, I study forest medicine to find the beneficial effects of forest bathing on **Wellness**.

# My hypothesis

## Relationship between Shinrin-yoku/forest bathing and immune function

- It is well known that immune system including natural killer (NK) cells plays an important role in defense against bacteria, viruses and tumors.
- It is also well known that stress inhibits immune function.
- Forest environment (Shinrin-yoku/forest bathing) may reduce stress.
- Therefore, I speculated that forest environment (Shinrin-yoku/forest bathing) may have beneficial effect on immune function by reducing stress.

# Natural killer (NK)

**Blood**

↓

Red blood cells | **White blood cells** | platelet

↓

**Granulocytes** | **Lymphocytes** | **Macrophages**

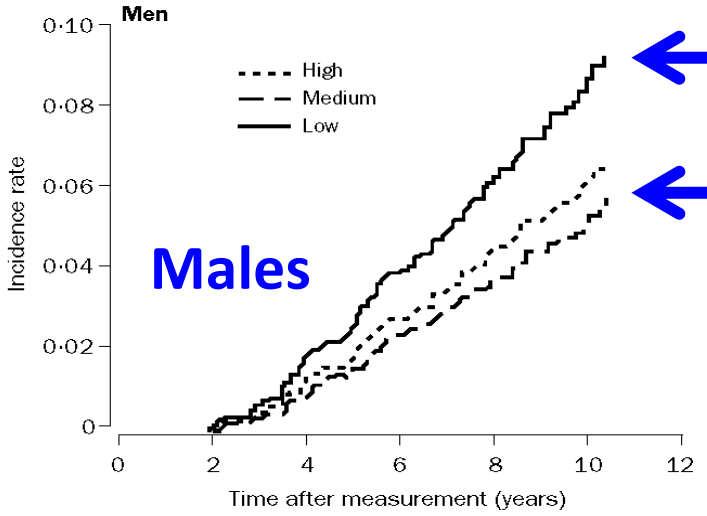
↓

T cells | **NK cells** | B cells

(Immune cells)

# Relationship between incidence rate of cancer and NK activity

Incidence rate of Cancer



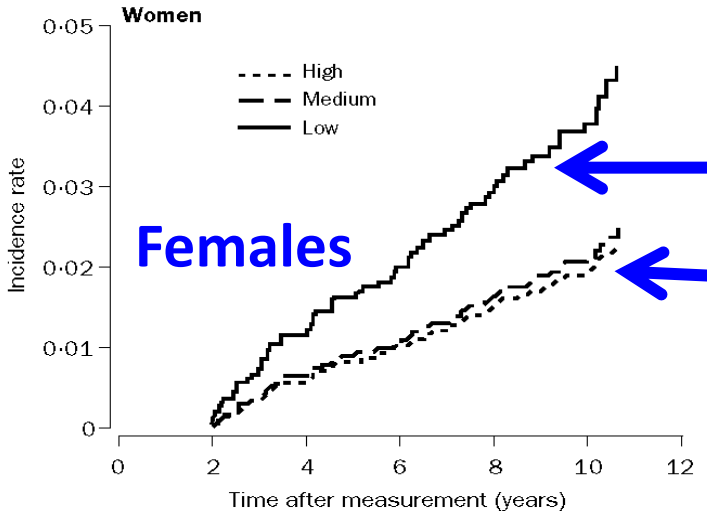

People with lower NK activity

People with higher NK activity

People with lower NK activity show higher incidence rate of cancer, whereas people with higher NK activity show lower incidence rate of cancer in both males and females.

From these findings, you can find the importance of NK cells for human health.

Incidence rate of Cancer




**Cumulative incidence rates of cancer by cytotoxic activity of peripheral-blood lymphocytes among men and women**
Categorised by tertiles. Men—low: ⩽42%; medium: 43–58%; high: >58%. Women—low: 34%; medium: 35–51%; high: >51%.

People with lower NK activity

People with higher NK activity

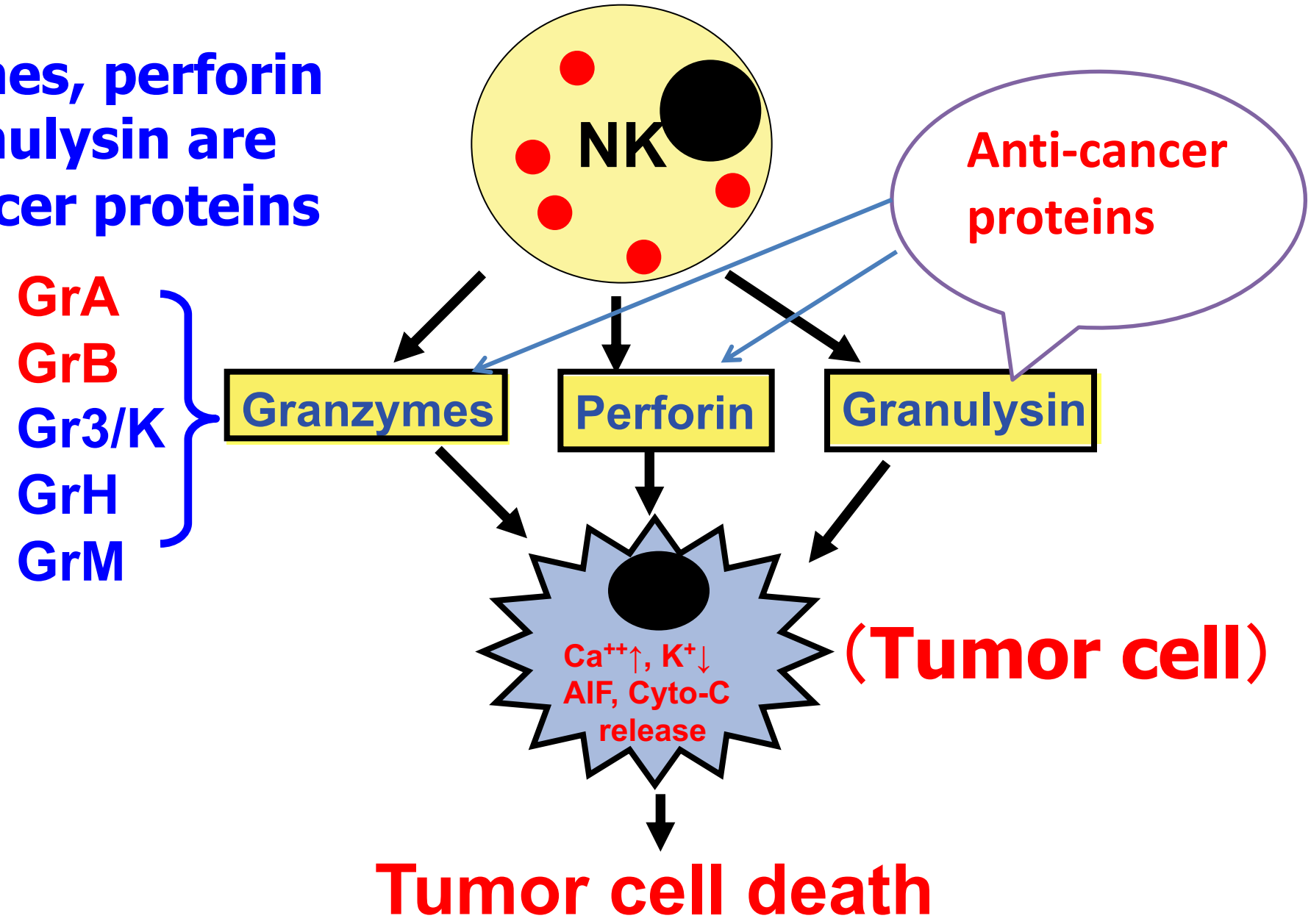
Kazue Imai, et al.
Lancet 2000; 356: 1795–99

Subjects: 3625

Periods of follow-up : 11 years

# Mechanism of NK-induced tumor cell death

**Granzymes, perforin and granulysin are anti-cancer proteins**



# Today's topics

1. Effect of Shinrin-yoku on human immune function
2. Effect of Shinrin-yoku on stress hormones
3. Effect of Shinrin-yoku on psychological responses
4. Effect of Shinrin-yoku on blood pressure and heart rate
5. What is Forest Medicine
6. The Impact of Shinrin-Yoku on Wellness
7. The future development of Forest Medicine

# Effect of Shinrin-yoku on human immune function

# Preventive effect of Shinrin-yoku on cancers

# The first **forest bathing/shinrin-yoku** study in Japan (in the world)

- In 2005, I conducted **the first forest bathing** study in **Iiyama city**, Ngano
- **Li Q**, et al. Forest bathing enhances human natural killer activity and expression of anti-cancer proteins. Int J Immunopathol Pharmacol. 2007;20(2):3-8.
- **The terms of forest bathing and Shinrin-yoku in English were first used and defined in this paper.**

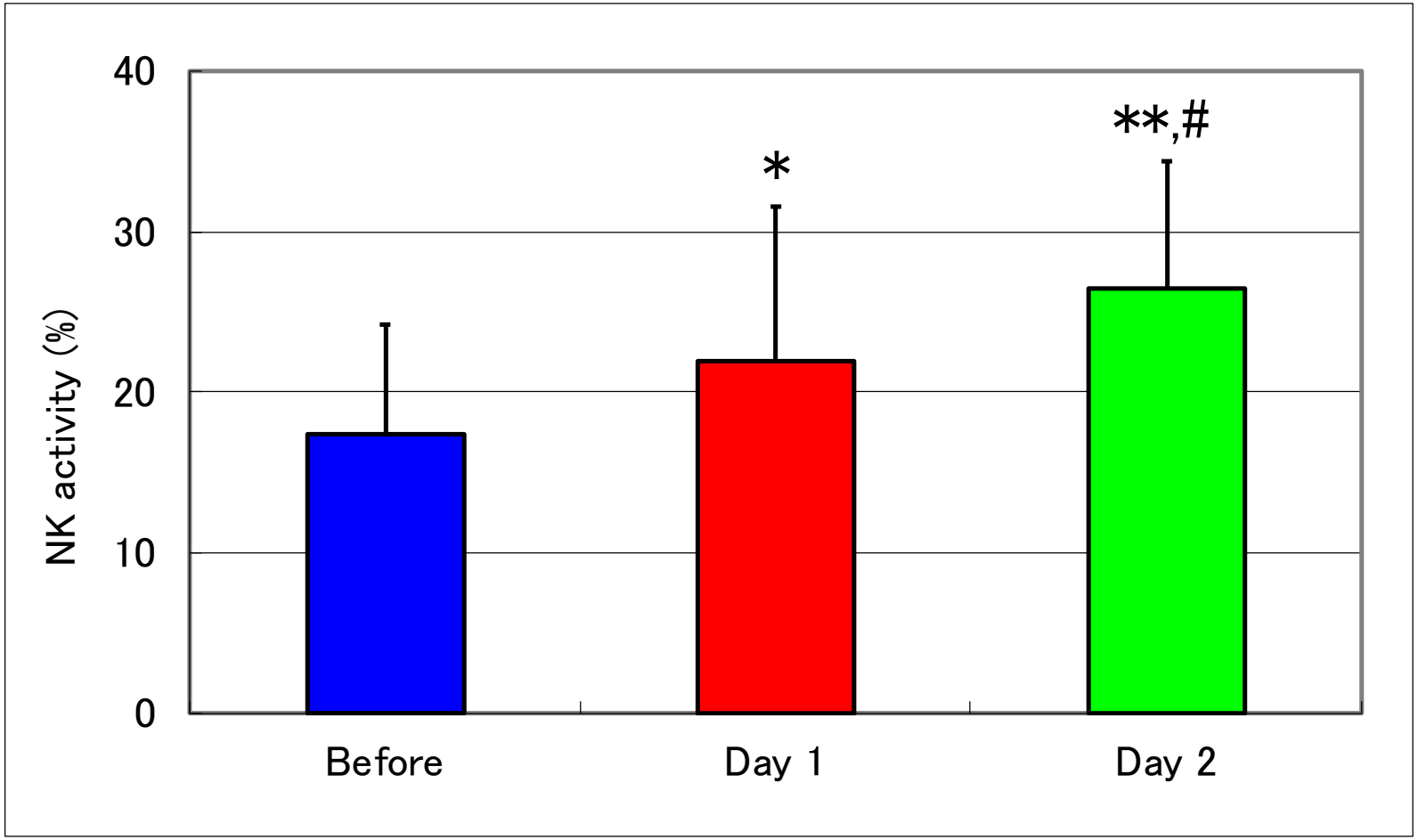
**Japanese oak, Japanese white birch, Bamboo grass**

