

Into the Magic Imaging Cave



**What happens
when you have an MRI scan**

Narrative text and illustration
Sylvia Graupner

Idea, scientific advice and explanatory text
Professor Rolf Vosschenrich, M.D.

Do you know the barn on the other side of the meadow?
That's where Lottie lives with her family.

**Lottie is bored. No one has time to play with her.
Do you sometimes get bored, too?**

Maybe a bit of exploring in the barn will liven things up.
It's full of interesting things, so Lottie definitely isn't bored
anymore. When she finds her big brother's old skateboard,
she just has to try it out!



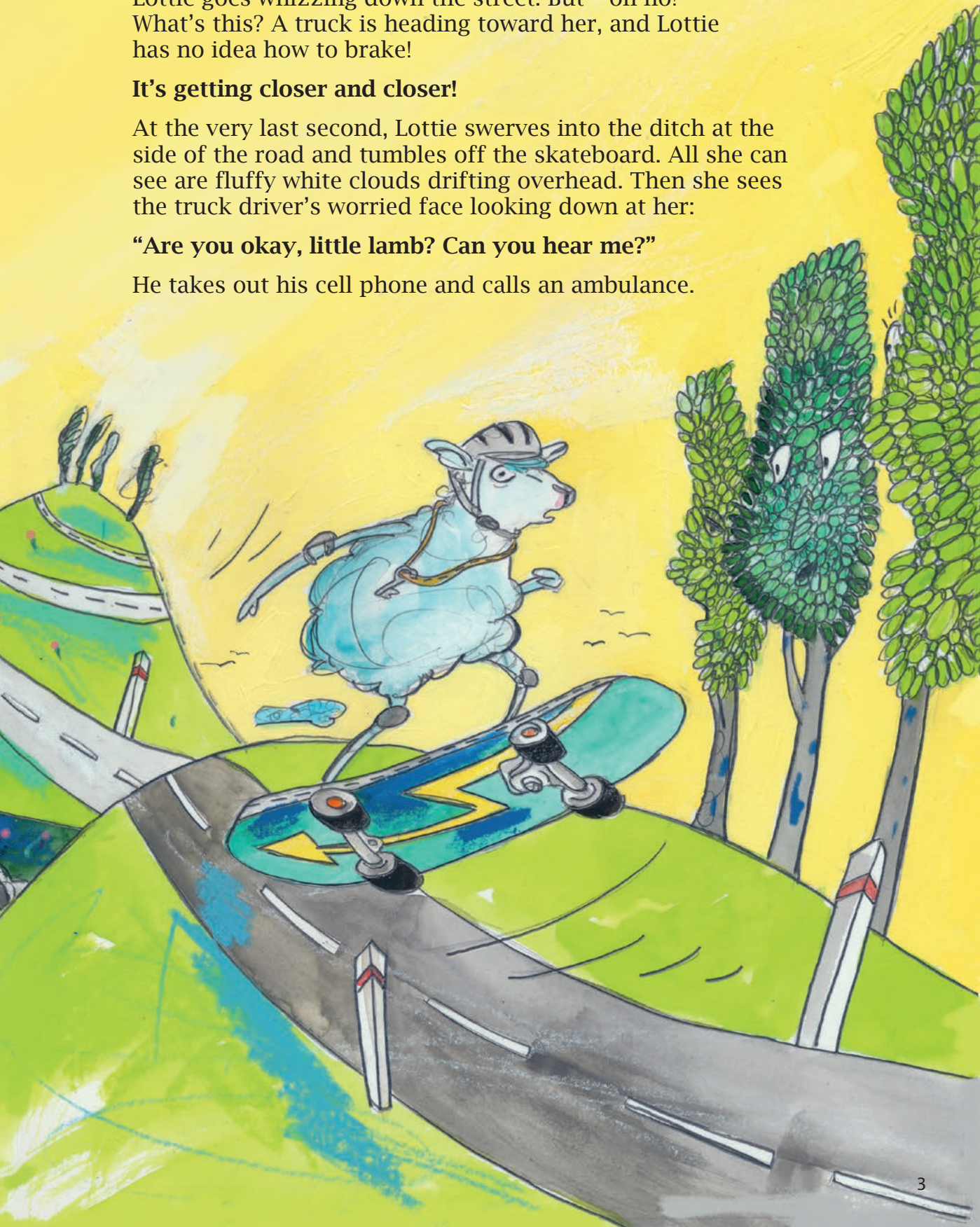
Lottie goes whizzing down the street. But – oh no! What's this? A truck is heading toward her, and Lottie has no idea how to brake!

