
PAO

1
00:00:05,190 --> 00:00:02,550
so joining me now here in mission

2
00:00:06,789 --> 00:00:05,200
control houston dr hans christian gunga

3
00:00:09,030 --> 00:00:06,799
he's one of the principal investigators

4
00:00:10,870 --> 00:00:09,040
for the circadian rhythm study uh it's

5
00:00:12,390 --> 00:00:10,880
taking place right now as we speak

6
00:00:14,070 --> 00:00:12,400
onboard the international space station

7
00:00:15,829 --> 00:00:14,080
japanese astronaut koichi wakata is

8
00:00:17,510 --> 00:00:15,839
engaged in it

9
00:00:19,189 --> 00:00:17,520
dr goonga thanks so much for being here

10
00:00:21,189 --> 00:00:19,199
today really appreciate it and first

11
00:00:22,950 --> 00:00:21,199
start me off real quick what is what is

12
00:00:24,390 --> 00:00:22,960
this circadian rhythm study why is you

13
00:00:26,150 --> 00:00:24,400

know why why are we doing it on board

14
00:00:28,870 --> 00:00:26,160
the international space station

15
00:00:32,150 --> 00:00:28,880
um actually this is a very important

16
00:00:34,229 --> 00:00:32,160
question because the the astronauts they

17
00:00:36,310 --> 00:00:34,239
they do not have a real

18
00:00:39,750 --> 00:00:36,320
day there they have several days and

19
00:00:41,750 --> 00:00:39,760
sunsets and such and so there there is

20
00:00:42,950 --> 00:00:41,760
over the millions of years we have

21
00:00:46,229 --> 00:00:42,960
developed

22
00:00:48,709 --> 00:00:46,239
the organism has adapted to this sunset

23
00:00:51,830 --> 00:00:48,719
and sundown so you have an internal

24
00:00:55,029 --> 00:00:51,840
rhythm and this internal rhythm is very

25
00:00:55,830 --> 00:00:55,039
important for your capabilities for your

26
00:00:57,990 --> 00:00:55,840
will

27
00:01:00,150 --> 00:00:58,000
vigor lens for all the things you are

28
00:01:03,349 --> 00:01:00,160
doing whether you sleep or not sleep

29
00:01:05,109 --> 00:01:03,359
and so if that rhythm is destroyed by

30
00:01:07,990 --> 00:01:05,119
having every day

31
00:01:10,390 --> 00:01:08,000
several times sunsets and sunlight

32
00:01:12,550 --> 00:01:10,400
sunsets some sunrise sun setting however

33
00:01:15,510 --> 00:01:12,560
yeah

34
00:01:16,310 --> 00:01:15,520
that's actually the case and that's why

35
00:01:20,230 --> 00:01:16,320
we

36
00:01:23,510 --> 00:01:20,240
introduced this study to uh analyze

37
00:01:25,190 --> 00:01:23,520
uh by measuring the core temperature

38
00:01:28,630 --> 00:01:25,200

that means the temperature in the body

39
00:01:31,830 --> 00:01:28,640
the temperature in the body is a signal

40
00:01:34,149 --> 00:01:31,840
for this circadian rhythm usually you

41
00:01:37,990 --> 00:01:34,159
usually have in the morning here on the

42
00:01:40,390 --> 00:01:38,000
ground between five and six am you have

43
00:01:41,789 --> 00:01:40,400
the lowest temperature that means in the

44
00:01:44,389 --> 00:01:41,799
in the body about

45
00:01:47,830 --> 00:01:44,399
36.5 and you have your highest

46
00:01:48,710 --> 00:01:47,840
temperature in the afternoon at 6 00 pm

47
00:01:51,030 --> 00:01:48,720
or so

48
00:01:53,350 --> 00:01:51,040
and this is about one day it sounds

49
00:01:54,630 --> 00:01:53,360
sounds less it's only one degree

50
00:01:56,789 --> 00:01:54,640
difference it's not a huge difference

51
00:01:59,590 --> 00:01:56,799
but no no it's measurable but it's

52
00:02:01,429 --> 00:01:59,600
measurable and it's it's a strong signal

53
00:02:04,550 --> 00:02:01,439
for the organism

54
00:02:05,990 --> 00:02:04,560
you you must realize that the the core

55
00:02:09,109 --> 00:02:06,000
temperatures is

56
00:02:10,949 --> 00:02:09,119
changing of metabolism and

57
00:02:12,150 --> 00:02:10,959
several other functions

58
00:02:14,790 --> 00:02:12,160
they

59
00:02:17,270 --> 00:02:14,800
are introduced by your internal rhythm

60
00:02:19,750 --> 00:02:17,280
which is coming from all the different

61
00:02:21,430 --> 00:02:19,760
or is organized from the different

62
00:02:23,750 --> 00:02:21,440
inputs and

63
00:02:26,710 --> 00:02:23,760

the core temperature is so to say the

64
00:02:28,790 --> 00:02:26,720
master of the orchestra of the different

65
00:02:31,990 --> 00:02:28,800
functions it's like an orchestra if you

66
00:02:35,190 --> 00:02:32,000
and you can expect if the the master of

67
00:02:38,949 --> 00:02:35,200