**a short break in the forest in 2005**

# Subjects were taking a rest in the forest in 2005

# Big Japanese cedar Forest

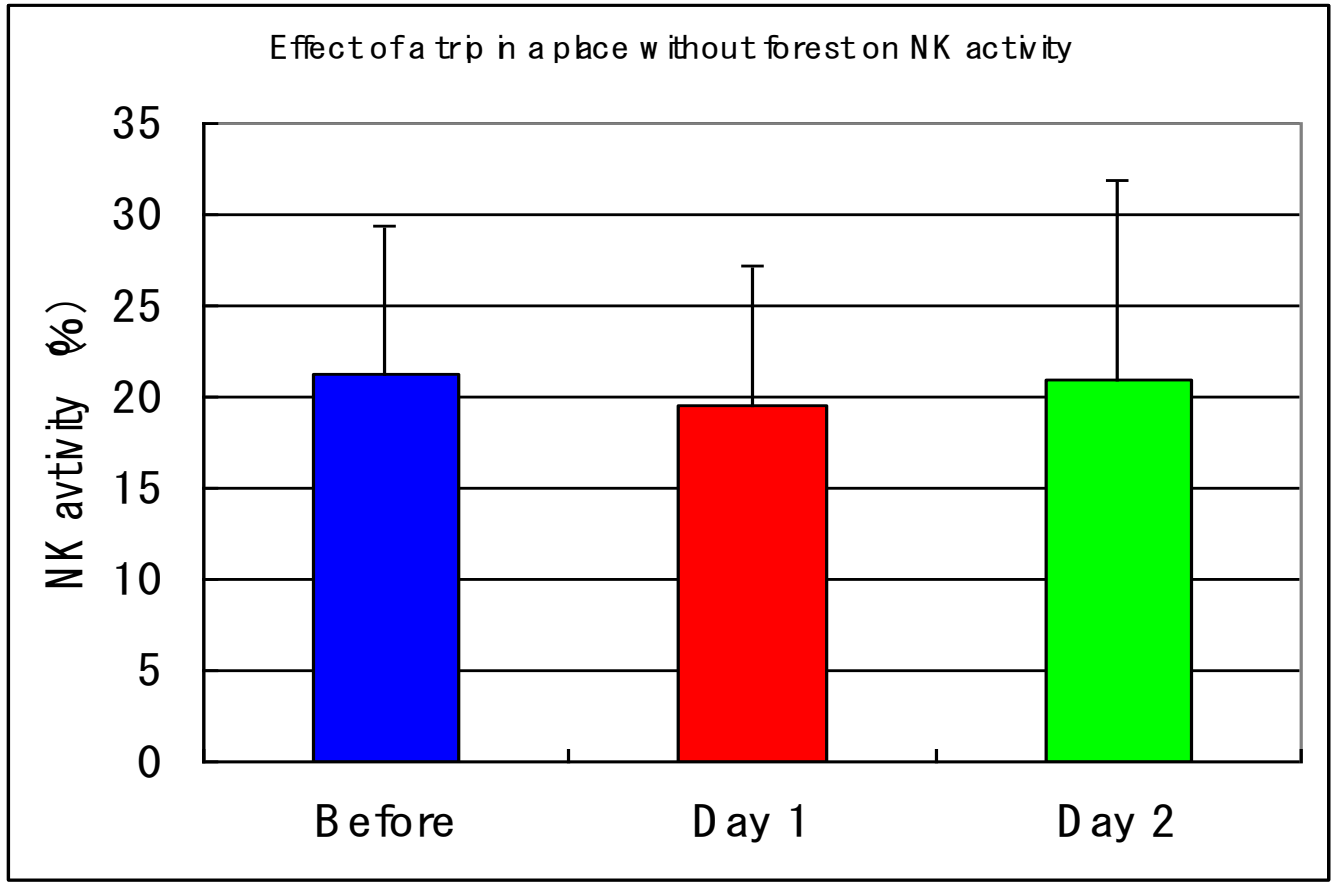
# Shinrin-yoku significantly enhances human NK activity in males




*: p<0.05, **: p<0.01, **from before the trip** #: p<0.05 **from Day 1**

Li Q. et al., Int J Immunopathol Pharmacol. 2007;20(2 Suppl 2):3-8.

# A trip to a place without forest does not enhance human NK activity in males



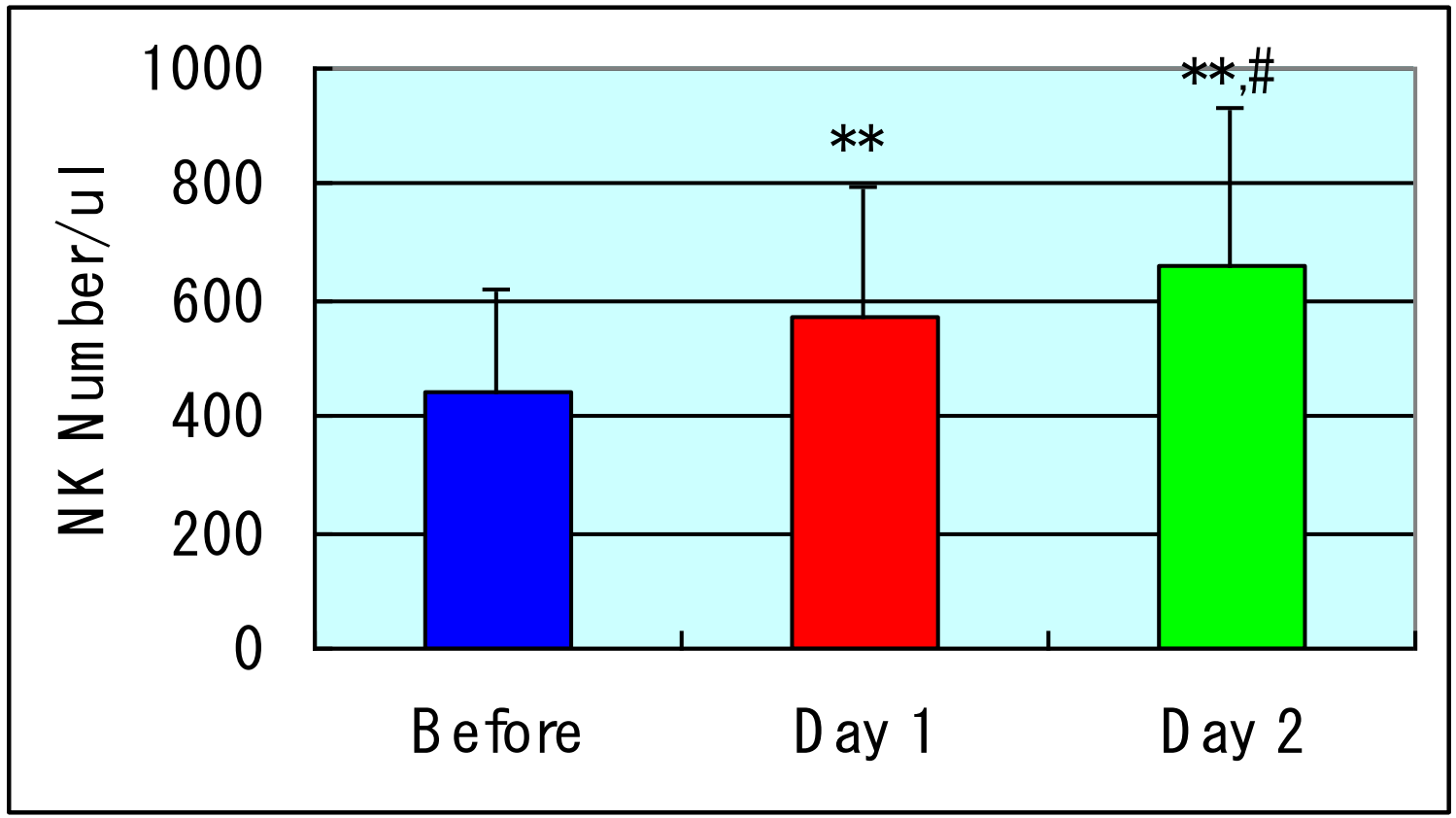

Li Q et al. Int J Immunopathol Pharmacol. 2008;21(1):117-27.

# Question

- **Q: Why do Shinrin-yoku increase human NK activity?**

- **A1: The number of NK cells increased.↑**
- **A2: The intracellular anti-cancer proteins increased.↑**

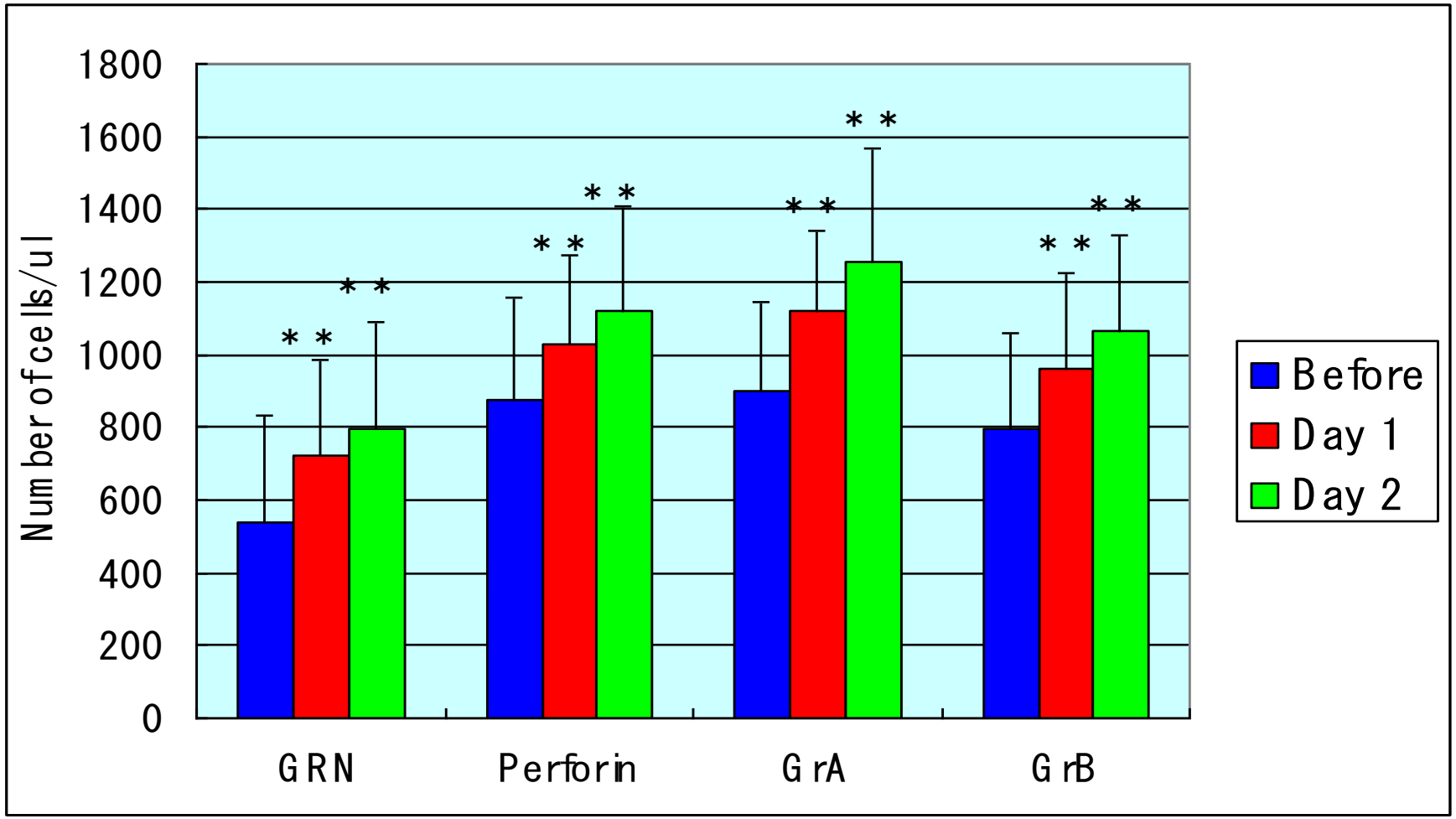
# Shinrin-yoku significantly increased the number of NK cells in males




**: p<0.01, significantly different from before the trip, #: p<0.01 significantly different from Day 1

Li Q. et al., Int J Immunopathol Pharmacol. 2007;20(2 Suppl 2):3-8.

# Shinrin-yoku significantly increased granulysin (GRN), perforin, granzyme (Gr) A/B-expressing cells




**: p<0.01, from before the trip $: p<0.01 from Day 1

Li Q. et al., Int J Immunopathol Pharmacol. 2007;20(2 Suppl 2):3-8.

# The 2nd and 3rd forest bathing/shinrin-yoku study in Japan (sustained effect of forest bathing)

- In 2006 and 2007, I conducted **the second and third forest bathing** study in **Akasawa (the birthplace of forest bathing in Japan) and Shinano tawn**, Ngano prefecture to investigate the **sustained effect of forest bathing** and the results were published as follows:
- **Li Q**, et al. Visiting a forest, but not a city, increases human natural killer activity and expression of anti-cancer proteins.
- Int J Immunopathol Pharmacol. 2008;21(1):117-27.
- **Li Q**, et al. A forest bathing trip increases human natural killer activity and expression of anti-cancer proteins in female subjects.
- J Biol Regul Homeost Agents. 2008;22(1):45-55.

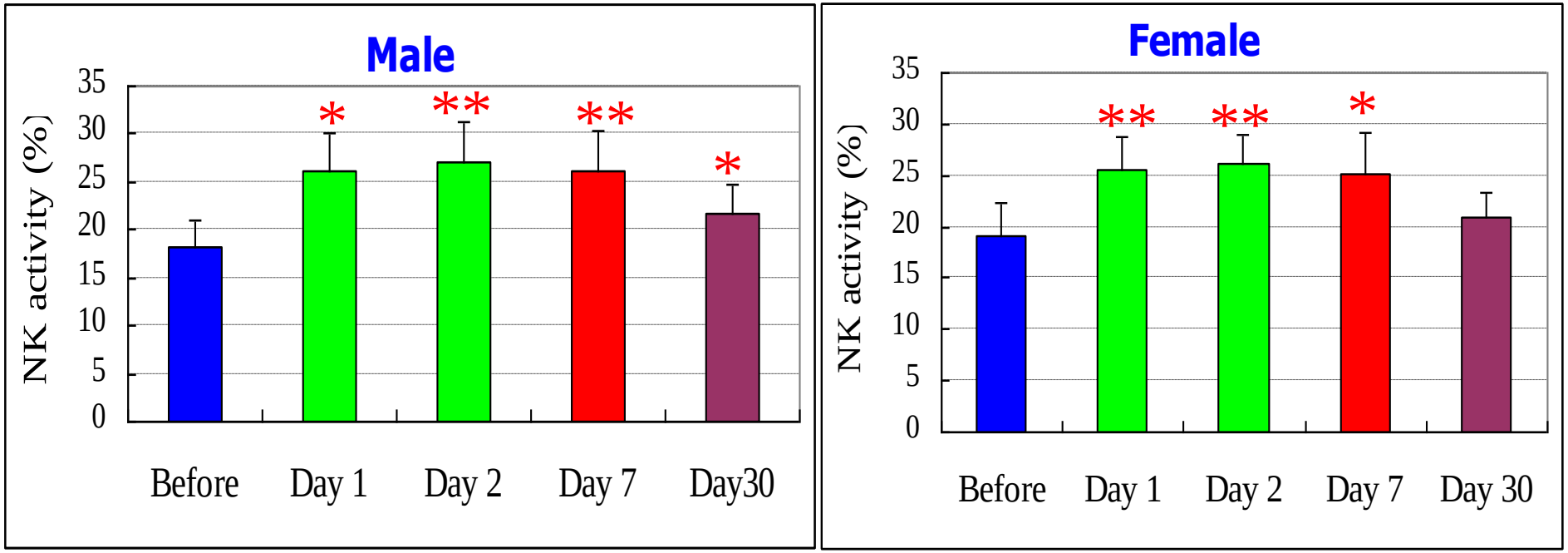
# Japanese cypress (the birthplace of forest bathing in Japan)

