

# Wound Healing

Wound healing is a complex biological process

Occurs across three nonlinear phases: inflammation, proliferation and granulation tissue formation, and tissue remodeling.

Within these stages there are varying contributions of a number of factors

- Such as constituents of the immune system, growth factors, chemoattractants, cytokines, and oxygen.

Psychological stress is also important to consider as it may interact with biological processes to delay wound healing across each of the phases.

- In large part due to effects of the HPA axis.

1  
00:00:03,429 --> 00:00:02,470  
not exist it really precludes doing any

2  
00:00:05,590 --> 00:00:03,439  
kind of

3  
00:00:08,230 --> 00:00:05,600  
ambitious or reasonable work looking at

4  
00:00:10,790 --> 00:00:08,240  
mechanisms and the data's not clear does

5  
00:00:12,790 --> 00:00:10,800  
intercessory prayer actually influence

6  
00:00:14,390 --> 00:00:12,800  
positive health health outcomes we're

7  
00:00:16,390 --> 00:00:14,400  
just not certain

8  
00:00:18,790 --> 00:00:16,400  
let's assume that it does influence

9  
00:00:21,510 --> 00:00:18,800  
positive health outcomes there is still

10  
00:00:23,990 --> 00:00:21,520  
no accepted biomedical explanation for

11  
00:00:26,550 --> 00:00:24,000  
ip's alleged healing effects

12  
00:00:28,230 --> 00:00:26,560  
there's very little data for example in

13  
00:00:30,390 --> 00:00:28,240

say the bird study or the harris study

14

00:00:32,389 --> 00:00:30,400

where there were positive findings we

15

00:00:34,150 --> 00:00:32,399

have the outcomes but we don't have any

16

00:00:36,150 --> 00:00:34,160

of the pathways we don't have any of the

17

00:00:37,590 --> 00:00:36,160

physiological data that may indicate

18

00:00:38,470 --> 00:00:37,600

that there are shifts within these

19

00:00:40,709 --> 00:00:38,480

people

20

00:00:42,310 --> 00:00:40,719

that would help justify why in fact they

21

00:00:43,990 --> 00:00:42,320

had a better course so we're lacking

22

00:00:46,150 --> 00:00:44,000

data

23

00:00:48,310 --> 00:00:46,160

ip's healing effects if they do exist

24

00:00:51,350 --> 00:00:48,320

appear to be non-local

25

00:00:54,069 --> 00:00:51,360

so are the mechanisms naturalistic

26

00:00:56,150 --> 00:00:54,079

is there some latent force or energy

27

00:00:58,709 --> 00:00:56,160

that's actually being tapped through ip

28

00:01:00,630 --> 00:00:58,719

that influences healing and perhaps

29

00:01:02,310 --> 00:01:00,640

there is something that exists and

30

00:01:04,869 --> 00:01:02,320

science just simply isn't able to

31

00:01:07,350 --> 00:01:04,879

measure it yet or to verify verify it in

32

00:01:09,750 --> 00:01:07,360

a way that would satisfy mainstream

33

00:01:11,190 --> 00:01:09,760

science perhaps the mechanisms are

34

00:01:14,070 --> 00:01:11,200

supernatural

35

00:01:17,109 --> 00:01:14,080

perhaps it is god who underlies the

36

00:01:19,109 --> 00:01:17,119

benefits of prayer but god can god be

37

00:01:21,030 --> 00:01:19,119

tested

38

00:01:23,270 --> 00:01:21,040

we would also have to consider that if

39

00:01:26,230 --> 00:01:23,280

prayer can indeed

40

00:01:28,230 --> 00:01:26,240

provide positive effects then are there

41

00:01:29,749 --> 00:01:28,240

no sibo effects or are there negative

42

00:01:31,990 --> 00:01:29,759

effects that could come from prayer

43

00:01:33,670 --> 00:01:32,000

there's data that indicates uh

44

00:01:35,590 --> 00:01:33,680

approximately five percent of people at

45

00:01:38,230 --> 00:01:35,600

least admit that they pray for harm for

46

00:01:40,950 --> 00:01:38,240

someone else that something befalls some

47

00:01:42,950 --> 00:01:40,960

negative consequence before someone else

48

00:01:45,510 --> 00:01:42,960

so if there's a positive and potentially

49

00:01:47,429 --> 00:01:45,520

negative consequence to prayer

50

00:01:50,069 --> 00:01:47,439

what does that mean in terms of our own

51  
00:01:53,030 --> 00:01:50,079  
ethics about subjecting patients to an

52  
00:01:55,030 --> 00:01:53,040  
intervention that may actually harm them

53  
00:01:57,670 --> 00:01:55,040  
there is a range of methodological

54  
00:02:00,230 --> 00:01:57,680  