an orchestra is not ready

68
00:02:41,190 --> 00:02:38,959
and if it's uh uh working with different

69
00:02:44,309 --> 00:02:41,200
orchestras that is a real that's a mess

70
00:02:45,830 --> 00:02:44,319
can you i can mess you up okay well so

71
00:02:47,509 --> 00:02:45,840
and like i had mentioned koichi's

72
00:02:48,790 --> 00:02:47,519
participating in this right now on board

73
00:02:50,630 --> 00:02:48,800
the station you know what's he doing and

74
00:02:53,350 --> 00:02:50,640
see you have a device right yeah

75
00:02:55,030 --> 00:02:53,360
actually that is it's it's the same it's

76
00:02:57,910 --> 00:02:55,040
not exactly the same but it's the same

77
00:03:01,430 --> 00:02:57,920
measurement device and here you see this

78
00:03:04,070 --> 00:03:01,440
is the kind of sensor we are using for

79
00:03:07,509 --> 00:03:04,080
the measuring of the core temperature

80
00:03:10,149 --> 00:03:07,519
and usually you have to go with several

81
00:03:12,149 --> 00:03:10,159
probes into the rectum into the ear and

82
00:03:13,350 --> 00:03:12,159
so and that's not visible for them

83
00:03:15,430 --> 00:03:13,360
that's a little uncomfortable for you

84
00:03:18,070 --> 00:03:15,440
yeah that's very at least at least it's

85
00:03:20,390 --> 00:03:18,080
uncomfortable and but this is a new type

86
00:03:21,830 --> 00:03:20,400
of sensor it's actually not measuring

87
00:03:25,350 --> 00:03:21,840
the temperature

88
00:03:27,589 --> 00:03:25,360

but it is measuring the heat flux from

89
00:03:31,190 --> 00:03:27,599
for example he's placing that on your on

90
00:03:34,630 --> 00:03:31,200
your front and there's it fixed for 36

91
00:03:35,830 --> 00:03:34,640
hours and here inside you have two

92
00:03:37,830 --> 00:03:35,840
sensors

93
00:03:40,550 --> 00:03:37,840
and one sensor is measuring the heat

94
00:03:43,030 --> 00:03:40,560
coming from your front going to the

95
00:03:45,270 --> 00:03:43,040
first sensor and then going to a certain

96
00:03:48,470 --> 00:03:45,280
material and then coming to the next

97
00:03:50,789 --> 00:03:48,480
sensor and this heat flux

98
00:03:52,710 --> 00:03:50,799
represents in some way

99
00:03:53,910 --> 00:03:52,720
uh your body core temperature especially

100
00:03:56,229 --> 00:03:53,920
under kind of an indirect way of

101
00:03:57,110 --> 00:03:56,239
measuring right okay it's an indirect

102
00:04:00,390 --> 00:03:57,120
way

103
00:04:03,190 --> 00:04:00,400
which is um has to be transformed by

104
00:04:05,509 --> 00:04:03,200
certain algorithms to

105
00:04:07,830 --> 00:04:05,519
yeah to to get the core temperature

106
00:04:09,350 --> 00:04:07,840
profile that's all that's what we need

107
00:04:12,470 --> 00:04:09,360
all right and that's later on that is

108
00:04:13,910 --> 00:04:12,480
stored then on these devices and we get

109
00:04:15,990 --> 00:04:13,920
the data down

110
00:04:18,629 --> 00:04:16,000
several weeks later and we do these

111
00:04:20,710 --> 00:04:18,639
measurements not only on one time but in

112
00:04:23,430 --> 00:04:20,720
the in the early beginning

113
00:04:25,270 --> 00:04:23,440

and then every month at least so that we

114
00:04:26,790 --> 00:04:25,280
can see whether there is a change in

115
00:04:29,510 --> 00:04:26,800
this

116
00:04:31,510 --> 00:04:29,520
curve of the core temperature and we

117
00:04:34,710 --> 00:04:31,520
expect that

118
00:04:36,550 --> 00:04:34,720
the amplitude so to say how how uh the

119
00:04:39,110 --> 00:04:36,560
the delta between

120
00:04:42,390 --> 00:04:39,120
normally that is reduced

121
00:04:43,990 --> 00:04:42,400
due to certain facts okay well so what

122
00:04:46,390 --> 00:04:44,000
what are you guys really hoping to you

123
00:04:50,310 --> 00:04:46,400
know find out and almost

124
00:04:52,390 --> 00:04:50,320
solve so okay that's the the the the uh

125
00:04:54,790 --> 00:04:52,400
one of them is the main points we would

126
00:04:56,390 --> 00:04:54,800
like to look at

127
00:04:58,710 --> 00:04:56,400
when in the mission

128
00:05:01,590 --> 00:04:58,720
we have certain rhythms and whether you

129
00:05:05,510 --> 00:05:01,600
have the same rhythm as i have so it's

130
00:05:06,790 --> 00:05:05,520
not clear who is more disturbed by this

131
00:05:09,029 --> 00:05:06,800
kind of

132
00:05:11,670 --> 00:05:09,039
circadian rhythmic changes and the other