# The birthplace of forest bathing in Japan


Learning breathing method


Female subjects enjoy the Forest Therapy

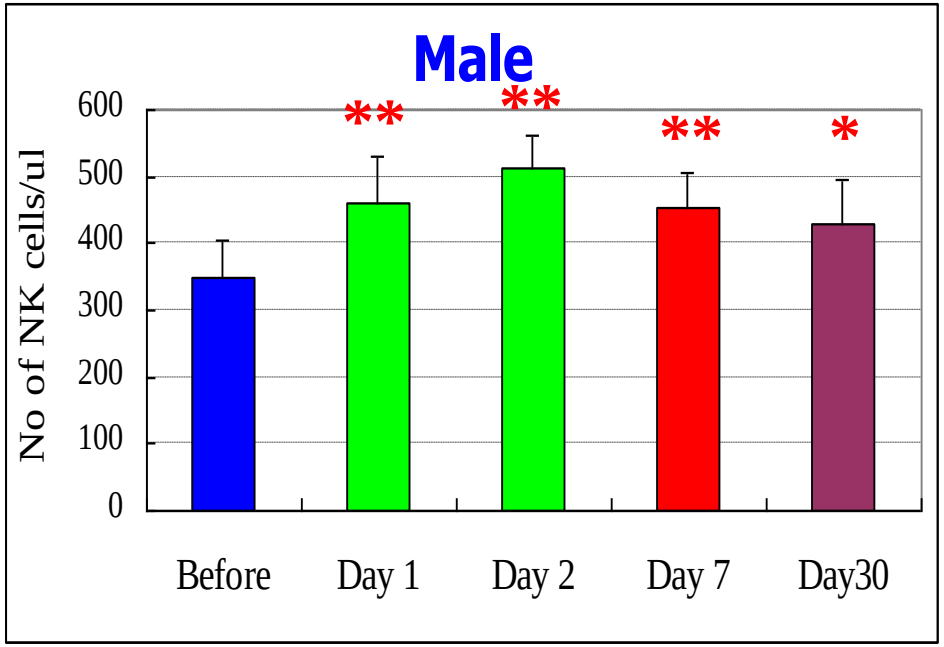
# Shinrin-yoku increased NK activity and this effect lasted for 30 days in both males and females

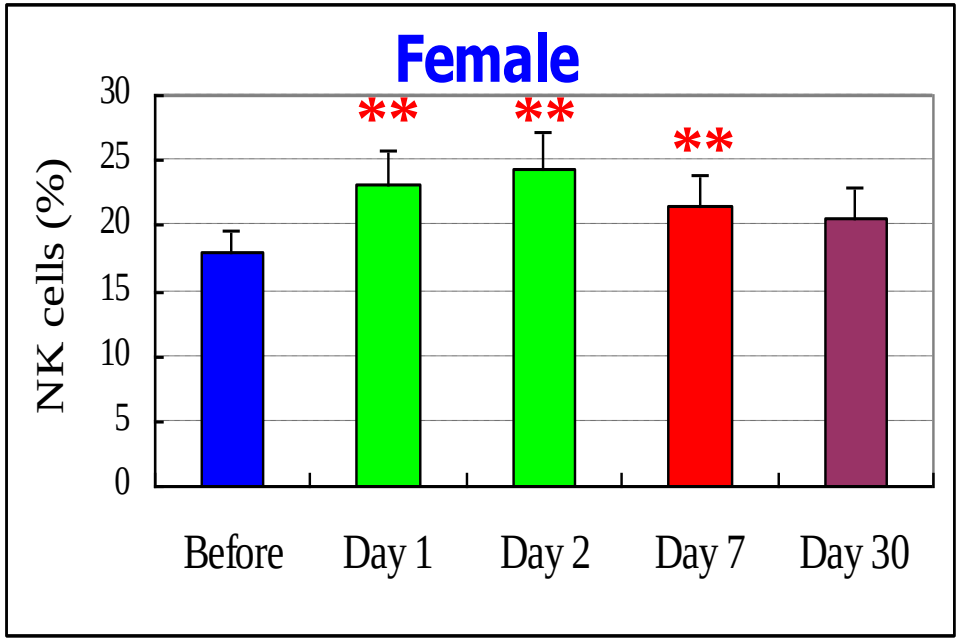



*: p<0.05, **: p<0.01, from before the trip

Li Q et al. Int J Immunopathol Pharmacol. 2008;21(1):117-27.
Li Q. et al. J Biol Regul Homeost Agents 2008;22(1):45-55.

# Shinrin-yoku increased the number of NK cells and this effect lasted for 30 days in both males and females

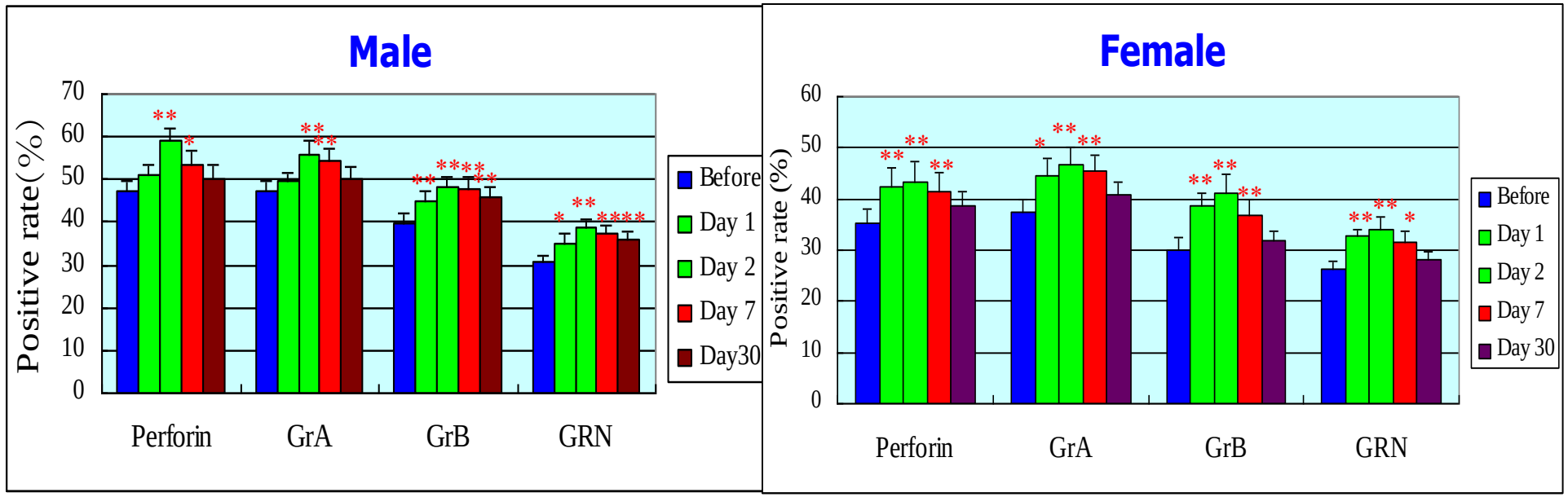



*: p<0.05, **: p<0.01, from before the trip

Li Q et al. Int J Immunopathol Pharmacol. 2008;21(1):117-27.
Li Q. et al. J Biol Regul Homeost Agents 2008;22(1):45-55.

# Shinrin-yoku increased intracellular anti-cancer proteins and this effect lasted for 30 days in both males and females



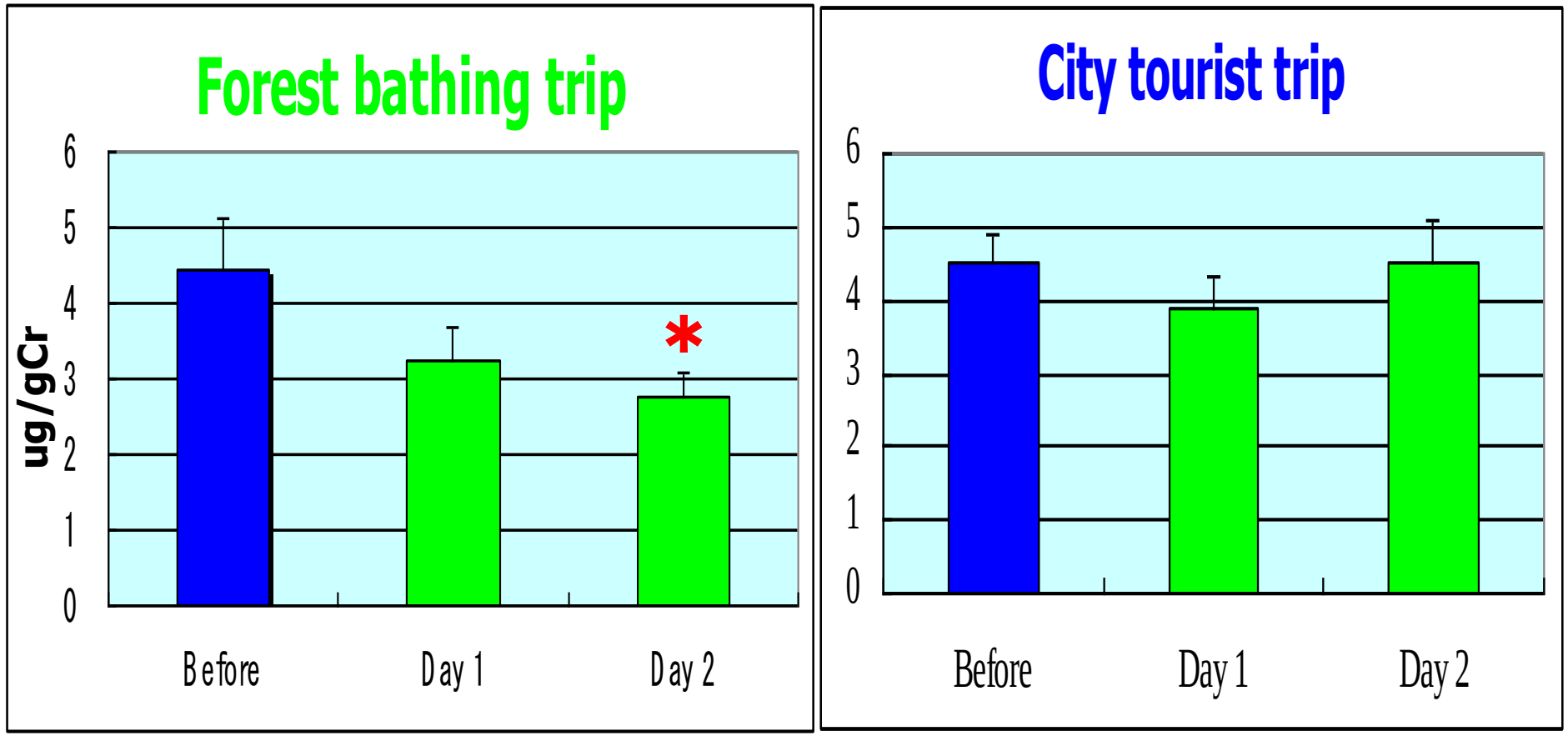

*: p<0.05, **: p<0.01, from before the trip

Li Q et al. Int J Immunopathol Pharmacol. 2008;21(1):117-27.
Li Q. et al. J Biol Regul Homeost Agents 2008;22(1):45-55.

# Effect of Shinrin-yoku on stress hormones

# Shinrin-yoku reduced urinary adrenaline, whereas a city tourist trip did not affect this

## Adrenaline is a stress hormone.

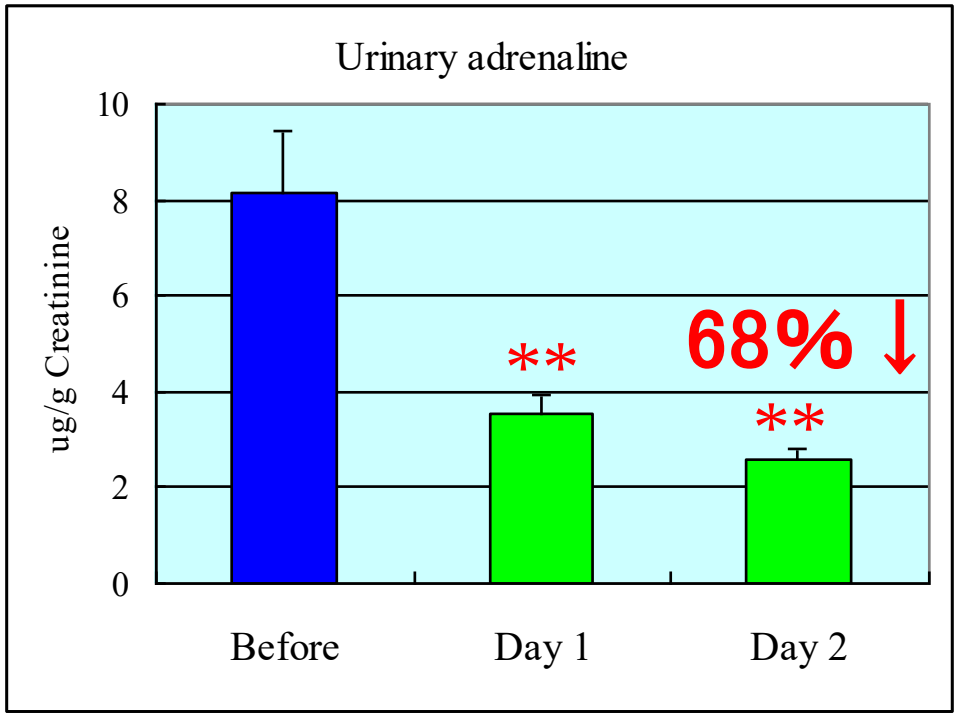


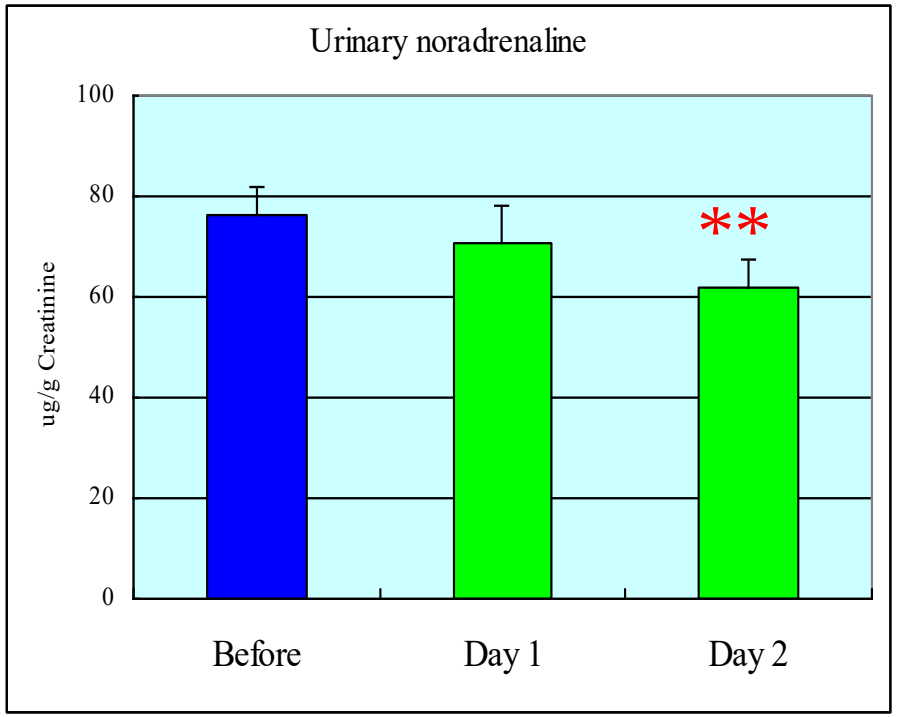

*: $p<0.05$ from Before

Li Q et al. Int J Immunopathol Pharmacol. 2008;21(1):117-27.