It's getting closer and closer!

At the very last second, Lottie swerves into the ditch at the side of the road and tumbles off the skateboard. All she can see are fluffy white clouds drifting overhead. Then she sees the truck driver's worried face looking down at her:

"Are you okay, little lamb? Can you hear me?"

He takes out his cell phone and calls an ambulance.



Wee-woo!

The ambulance arrives with its siren blaring and lights flashing.

The paramedic carefully examines Lottie and then puts her on a stretcher and into the back of the ambulance.

Soon, they reach Woodland Hospital, and Lottie is wheeled into the emergency room.





With humans,
it looks like this



Amazingly, her mom is already there. Lottie is so glad to see her!

But – ouch – her ankle really hurts.

The doctor isn't sure whether her ankle is broken or just sprained. Doctors treat a sprained ankle differently than a broken ankle. To see what is really wrong with Lottie, the doctor arranges an MRI scan.

“What’s an MRI scan?” asks Lottie.

The doctor explains kindly:
M-R-I stand for three different words:
magnetic resonance imaging.



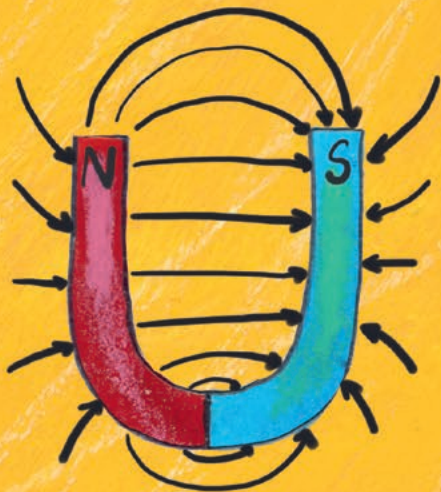


Inside our magic cave is a giant **magnet** (that's where the first word comes from). It's protected by an outer shell.

The magnet is really strong and attracts anything made out of metal.

You lie on a special table that slides you smoothly into the magic cave like a train entering a tunnel. And then our dwarfs of the magic imaging cave get to work.

The effect of a magnetic field



N and S are the two opposite poles of a magnet

Hydrogen particles



Without and with a magnetic field



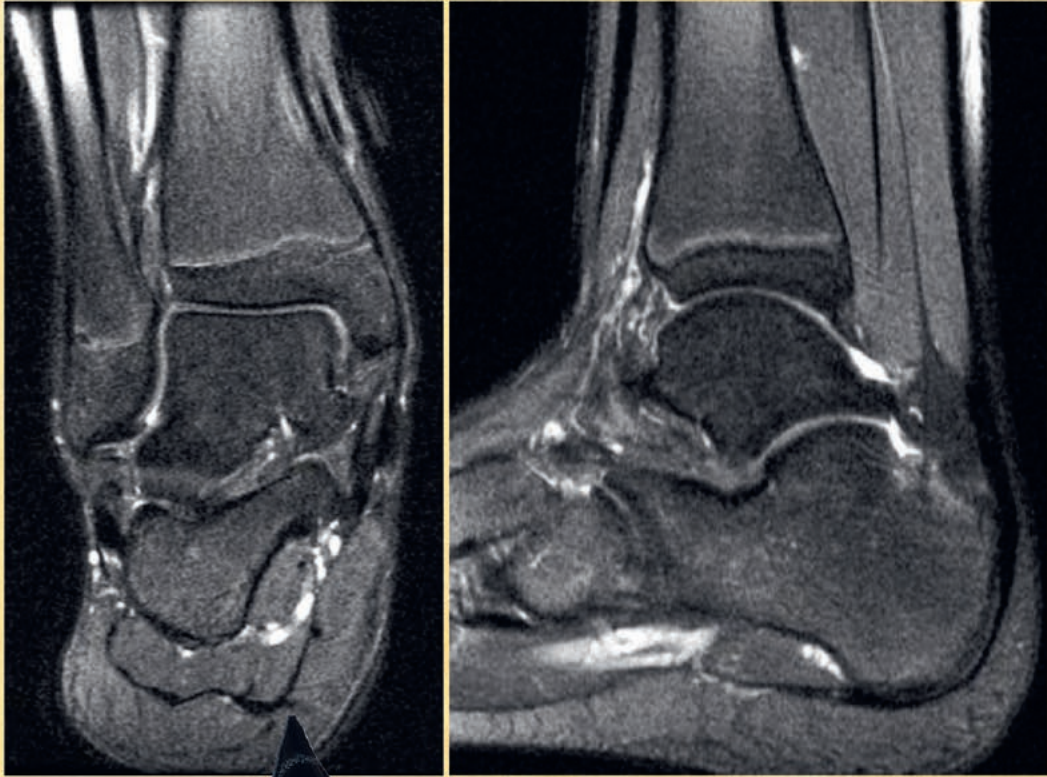
Our magical dwarfs have their own little magnets. They use these to set the rhythm and volume of the scan. They can turn them on and off or move them around at different speeds.