133
00:05:13,909 --> 00:05:11,680
so this gives you an example and gives

134
00:05:16,230 --> 00:05:13,919
you some hints about the

135
00:05:17,270 --> 00:05:16,240
capabilities of the different subjects

136
00:05:19,830 --> 00:05:17,280
and

137
00:05:21,909 --> 00:05:19,840
at least it it's important for our

138
00:05:25,430 --> 00:05:21,919

opinion for long to really long term

139
00:05:27,350 --> 00:05:25,440
space flights and we have to look at at

140
00:05:30,310 --> 00:05:27,360
methods and that

141
00:05:32,070 --> 00:05:30,320
technologies probably to keep

142
00:05:35,430 --> 00:05:32,080
that rhythm and that can be that can be

143
00:05:38,070 --> 00:05:35,440
done by by special lights or by by very

144
00:05:40,150 --> 00:05:38,080
structured meals or so very structured

145
00:05:42,390 --> 00:05:40,160
day then you have can have some inputs

146
00:05:43,990 --> 00:05:42,400
and uh we are working on that but that

147
00:05:46,390 --> 00:05:44,000
is that is so to say the terrestrial

148
00:05:49,270 --> 00:05:46,400
part there's also it is a

149
00:05:50,469 --> 00:05:49,280
space part we have so also a terrestrial

150
00:05:54,390 --> 00:05:50,479
because

151
00:05:55,990 --> 00:05:54,400
this this is now just in the last year

152
00:05:57,749 --> 00:05:56,000
we had several measurements in the

153
00:05:59,110 --> 00:05:57,759
german heart center for heart

154
00:06:01,189 --> 00:05:59,120
transplantation

155
00:06:03,990 --> 00:06:01,199
because these people they have not a

156
00:06:07,430 --> 00:06:04,000
high temperature they get very low their

157
00:06:09,110 --> 00:06:07,440
body temperature at 16 or 15 degrees so

158
00:06:11,590 --> 00:06:09,120
they are very very low to keep they are

159
00:06:15,029 --> 00:06:11,600
waiting for the heart and this device

160
00:06:16,629 --> 00:06:15,039
can be placed outside the the thorax

161
00:06:19,029 --> 00:06:16,639
and to to protocol their core

162
00:06:23,350 --> 00:06:19,039
temperature so very non-invasive very

163
00:06:25,590 --> 00:06:23,360

non-invasive it's easy to clean yeah and

164
00:06:29,830 --> 00:06:25,600
i think in in future you will hear much

165
00:06:32,150 --> 00:06:29,840
more about heat flux sensors in clinics

166
00:06:34,950 --> 00:06:32,160
for monitoring for example not only at

167
00:06:38,710 --> 00:06:34,960
big operations like like

168
00:06:41,110 --> 00:06:38,720
heart transfer but any kind of narcosis

169
00:06:43,189 --> 00:06:41,120
will shut down your possibilities to

170
00:06:44,870 --> 00:06:43,199
regulate your temperature yeah and so

171
00:06:47,749 --> 00:06:44,880
you probably after

172
00:06:49,830 --> 00:06:47,759
certainly you get hypothermic because

173
00:06:52,550 --> 00:06:49,840
the body do not react and this can be

174
00:06:55,110 --> 00:06:52,560
protocoled by this temperature and so

175
00:06:58,230 --> 00:06:55,120
there's a direct clinical application of

176
00:06:59,749 --> 00:06:58,240
this uh method which we designed for

177
00:07:01,830 --> 00:06:59,759
space so

178
00:07:03,270 --> 00:07:01,840
i mean that that really is an amazing

179
00:07:04,390 --> 00:07:03,280
you know earth example of just

180
00:07:06,309 --> 00:07:04,400
technology

181
00:07:07,749 --> 00:07:06,319
developed to find out why astronauts

182
00:07:09,510 --> 00:07:07,759
can't sleep and now it could do

183
00:07:11,430 --> 00:07:09,520
something i mean it's amazing how it can

184
00:07:13,430 --> 00:07:11,440
transfer we are very very

185
00:07:16,309 --> 00:07:13,440
we are very happy that this could be

186
00:07:18,710 --> 00:07:16,319
transferred to it and uh

187
00:07:20,629 --> 00:07:18,720
yeah looking forward about the results

188
00:07:22,390 --> 00:07:20,639

all right well again dr hans christian

189
00:07:24,710 --> 00:07:22,400
gungo one of the principal investigators

190
00:07:26,070 --> 00:07:24,720
for the circadian rhythm study uh thanks

191
00:07:28,070 --> 00:07:26,080
for you know coming on and telling us

192
00:07:29,350 --> 00:07:28,080
about it it's fascinating i i mean i

193
00:07:31,749 --> 00:07:29,360
hadn't even thought about temperature

194
00:07:33,189 --> 00:07:31,759
being used to you know regulate sleep

195
00:07:35,029 --> 00:07:33,199
cycles things like that i just learned

196
00:07:37,110 --> 00:07:35,039
something pretty amazing today so i