# Shinrin-yoku reduced urinary adrenaline and noradrenaline in females

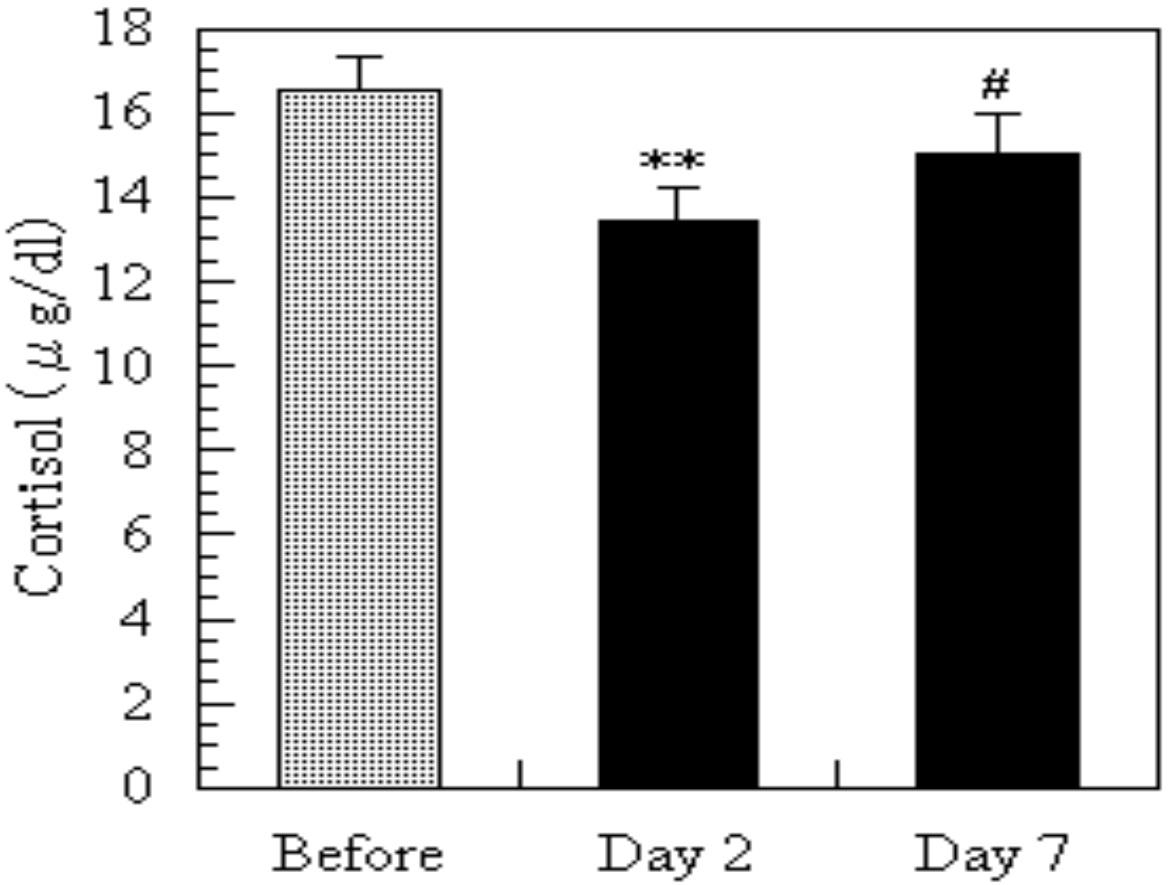
**Adrenaline and noradrenaline are stress hormones.**




**:p<0.01 Li Q. et al., J Biol Regul Homeost Agents 2008;22(1):45-55.

# Shinrin-yoku reduced cortisol in serum in males



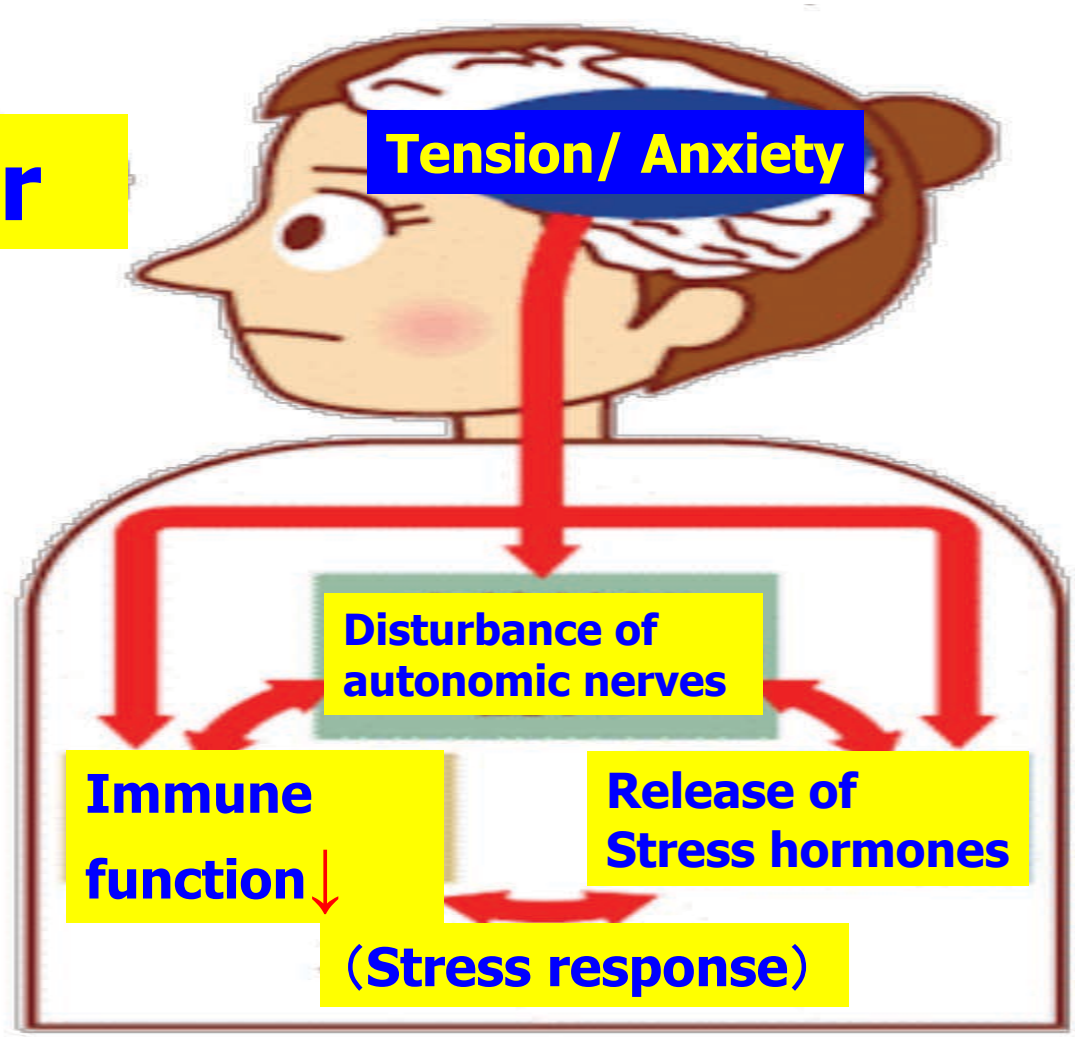

**Cortisol is another stress hormone**

N=16, mean ± SE.
**: p<0.01, #: p=0.053

**Li Q**, et al. A day trip to a forest park increases human natural killer activity and the expression of anti-cancer proteins in male subjects.
J Biol Regul Homeost Agents. 2010 Apr-Jun;24(2):157-65.

# Stress and immune response

**Stressor**




Shinrin-yoku

↓

Reducing stress

↓

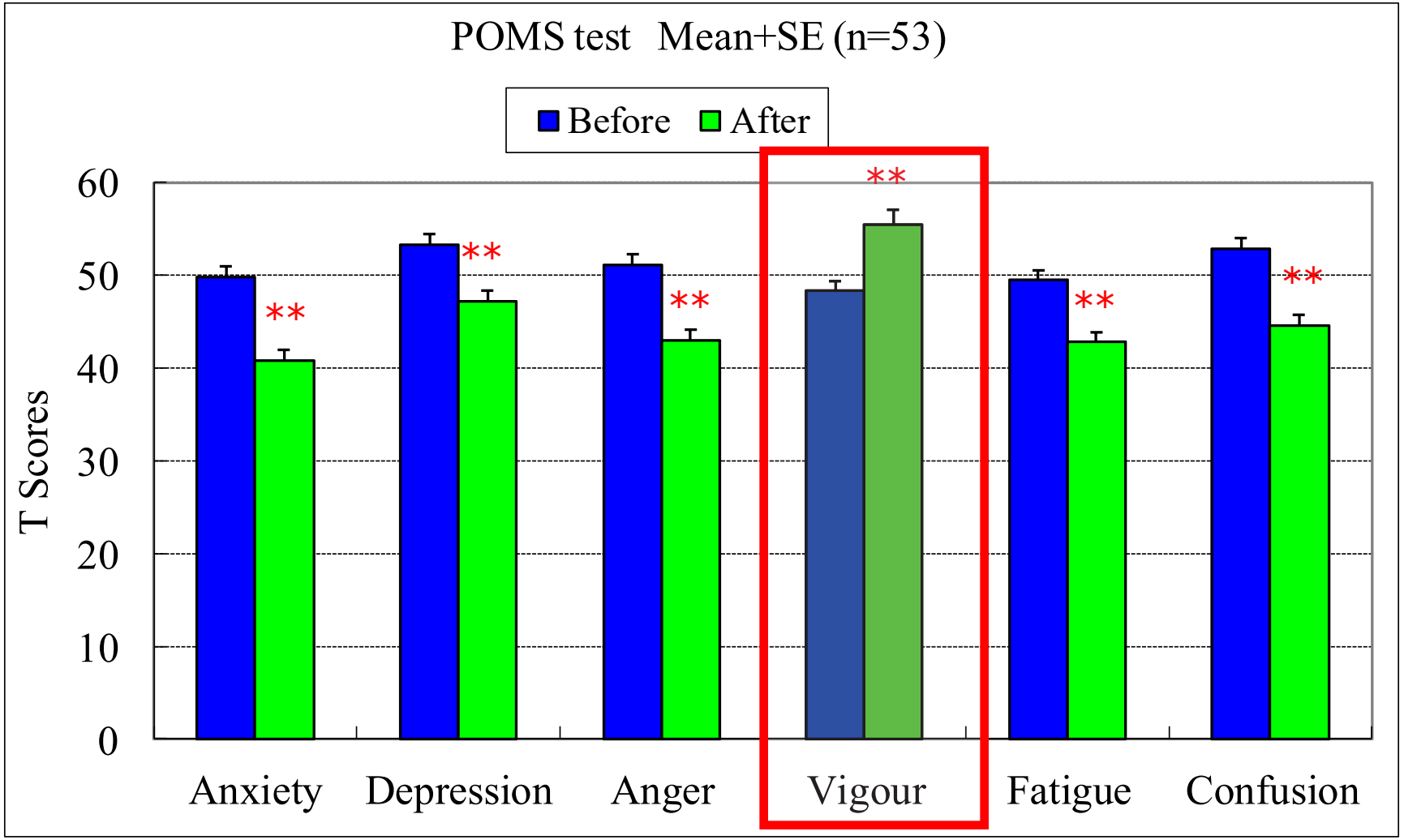
Recover in NK activity

↓

NK activity increased

# Effect of Shinrin-yoku on psychological responses

# Shinrin-yoku reduces the scores of anxiety, depression, anger, fatigue and confusion, whereas increase the score of vigor