The noise they make sounds like sawing, banging, or drumming. These little magnets wake up the cells in your body.

When the cells want to be left in peace, they send out signals. This is known as an echo, or resonance (the second word).

The process repeats itself several times. Some scans take longer than others.





This is what a human ankle looks like
from the front and the side



When doctors are looking for something in the human body, they have to think about where it might be and how they can find it.

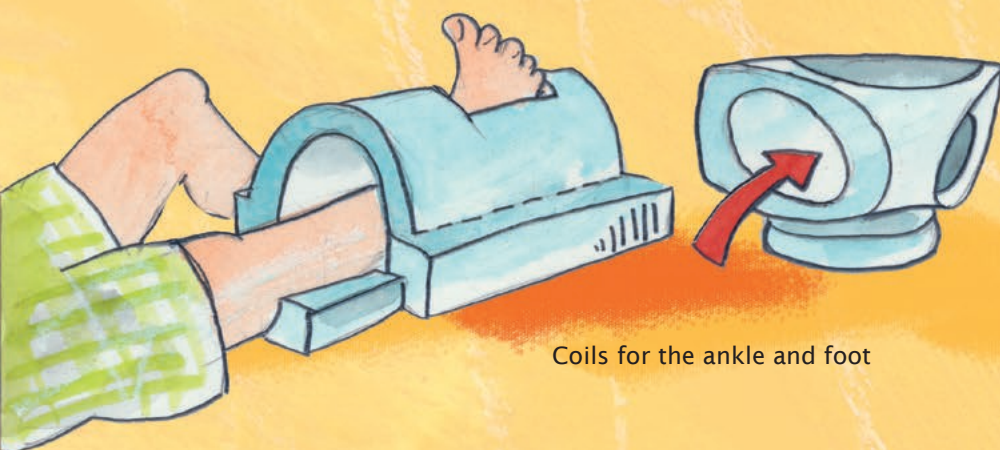
Imagine if a small bead was baked into a cake.

You wouldn't know where the bead was – so to find it, you'd slice the cake up.

The magic imaging dwarfs and their little magnets help the doctors. The magnets can wake up different parts of the body, or even individual cells.

This creates images (that's where the third word comes from) **which show the body as a series of layers.**

They're like the slices of the cake.



Coils for the ankle and foot

When the body sends out its signals, receivers pick them up.

The receivers on an MRI scanner are called coils.

Some coils are positioned under your body, others are placed on top. Some are like a sock or a shoe that you slip your foot into. Coils can be made up of connected and movable parts, or they can be put together like a construction set.

To make sure nothing pinches or squeezes you, soft pads go in between you and the coil.