criticism directed at trials um the

55  
00:02:02,069 --> 00:02:00,240  
standards of which uh seem to be at

56  
00:02:03,990 --> 00:02:02,079  
times somewhat higher

57  
00:02:05,510 --> 00:02:04,000  
than the criticism that's levied towards

58  
00:02:07,670 --> 00:02:05,520  
more traditional kinds of medical

59  
00:02:09,830 --> 00:02:07,680  
research but it's out there

60  
00:02:11,510 --> 00:02:09,840  
that studies essentially lack scientific

61  
00:02:13,750 --> 00:02:11,520  
rigor with a number of problems

62  
00:02:16,150 --> 00:02:13,760  
depending on what the study may be

63  
00:02:18,790 --> 00:02:16,160

uh there's also an argument that we

64

00:02:21,030 --> 00:02:18,800

cannot have true uh controls in these

65

00:02:23,830 --> 00:02:21,040

studies because there's no way to

66

00:02:26,309 --> 00:02:23,840

control for off protocol prayer

67

00:02:28,710 --> 00:02:26,319

humans are likely to be prayed for by

68

00:02:30,790 --> 00:02:28,720

family or friends as well as receiving

69

00:02:32,949 --> 00:02:30,800

the intercessory prayer

70

00:02:36,630 --> 00:02:32,959

we certainly can't ask people to not be

71

00:02:38,630 --> 00:02:36,640

prayed for so can we really actually

72

00:02:41,350 --> 00:02:38,640

capture the effects of in

73

00:02:43,670 --> 00:02:41,360

additional intercessory prayer

74

00:02:46,309 --> 00:02:43,680

and there's also a range of criticism

75

00:02:48,710 --> 00:02:46,319

relative to potential confounds to the

76  
00:02:50,869 --> 00:02:48,720  
ip effects that have to do with the

77  
00:02:53,270 --> 00:02:50,879  
human subjects themselves

78  
00:02:55,430 --> 00:02:53,280  
saying that any effects of ip actually

79  
00:02:59,030 --> 00:02:55,440  
have to do with psychologic factors or

80  
00:03:02,630 --> 00:02:59,040  
social factors inherent in being human

81  
00:03:06,229 --> 00:03:02,640  
or potentially placebo effects

82  
00:03:09,509 --> 00:03:06,239  
so i decided to do my study uh

83  
00:03:15,350 --> 00:03:12,229  
one being is one way to begin to counter

84  
00:03:17,270 --> 00:03:15,360  
some of those criticisms

85  
00:03:18,710 --> 00:03:17,280  
and as i was reflecting on this whole

86  
00:03:19,910 --> 00:03:18,720  
issue

87  
00:03:24,309 --> 00:03:19,920  
i

88  
00:03:26,070 --> 00:03:24,319

would be to control for for example

89

00:03:29,030 --> 00:03:26,080

human confounds

90

00:03:30,550 --> 00:03:29,040

to help control for off protocol prayer

91

00:03:33,270 --> 00:03:30,560

even though there are some individuals

92

00:03:35,430 --> 00:03:33,280

who pray for healing and well-being of

93

00:03:37,750 --> 00:03:35,440

all life on the planet those people are

94

00:03:41,110 --> 00:03:37,760

fewer than the individuals who would be

95

00:03:43,430 --> 00:03:41,120

praying for humans only

96

00:03:45,750 --> 00:03:43,440

and so a non-human primate model in

97

00:03:47,589 --> 00:03:45,760

particular provides an interesting

98

00:03:49,830 --> 00:03:47,599

parallel for us to take a look at the

99

00:03:51,910 --> 00:03:49,840

effects of ip but again offering for a

100

00:03:54,229 --> 00:03:51,920

variety of controls

101  
00:03:56,550 --> 00:03:54,239  
also controlled access to data

102  
00:03:59,190 --> 00:03:56,560  
animals always show up for their

103  
00:04:01,270 --> 00:03:59,200  
lab appointments

104  
00:04:03,350 --> 00:04:01,280  
it can be challenging though to find a

105  
00:04:04,470 --> 00:04:03,360  
comparable disorder one we find in

106  
00:04:07,350 --> 00:04:04,480  
animals

107  
00:04:09,589 --> 00:04:07,360  
that we can compare to humans

108  
00:04:10,869 --> 00:04:09,599  
self-injurious behavior is one of those

109  
00:04:13,830 --> 00:04:10,879  
disorders

110  
00:04:16,469 --> 00:04:13,840  
self-injurious behavior refers to

111  
00:04:19,349 --> 00:04:16,479  
potential a potentially severe form of

112  
00:04:22,950 --> 00:04:19,359  
behavioral pathology it's often found in

113  
00:04:25,749 --> 00:04:22,960

subgroups of primates captive primates

114

00:04:28,629 --> 00:04:25,759

it can consist of a variety of behaviors

115

00:04:30,790 --> 00:04:28,639

like hair plucking for example over

116

00:04:33,270 --> 00:04:30,800