**: p<0.01 significantly different from before

Li Q. Forest Medicine, 2012

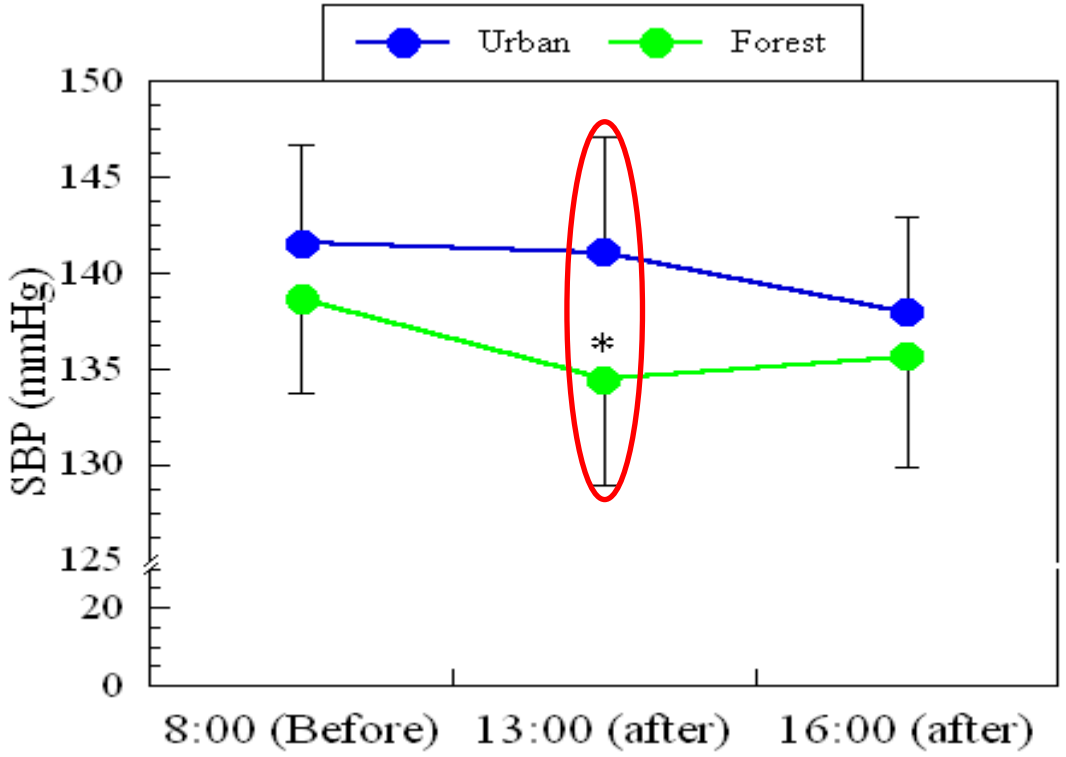
# Effect of Shinrin-yoku on blood pressure and heart rate

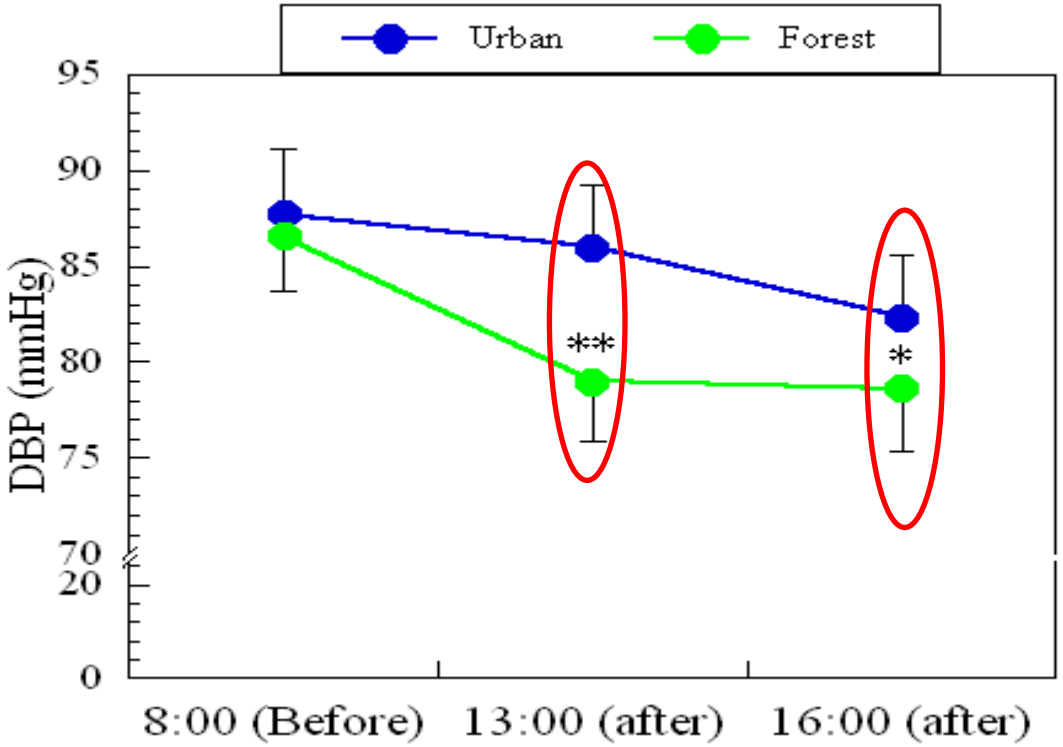
# Forest bathing experiment


Control experiment (urban tour)

# Shinrin-yoku significantly reduces blood pressure compered with city walking

# Blood pressure was decreased about 7-8mmHg by forest bathing



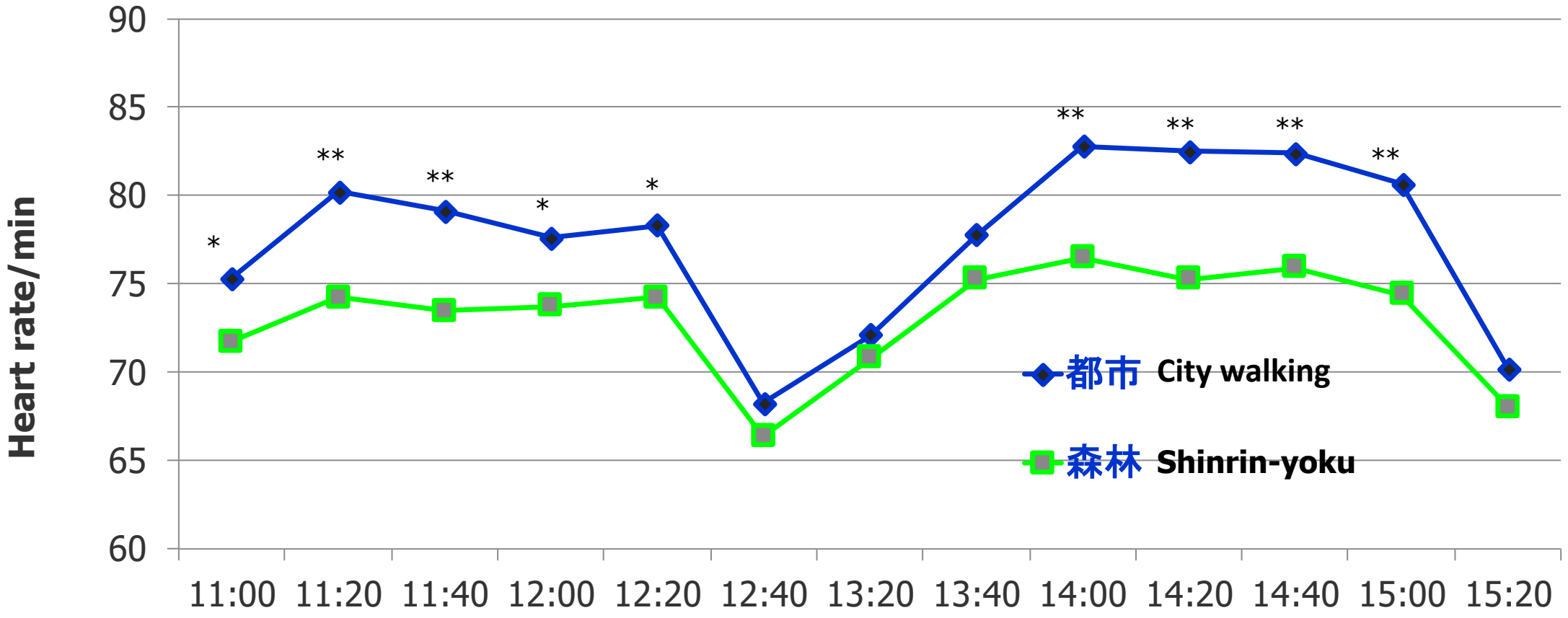

SBP: Systolic blood pressure,
DBP: Diastolic blood pressure

*: $p<0.05$, **: $p<0.01$ forest vs city (n=16)

Li et al: Eur J Appl Physiol. 2011;111(11):2845-53.

# Shinrin-yoku reduced heart rate

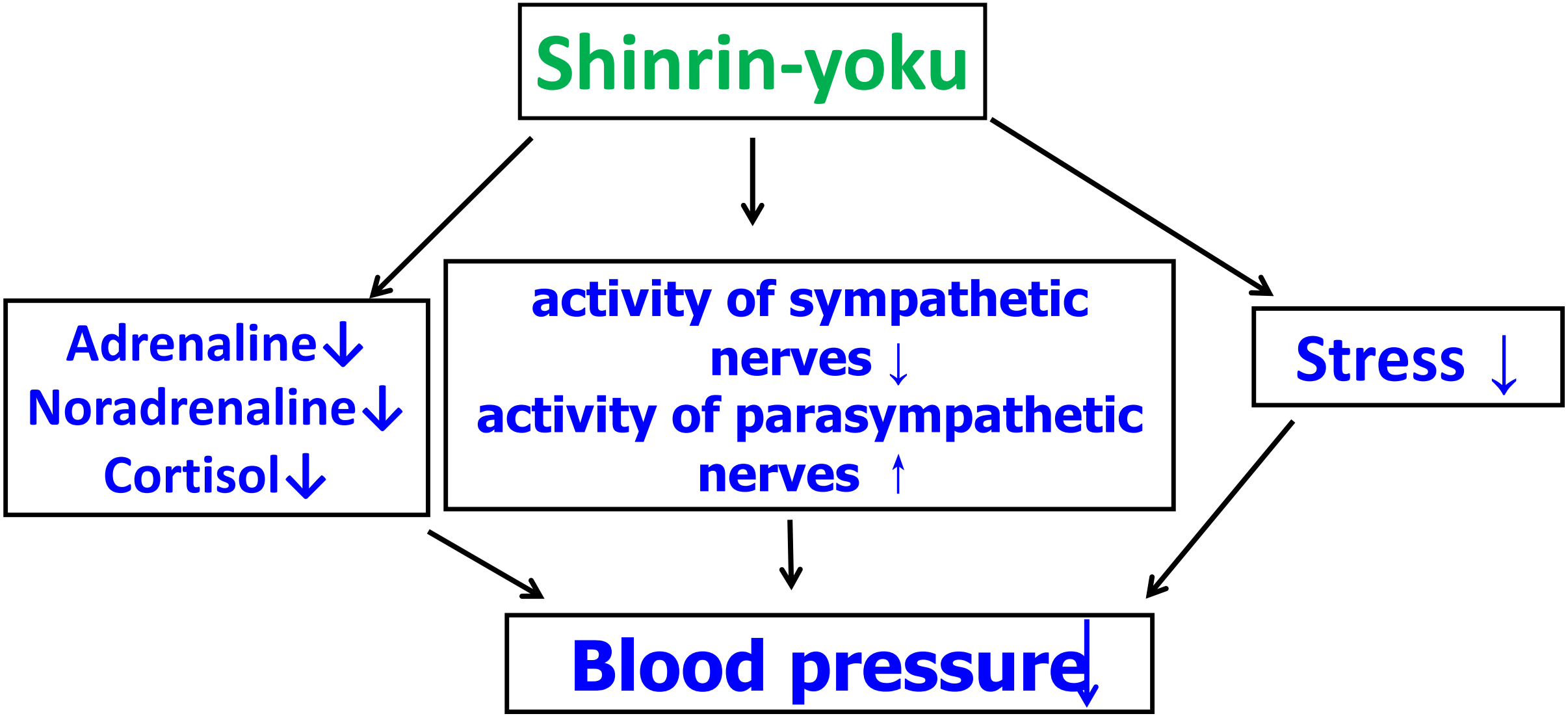
Heart rate is a basic index of activity of the autonomic nervous system, the decrease in heart rate indicates a state of relaxation with a higher activity of parasympathetic nerve and lower activity of sympathetic nerve




*: p<0.05, **: p<0.01 vs shinrin-yoku (n=19)


**Li Q, et al. Effects of Forest Bathing on Cardiovascular and Metabolic Parameters in Middle-Aged Males. Evid Based Complement Alternat Med. 2016;2016:2587381.**

# Mechanism of Shinrin-yoku on blood pressure



# New science
# Forest Medicine

# On July 5, 2010, The New York Times reported our studies and cited 4 papers

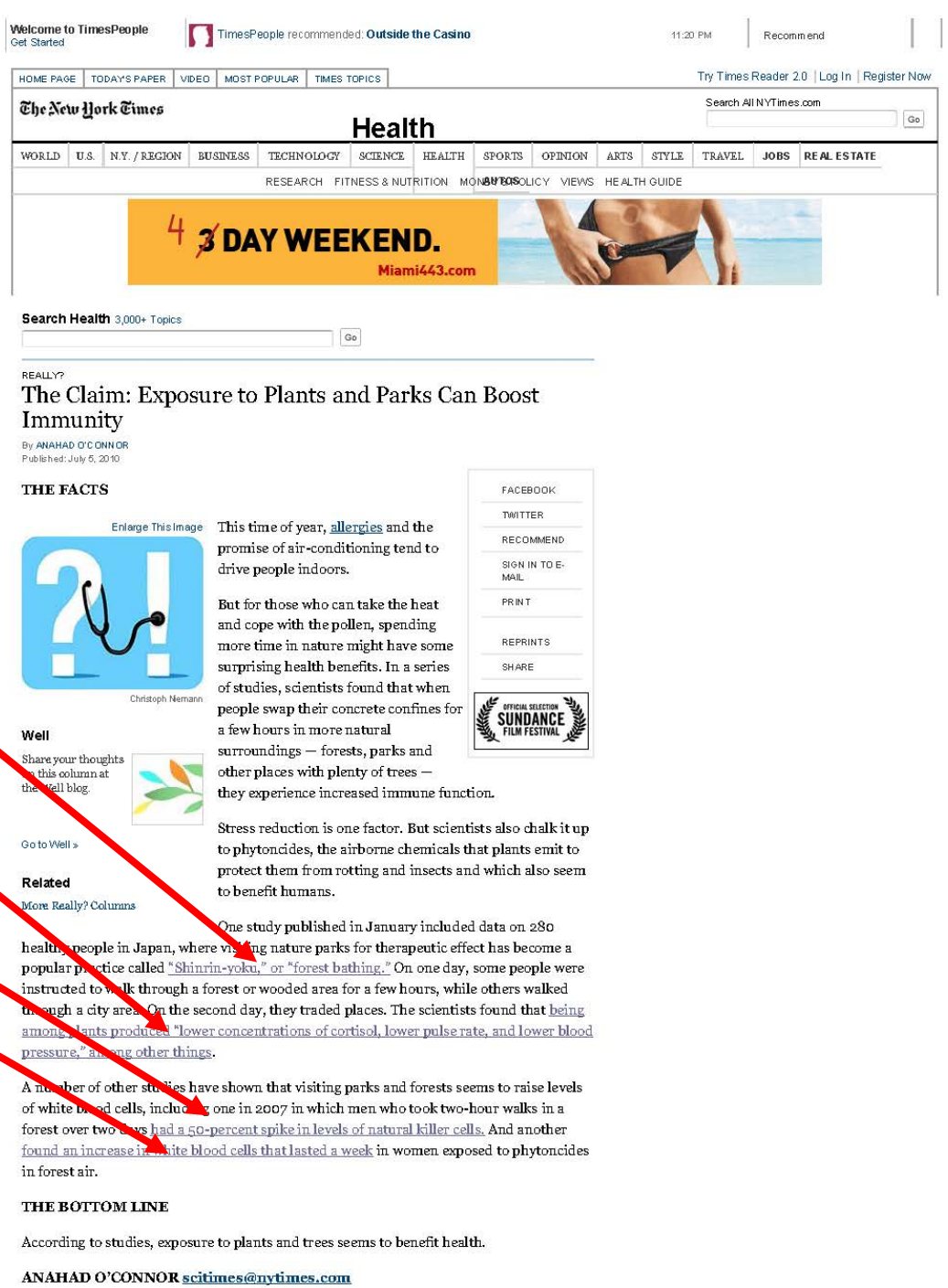
**Environ Health Prev Med. 2010;15:27-37.**