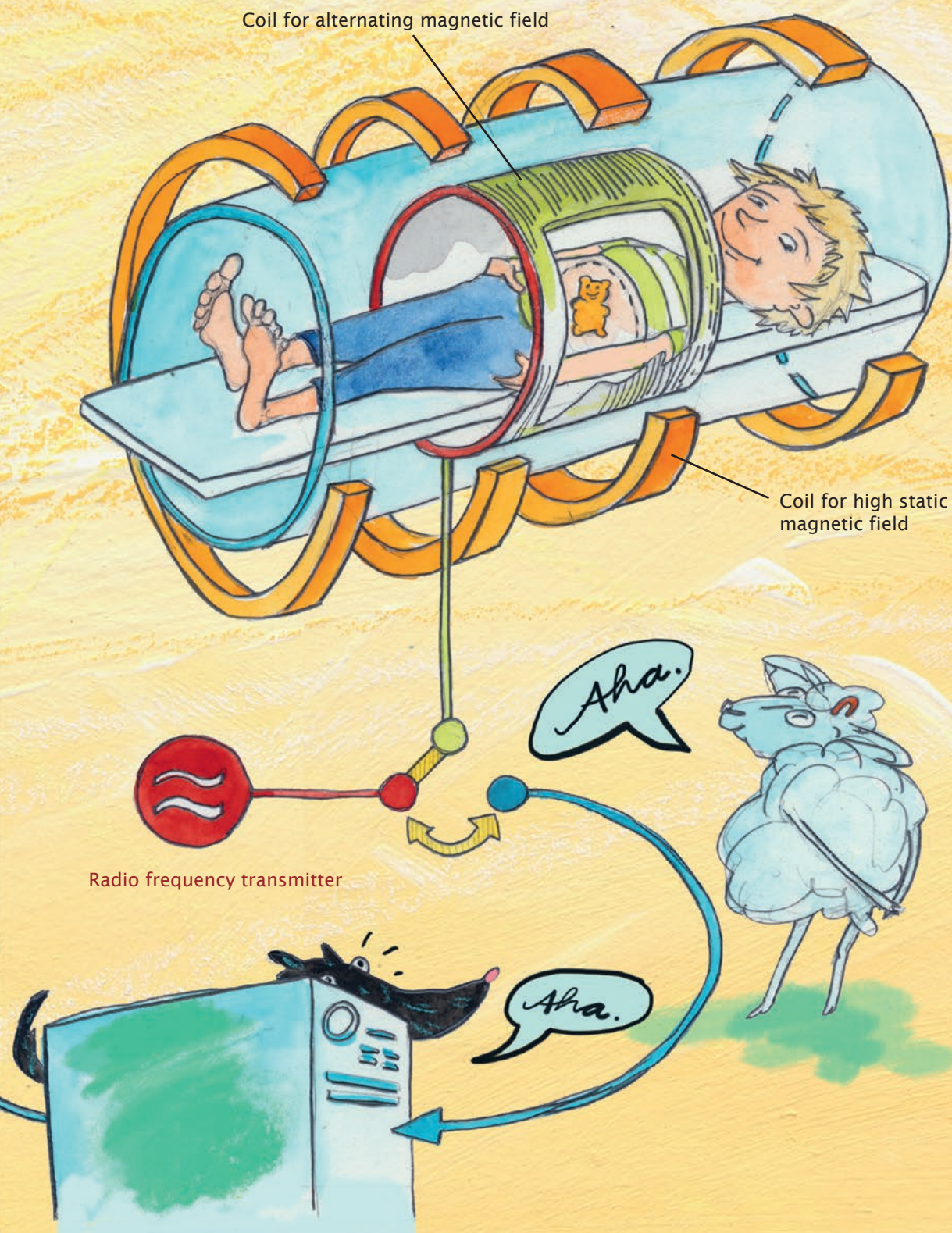
Once the receivers have picked up the signals from your body, fast computers organize them and put the layers of images together.

The results are pictures of the inside of your body.

The magic doctor can then view the images on a computer to make sure they show everything they should.

Then the doctor can see if anything is wrong with you.









A person's knee with contrast agent

For some scans, you also need a **magic potion** called a “**contrast agent**”.