**Environ Health Prev Med. 2010;15:18-26.**

**Int J Immunopathol Pharmacol. 2007;20:3-8.**

**J Biol Regul Homeost Agents. 2008;22:45-55.**

**After this report, a publisher in NY invited me to write a book: Forest Medicine and the book was published in 2012**



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REALLY?

## The Claim: Exposure to Plants and Parks Can Boost Immunity

By ANAHAD O'CONNOR
Published: July 5, 2010

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**THE FACTS**

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Christoph Niemann

This time of year, allergies and the promise of air-conditioning tend to drive people indoors.

But for those who can take the heat and cope with the pollen, spending more time in nature might have some surprising health benefits. In a series of studies, scientists found that when people swap their concrete confines for a few hours in more natural surroundings — forests, parks and other places with plenty of trees — they experience increased immune function.

Stress reduction is one factor. But scientists also chalk it up to phytoncides, the airborne chemicals that plants emit to protect them from rotting and insects and which also seem to benefit humans.

One study published in January included data on 280 healthy people in Japan, where visiting nature parks for therapeutic effect has become a popular practice called "Shinrin-yoku," or "forest bathing." On one day, some people were instructed to walk through a forest or wooded area for a few hours, while others walked through a city area. On the second day, they traded places. The scientists found that being among plants produced "lower concentrations of cortisol, lower pulse rate, and lower blood pressure," among other things.

A number of other studies have shown that visiting parks and forests seems to raise levels of white blood cells, including one in 2007 in which men who took two-hour walks in a forest over two days had a 50-percent spike in levels of natural killer cells. And another found an increase in white blood cells that lasted a week in women exposed to phytoncides in forest air.

**THE BOTTOM LINE**

According to studies, exposure to plants and trees seems to benefit health.

**ANAHAD O'CONNOR** scitimes@nytimes.com

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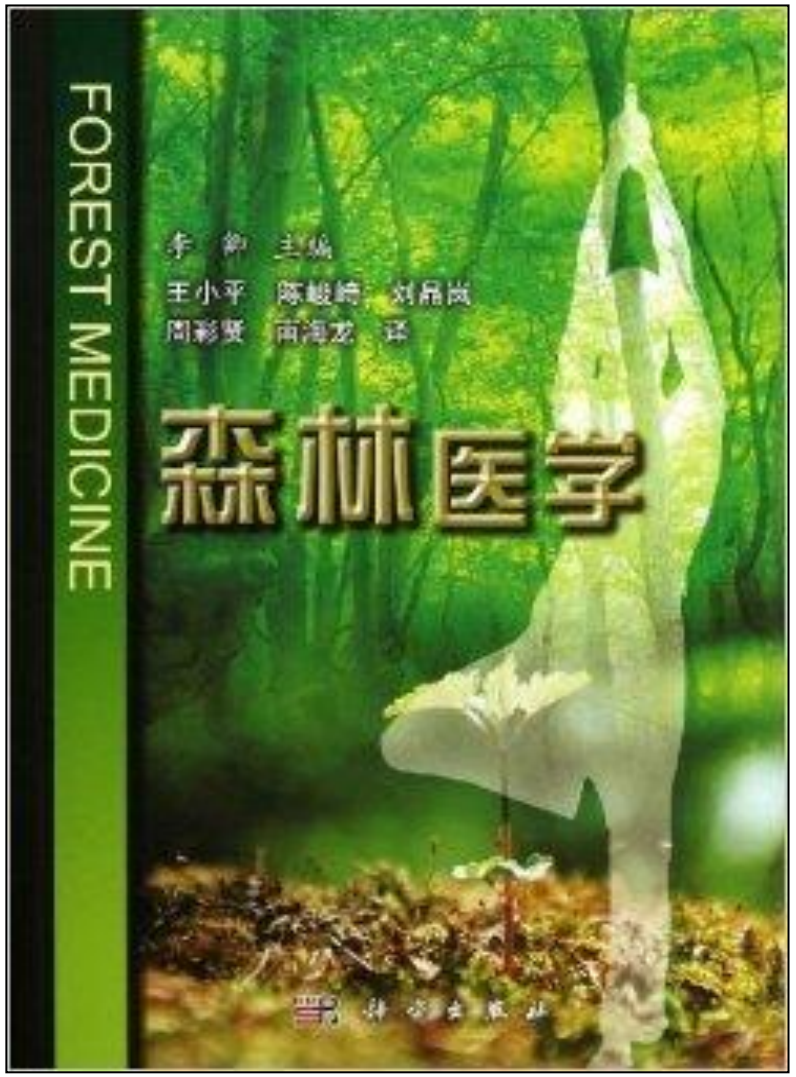
# What is Forest Medicine

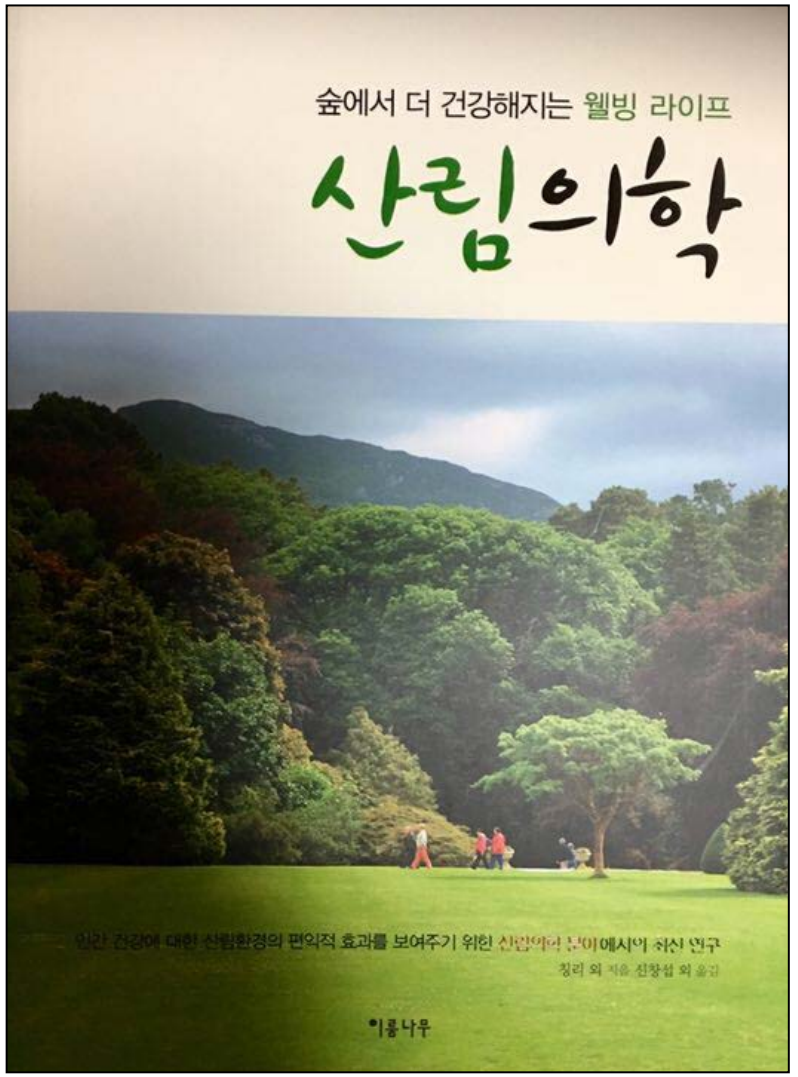
- Since 2004, we have conducted many studies to investigate the effect of forest bathing on human health.
- We have established a new science, **Forest Medicine** and **published the book: Forest Medicine in 2012**.
- Imagine a new medical science that could let you know how to be more active, more relaxed and healthier with reduced stress and reduced risk of lifestyle-related disease and cancer by visiting forests. This new medical science is called **Forest medicine**.
- **Forest Medicine** is a new, interdisciplinary science, belonging to the categories of environmental medicine and preventive medicine, which studies the effects of forest environments on human **wellness**.

# Forest Medicine (Editor: Dr. Qing Li)


English edition(2012 in USA)




Chinese translation edition (2013)




Korean translation edition(2017)

# The Impact of Shinrin-Yoku on Wellness

- Increase the activity of natural killer cells—immune cells that play an important role in defense against bacteria, viruses, and tumors;

→ **has a potential preventive effect on cancers**

- Reduce blood pressure and heart rate;

→ **has a potential preventive effect on hypertension, cardiovascular diseases**

- Reduce stress and stress hormones;

→ **has a effect on stress management**

- Increase the activity of the parasympathetic nervous system (part of rest and recover) and reduce the activity of the sympathetic nervous system (part of fight or flight), producing psychologically calming effects;

→ **has a potential preventive effect on depression and mental disorders**

# The Impact of Shinrin-Yoku on Wellness

◆Reduce symptoms of anxiety, depression, anger, fatigue, and confusion;

**→ has a potential preventive effect on depression**

◆Improve sleep;

**→ has a potential preventive effect on sleep disorder**

◆Increase energy;

**→ keeps health status**

◆**Potential preventive effects on lifestyle related diseases by reducing stress.**

# The future development of Forest Medicine

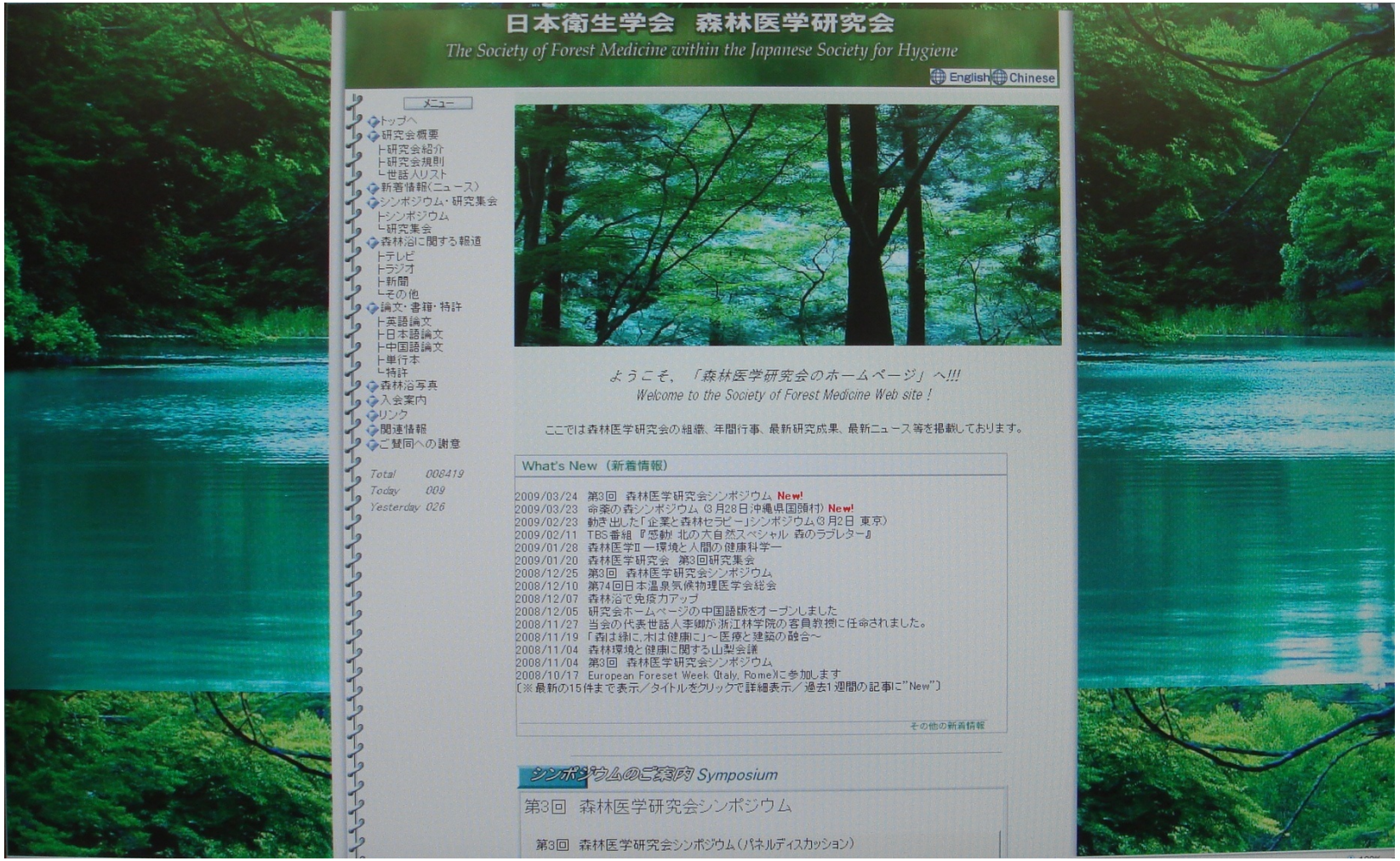
Based on the above background, I would like to propose the future development of **Forest Medicine**.

1. To expand the philosophy of **Forest Medicine** into global wellness field in the world.
2. To verify the preventive effects of **Forest Medicine** on lifestyle-related diseases in the world.
3. To establish an international certification system for **Forest Medicine specialist** and **Forest Therapist**.
4. To establish the Shinrin-yoku/Forest bathing as a treatment for some lifestyle-related diseases.
5. To apply the Shinrin-yoku/Forest bathing into rehabilitation medicine.

# The Society of Forest Medicine established in 2007

## http://forest-medicine.com (in Japanese, English, Chinese)

## President: Dr. Qing Li

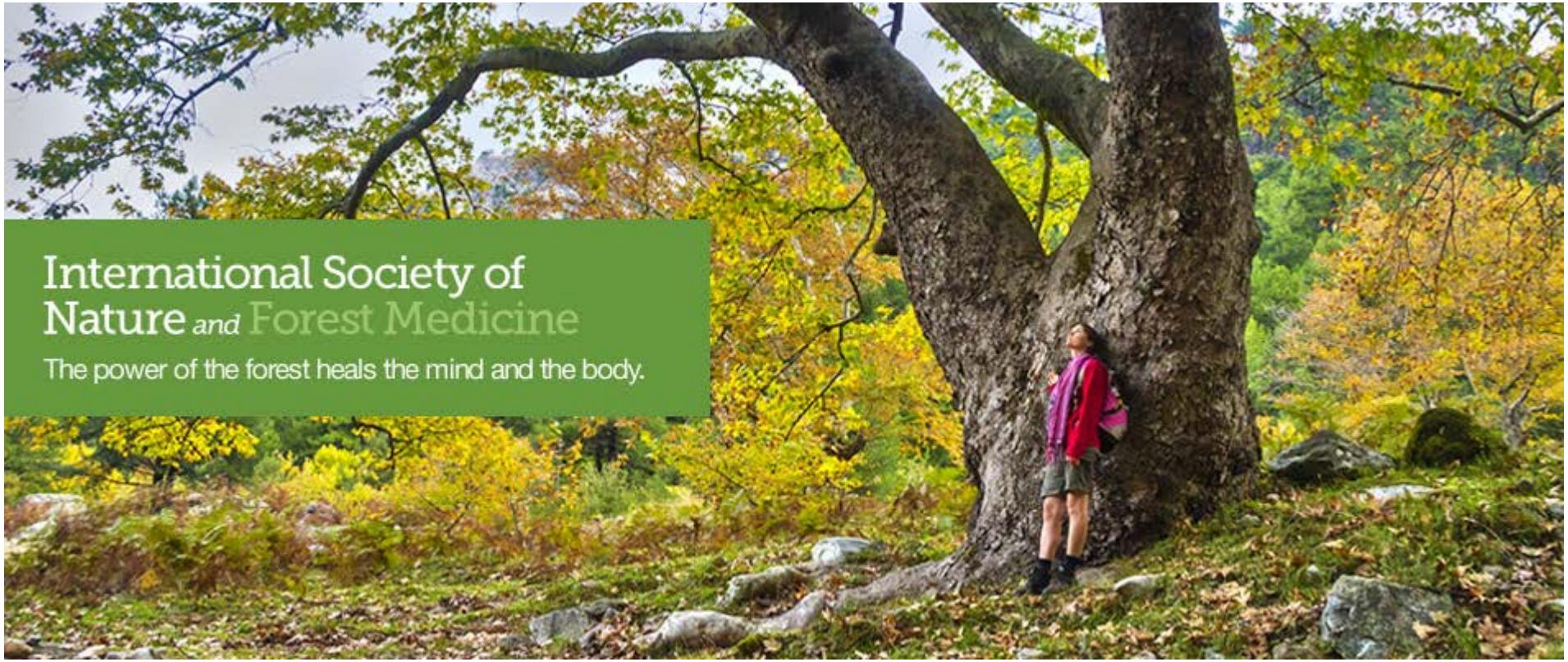


# International Society of Nature and Forest Medicine (INFOM) established in 2011

## http://infom.org

## President: Dr. Michiko Imai

## Vice-President & Secretary-General: Dr. Qing Li



# 全国63の森（63 Forests）

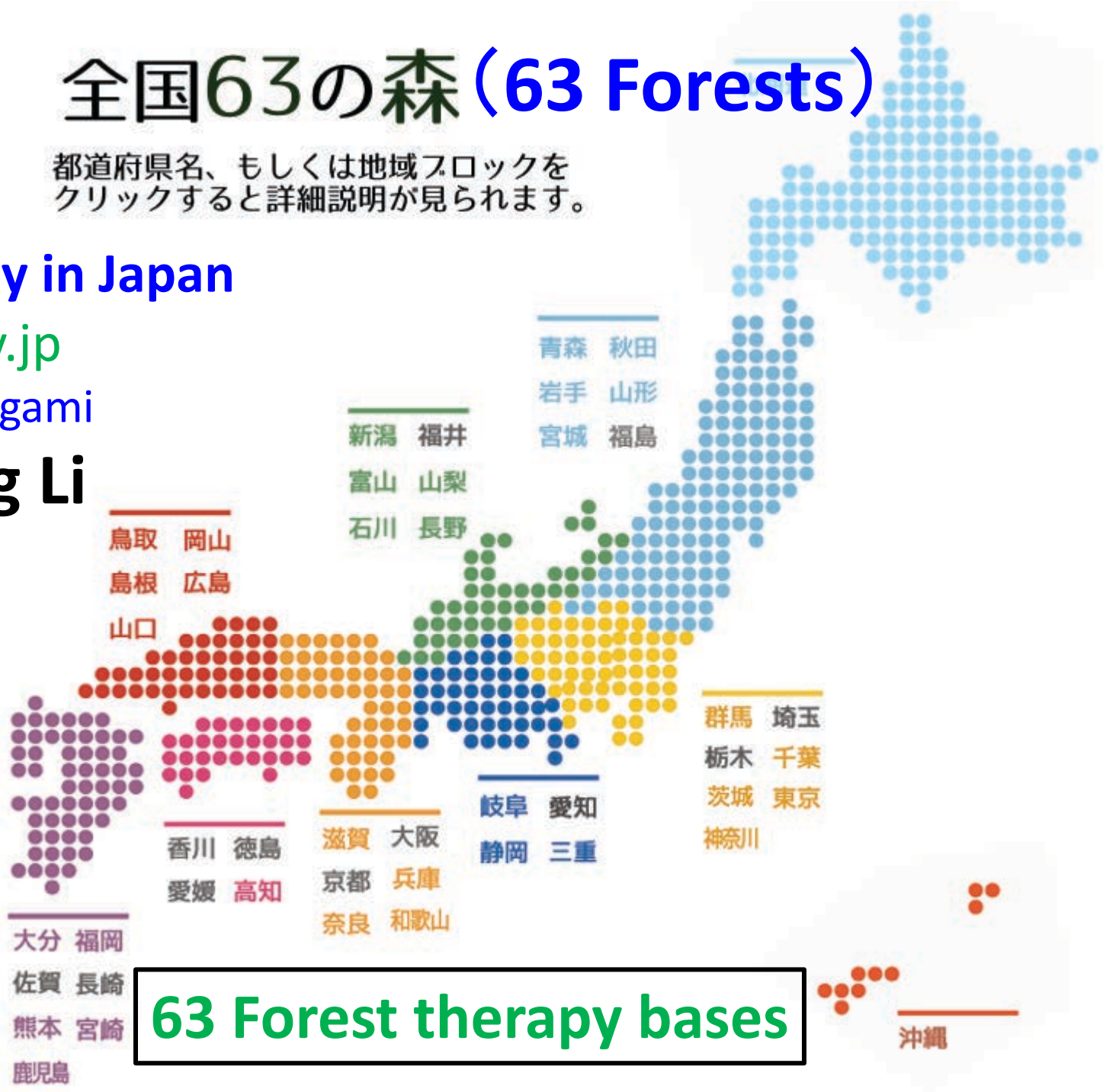
都道府県名、もしくは地域ブロックを
クリックすると詳細説明が見られます。

**Forest Therapy Society in Japan**

http://www.fo-society.jp

Chairman: Dr. Kiyotaka Segami

**Director: Dr. Qing Li**



# Fuji TV（News Speak）
# November 8, 2005

# The Japan Times 2008.5.2



# 'Forest therapy' taking root

## Researchers find that a simple stroll among trees has real benefits

Akemi Nakamura
STAFF WRITER

For stressed-out workers, this may someday be a doctor's prescription: Walk around in the woods.

Scientists in Japan have been learning a lot in recent years about the relaxing effects of forests and trees on mental and physical health. Based on their findings, some local governments are promoting "forest therapy."

Experience shows that the scents of trees, the sounds of brooks and the feel of sunshine through forest leaves can have a calming effect, and the conventional wisdom is right, said Yoshifumi Miyazaki, director of the Center for Environment Health and Field Sciences at Chiba University.

Japan's leading scholar on forest medicine has been conducting physiological experiments to examine whether forests can make people feel at ease.

One study he conducted on 260 people at 24 sites in 2005 and 2006 found that the average concentration of salivary cortisol, a stress hormone, in people who gazed on forest scenery for 20 minutes was 13.4 percent lower than that of people in urban settings, Miyazaki said.

This means that forests can lower stress and make people feel at ease, he said, noting that findings in other physiological experiments, including fluctuations in heart beats and blood pressure, support this conclusion.

"Humans had lived in nature for 5 million years. We were made to fit a natural environment. So we feel stress in an urban area," Miyazaki said. "When we are exposed to nature, our bodies go back to how they should be."

Taking a walk in a forest, or "forest bathing" as it is sometimes called, can strengthen the immune system, according to Li Qing, a senior assistant professor of forest medicine at Nippon Medical School in Tokyo.

Li conducted experiments to see whether spending time in a forest increases the activity of people's natural killer (NK) cells, a component of the immune system that fights cancer.

In one, 12 men took a two-night trip to a forest in Nagano Prefecture in 2006, during which they went on three leisurely strolls and stayed in a hotel in the woods. Thirteen female nurses made a similar trip to another forest in the prefecture in 2007.

NK activity was boosted in the subjects in both groups, and the increase was observed as long as 30 days later, Li said.

"When NK activity increases, immune strength is enhanced, which boosts resistance against stress," Li said, adding that forest therapy for immune-compromised patients may be developed within a few years.

Li said the increase in NK activity can be attributed partly to inhaling air containing phytoncide, or essential wood oils given off by plants.

Miyazaki of Chiba University said forests gratify the five senses by providing the sounds of birds, cool air, green leaves, the touch of trees, wild plants and grasses.

"The atmosphere of forests makes people calm," he said.

Based on studies on the effects of forests, the public and private sectors are now promoting forest therapy.

The Forest Therapy Executive Committee, a group of researchers, other intellectuals and the government-affiliated National Land Afforestation Promotion Organization, started officially recognizing certain forests by granting the designations of Forest Therapy Base and Forest Therapy Road in 2006. The titles are given to forests that have been found by researchers through scientific evidence to have relaxing effects.

Officials from the Forest Agency and the Health, Labor and Welfare Ministry participate in the group as observers.

A forest therapy base comprises a forest and walking paths typically managed by local governments.

So far, 31 bases and four roads nationwide have gained such recognition.

Visitors to some of the therapy bases and roads have the option of taking part in various health programs, including medical checkups, breathing and aromatherapy classes, and guided walks with experts on forests and health care.

At the Akazawa Natural Recreation Forest in Agematsu, Nagano Prefecture, which was recognized as a forest therapy base in 2006, visitors can get free medical checkups among Japanese cypress trees on Thursdays. The forest is known as the Japanese birthplace of the concept of forest bathing in 1982.

Some companies have come to use forest therapy for their employees' health care.

The Shinano Municipal Government in Nagano Prefecture, which manages the Iyashi no Mori (Healing Forests) forest therapy base, has contracts with four companies, a town official said.

Visitors to the forest therapy base can take part in various programs, including dietary management, hydrotherapy and aromatherapy.

The formal designations have drawn more people to such towns.

The Oguni Municipal Government in Yamagata Prefecture said 1,280 people visited the Nukumidaira beech forest there in fiscal 2007, including some 100 people who took part in forest walking tours with "matagi" traditional hunters.