The potion travels around your body through your blood vessels. It helps your doctor to see which cells are healthy and which might be sick.

How does it work?

First, the magic doctor ties a strap tightly around your arm. That makes it easy to see the blood vessels underneath your skin.

Then the doctor disinfects your arm. After that, you'll feel a little pinprick. The doctor can now inject the clear magic potion into your vein. You won't feel a thing. When all the potion is inside you, the doctor puts a little plaster on your arm.



My pockets are empty!

Mine. too.



Before you have an MRI scan, you have to make sure you aren't wearing or carrying anything with metal in it.

Some people have retainers on their teeth, hair clips, glasses, keys, coins, pocketknives, watches, cell phones, cards with magnetic strips ...

This is really, really important. If you take any metal items into the scanner, they will create their own magnetic field and mess up the examination.

The Woodland Hospital elves remind Lottie to put her hair clips and keys away safely before her scan.



At first, Lottie is scared of the strange surroundings with all the unfamiliar smells and noises. But the elves are friendly and take very good care of the little lamb.

Her mom is there too, thank goodness, so everything is going to be just fine.

Then Lottie enters the mysterious room that contains the MRI scanner:

the magic imaging cave.

The kind dwarfs are already there. Lottie is curious about what will happen next. The elves give Lottie headphones. Or sometimes you get earplugs. This is to keep out the noise that the magic imaging dwarfs have to make. The elves also give Lottie a rubber ball to hold. If she squeezes it real hard and then releases it, the elves will hear a sound and come to Lottie straightaway to see what the matter is.

But it's important not to squeeze it just for fun.

That might give the dwarfs a real fright and they might even run away. Then the elves would have to start the scan all over again.



It's about
to start.



"CRASH!! BANG!!" ELF TECHNO

Try to keep
nice and still.



Now listen up, this is important!
You have to stay very, very still during the scan.

If Lottie doesn't move a muscle, the dwarfs will be happy and they'll be able to see very clear pictures.

But if she doesn't, the magic imaging can't work properly. The pictures will come out all blurry, and the slices won't fit together properly.

Even though the magic doctor is really smart, blurry pictures will make it impossible to tell whether Lottie is injured or not.



The doctor
looks at the pictures
on the screen and
sees that Lottie has
sprained her ankle.

He'll put her leg
in a splint
to keep the ankle still.



Lottie can't imagine what that will be like - she loves scampering around and skipping through the meadow so much.

But her doctor says she has to rest her injured ankle for two weeks.

After that, she's free to hop, skip, and jump to her heart's content.





Hang on, the meadow behind the barn looks totally different now. Lottie's big brother has turned it into a skatepark! Lottie jumps for joy.

What a wonderful surprise!

"It's so you don't have to skate on the street anymore," her brother whispers into her ear.

Lottie won't ever be bored again.
Soon she's whizzing up and down the ramps
like a real daredevil - and when she gets tired,
Mom's on hand to make her a mug of hot chocolate.



That night, Lottie dreams of flying to the Woodland Hospital on her skateboard and waving to the doctor and the magic imaging elves.

“I’m so glad I’m all better now,”

she murmurs in her sleep.

“Skateboarding is way more fun than limping.”

**Lottie is an adventurous little lamb.
She loves to skateboard.**

But poor Lottie had an accident and may have broken
her ankle. Now instead of leaping, she can only limp.
Lottie is off to the hospital for an MRI scan.

This engaging story explains to children what it's like
to have an MRI scan in a way they can understand.



This book has been produced with the
friendly assistance of Siemens Healthineers.

For further information please visit
[siemens-healthineers.com/mri](https://www.siemens-healthineers.com/mri)

Order number: A91MR-100-75X-7600
All Rights Reserved

© 2019 Rolf Vosschenrich, Sylvia Graupner
Translation: Jen Metcalf and Sheila Regan, UNIWORKS,
Erlangen, Germany; Typograph: Claudia Oehm, Agentur
Baumgärtner, Fürth, Germany; Printer: Schmidl & Rotaplan
Druck GmbH, Regensburg, Germany