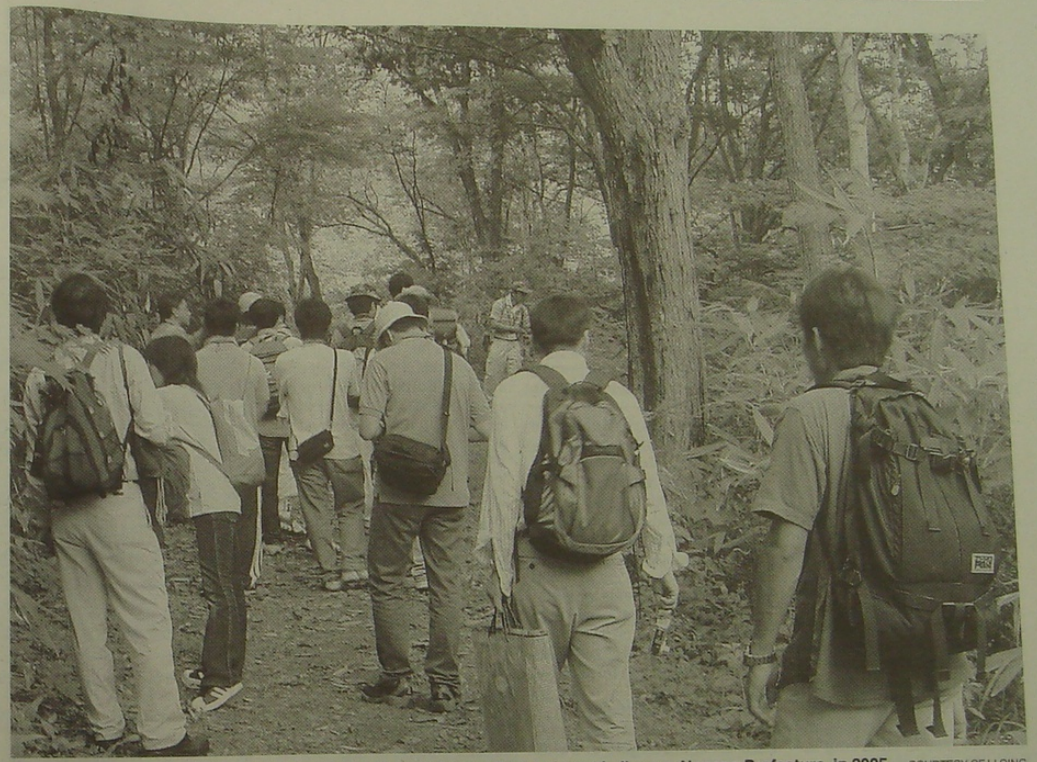
"Before we got the recognition (in 2006), there were not so many visitors to the woods. Now we can see some people in the forest even on weekdays," said Juro Watanabe, a town official in charge of forest therapy.

Recognition as a forest therapy base can be a big help, said Shigetaka Harashima, manager of the forest therapy project for the Okutama Municipal Government in Tokyo.

The town received official recognition in April 2008 and is now cooperating with experts to draw up therapy programs that will be available next year.

Chiba University's Miyazaki said he hopes the number of forest therapy bases and roads will reach 100 nationwide over the next decade so people will have plenty of choices when they look for different types of forests.

"Some people like broadleaf forests and others prefer forests of conifer trees like hinoki cypress that give off a strong aroma," Miyazaki said. "I hope people try to find a forest that suits their tastes and visit them from time to time."



Turning over a new leaf: People take part in a "forest therapy" experiment in Iiyama, Nagano Prefecture, in 2005. COURTESY OF LI QING

*For more information about Forest Therapy Bases and Roads, visit http://forest-therapy.jp/*

# An interview from Bloomberg TV
# July 1, 2009

American Scientist



## A Walk in the Woods

*Evidence builds that time spent in the natural world benefits human health*

For the month of April, I decided to visit the Haw River, which flows near where I live, every day. I wouldn't hold myself strictly to this, but I would try, and I would observe—not impartially, of course, but closely—how I felt. Some days I took leisurely walks with friends, leaning over the railing of the pedestrian bridge to watch the river, high from recent rains, and to smell the distinctive, muddy smell of the water mingled with that of the banks overrun with invasive honeysuckle. On others, coming home late at night, I drove straight down to the bridge and walked out to stare down at the dark water, a move that felt a bit like the natural-world equivalent of visiting a drive-through restaurant.

I did this because I hadn't been spending much time at the river, even though it's only a short walk from home, and even though I like doing it. The results of my informal experiment? I did, in fact, feel better—calmer, more relaxed, clearer-headed. I suspect that many people have similar feelings about the effects of spending time in the wilder places near where they live. Perhaps that's why Richard Louv's 2005 book *Last Child in the Woods*, which explores the relation between the natural world and children's development, became a bestseller in the United States.

But to know empirically that these experiences are beneficial—and to know exactly how they might help us—requires more than personal experience. A growing and varied body of research attempts to quantify how and why spending time in the natural world might have beneficial effects on humans' physical and psychological health. One of the first and most well-known studies, published in *Science* by Richard S. Ulrich in 1984, found that patients recovering from surgery in rooms with a window facing a natural setting had shorter hospital stays and took less pain medicine than did patients whose window faced a brick wall. Since then, researchers have asked whether the presence of trees influences people's sense of safety in inner-city neighborhoods; explored how gardening might improve quality of life for people with disabilities; and used physiolgical measures to test for restorative effects of natural environments. If some of these studies seem too specific to be useful in answering the broader question, their results in sum suggest that time spent in nature improves human health. The more difficult questions are how, and in what ways, these effects arise. These questions are not the kind that can be answered by a single, groundbreaking paper; rather, like so many of the subtle and complex problems science explores, the evidence is being deposited, small study by small study, like layers of sediment on a river bed.

The health effects of "forest bathing," or taking walks in the woods, are measured in several recent studies. Above, subjects in a study by Qing Li and his colleagues take a walk in a forest park in Saitama prefecture, north of Tokyo, Japan, in September 2010. The sample size is small, but the results indicate that time spent in forests may have such salutary effects as lowered blood pressure and noradrenaline levels. (Photograph courtesy of Qing Li.)

One such body of work is accumulating in Japan, where researchers are investigating the physiological effects of *shinrin-yoku*—"forest bathing," or, to put it plainly, taking walks in the woods. Qing Li, a professor in the Department of Hygiene and Public Health at Nippon Medical School, Tokyo, has been involved with several such studies. He and his colleagues recently measured specific physiological markers before and after study subjects took walks in a forest and in an urban control environment. The study's sample size is small—16 male subjects—and the timescale short—effects were measured after one day trip to the forest and one to the city—but the results suggest that the forest trip had positive effects on health. Subjects' blood pressure measured in the forest was significantly lower when compared to measurements taken in the city. Levels of the stress hormone noradrenaline, measured in urine, were also significantly lower after the forest walk than after the urban walk. And blood levels of the adrenal hormone dehydroepiandrosterone sulfate (DHEA-S) and of adiponectin, a hormone secreted by fat tissue, were higher after the forest walk but not the urban walk. The authors note that DHEA-S may contribute to heart health, among other benefits, and that lower levels of adiponectin are associated with obesity and type 2 diabetes.

Li and his coauthors, whose study appeared in the *European Journal of Applied Physiology* in March, speculate that the forest trip's effects on blood pressure may be related to phytoncides, volatile organic compounds (VOCs) that plants produce and release as protection from fungi and bacteria. In a separate study for which Li was also lead author, researchers unsurprisingly found higher concentrations of several phytoncides in a forest than in an urban area of Tokyo.

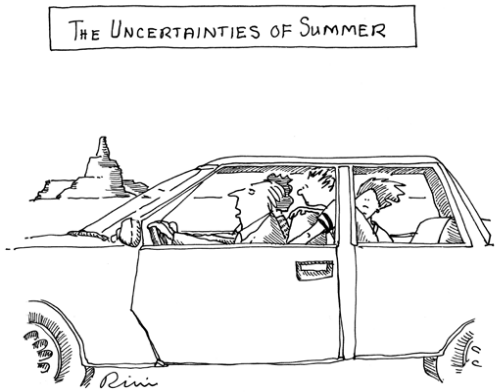
Another recent study, by Juyoung Lee, a researcher at the Center for Environment, Health and Field Sciences at Chiba University, Japan, and others, offers similar results. In this three-day field experiment, 12 young male subjects visited forest and urban environments. The study, published in February in *Public Health*, found that in the forest, subjects' parasympathetic nervous-system activity was heightened and their sympathetic nervous-system activity suppressed. Pulse rates were lower, as were salivary levels of the adrenal hormone cortisol, which is associated with stress. Participants reported that their positive feelings increased, and negative feelings decreased, in the forest. Blood-pressure measurements, however, did not differ significantly between the forest and urban locations. The authors also measured phytoncide levels in the forest study area and found 10 different compounds, ranging in concentration from 0.3 micrograms per cubic meter to 1,336 micrograms per cubic meter.

In support of the idea that phytoncides may be responsible for some of the health effects seen in Li's study, he and his coauthors cite a 2003 paper that found that inhalation of cedarwood oil lowered blood pressure. A review article of forest-bathing studies, published in *Environmental Health and Preventive Medicine* in 2009 by Yuko Tsunetsugu and others, notes several laboratory studies that tested human responses to inhalation of plant VOCs. The results included such positive effects as lowered blood pressure and improved task performance. But to find a correlation between the mixture of phytoncides in forest air and physiological changes in humans would require experiments of more complex design. So although the idea that the very scent of the forest might improve health is appealing, determining whether it's true and the extent of any effects will need more study.

This is just one of many avenues of inquiry that forest-bathing research opens. Can the physiological effects of studies like Li's be replicated in larger studies, and in women and children? Do effects differ across gender and age? Do forests in varied bioregions, with different microclimates and compositions of tree species, vary in their effects on health? Do people who have grown up in one region experience different health effects in forests in their home bioregion than in other forests?

Policy questions abound as well. Carol Colfer, a cultural anthropologist and senior associate with the Center for International Forestry Research in Bogor, Indonesia, studies human use of forests in developing countries. "I suppose the logical result would be developing more or at least maintaining existing parks in cities, and expanding protected areas—but with much more serious attention to the human rights of people living in these areas," she says of Li's study. "Even better would be encouraging in situ conservation on people's own lands." Li is interested in exploring how his results could be used in medicine. "I am planning to develop forest bathing to be a preventive measure for some diseases such as depression, hypertension and cancers," he says.

What's clear is that trying to quantify a seemingly intuitive claim—humans benefit from spending time in the natural world—is turning up more complex answers, and more resulting questions, than a fir tree has needles. If policymakers take note of this work as it emerges, they might be better equipped to improve public health. For my part, I've extended my efforts to visit the river each day into the month of May. The weather's better for swimming now, and the air smells as good as ever.—*Anna Lena Phillips*




"I can tell you if we are 'there' or if it is 'yet' but not both at the same time."

# BBC Radio

http://www.bbc.co.uk/programmes/b01p7fgv

## Date: December 8, 2012, 10:30 AM～

## Title: ‘The Secret Power of Trees’

**Dr. Qing Li, the Vice-President and the Secretary-General of INFOM received an interview by BBC Radio on Forest Medicine**

# BBC world news (April 25, 2018)

http://www.bbc.com/news/av/health-43867400/forest-bathing-how-a-walk-in-the-woods-could-do-you-good

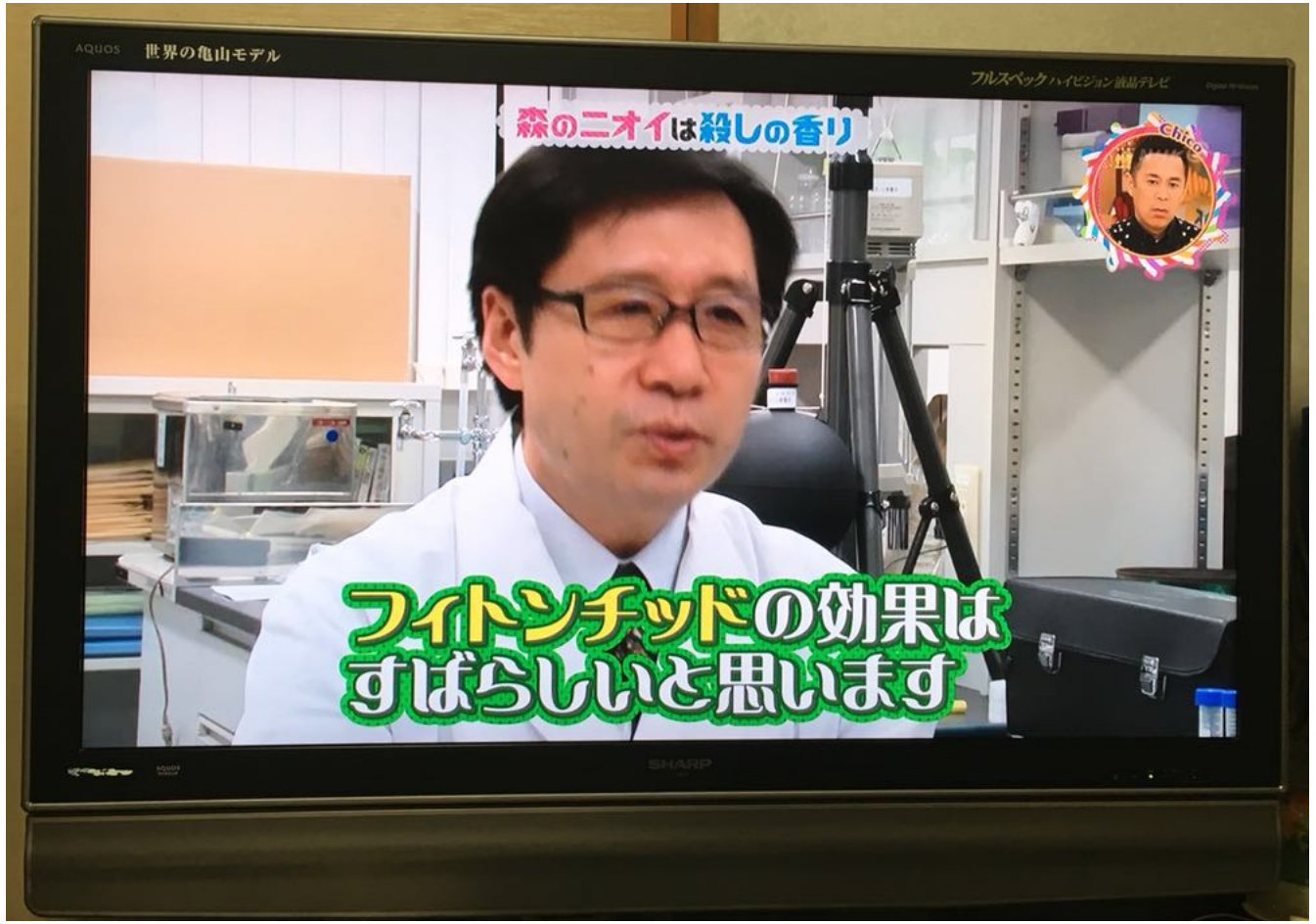
# French radio (April 16, 2018)

https://www.francetvinfo.fr/replay-radio/mise-a-jour/dr-qing-li-plus-il-y-a-darbres-et-plus-ils-sont-grands-plus-vous-aurez-deffets_2685216.html


# German TV interview（2016.11）

# French TV interview (2016.11)

# NHK program on 2018.04.27 about Phytoncide



# Nippon Medical School website

# Let’s go to shinrin-yoku ！