grooming to the point of creating new

117

00:04:36,070 --> 00:04:33,280

wounds or perhaps aggravating existing

118

00:04:38,629 --> 00:04:36,080

wounds there seems to be a psychologic

119

00:04:41,270 --> 00:04:38,639

component so the etiology of this of

120

00:04:43,189 --> 00:04:41,280

this disorder appears to be found in

121

00:04:46,070 --> 00:04:43,199

primates who have been subjected to

122

00:04:47,990 --> 00:04:46,080

particularly adverse early experiences

123

00:04:50,950 --> 00:04:48,000

and have a variety of stressful

124

00:04:53,430 --> 00:04:50,960

experiences across their life

125

00:04:55,990 --> 00:04:53,440

and there are similarities between sib

126

00:04:58,390 --> 00:04:56,000

in primates and obsessive compulsive

127

00:05:01,030 --> 00:04:58,400

disorder in humans we can see people who

128

00:05:03,590 --> 00:05:01,040

perhaps engage in aggressive repetitive

129

00:05:07,670 --> 00:05:03,600

hand washing and they can actually end

130

00:05:10,150 --> 00:05:07,680

up creating wounds on their hands

131

00:05:12,150 --> 00:05:10,160

sib is believed related to serotonergic

132

00:05:14,469 --> 00:05:12,160

system dysregulation it's thought that

133

00:05:16,150 --> 00:05:14,479

there is too little serotonin centrally

134

00:05:18,629 --> 00:05:16,160

we see that an obsessive-compulsive

135

00:05:20,950 --> 00:05:18,639

disorder in people as well there's also

136

00:05:23,110 --> 00:05:20,960

data that suggests that there's hpa axis

137

00:05:25,390 --> 00:05:23,120

dysregulation that's occurring too some

138

00:05:27,510 --> 00:05:25,400

data suggesting too high levels of

139

00:05:30,950 --> 00:05:27,520

glucocorticoids particularly cortisol

140

00:05:33,189 --> 00:05:30,960

other data suggesting that it may be

141

00:05:34,950 --> 00:05:33,199

too little low levels

142

00:05:37,830 --> 00:05:34,960

what are the therapies for treating

143

00:05:40,629 --> 00:05:37,840

self-injurious behavior increasing the

144

00:05:41,990 --> 00:05:40,639

central levels of serotonin particularly

145

00:05:44,070 --> 00:05:42,000

through the administration of a

146

00:05:47,029 --> 00:05:44,080

particular class of antidepressants

147

00:05:49,590 --> 00:05:47,039

ssris or selective serotonin reuptake

148

00:05:51,830 --> 00:05:49,600

inhibitors you'd know it as paxil prozac

149

00:05:54,390 --> 00:05:51,840

that class of antidepressants

150

00:05:55,590 --> 00:05:54,400

it works in people it also works in

151  
00:05:58,550 --> 00:05:55,600

primate

152  
00:06:00,950 --> 00:05:58,560

however there are many animal labs

153  
00:06:03,670 --> 00:06:00,960

primate labs who are too small and don't

154  
00:06:06,790 --> 00:06:03,680

have the funding to be able to afford

155  
00:06:08,870 --> 00:06:06,800

ssri therapy it's really quite expensive

156  
00:06:10,870 --> 00:06:08,880

so an alternative that's been used is

157  
00:06:13,350 --> 00:06:10,880

oral l-tryptophan

158  
00:06:14,390 --> 00:06:13,360

it's a dietary component it's taken

159  
00:06:16,390 --> 00:06:14,400

orally

160  
00:06:19,670 --> 00:06:16,400

with the thought that let central levels

161  
00:06:20,629 --> 00:06:19,680

of serotonin would increase and in turn

162  
00:06:22,870 --> 00:06:20,639

change

163  
00:06:26,550 --> 00:06:22,880

the consequent behavior or reduce the

164

00:06:31,189 --> 00:06:29,029

wound healing is a complex biological

165

00:06:34,070 --> 00:06:31,199

process it occurs across three

166

00:06:36,150 --> 00:06:34,080

non-linear phases the first phase is

167

00:06:39,189 --> 00:06:36,160

inflammation significant for blood

168

00:06:41,670 --> 00:06:39,199

clotting and migration of a variety of

169

00:06:43,990 --> 00:06:41,680

immune cells to the wound site the

170

00:06:46,230 --> 00:06:44,000

second is proliferation and granulation

171

00:06:48,469 --> 00:06:46,240

tissue formation there is new tissue

172

00:06:51,430 --> 00:06:48,479

that's formed it's temporary tissue it's

173

00:06:53,990 --> 00:06:51,440

viable but temporary to seal the wound

174

00:06:55,830 --> 00:06:54,000

creating a new epidermal surface and

175

00:06:57,510 --> 00:06:55,840

tissue remodeling with the goal of

176  
00:06:59,830 --> 00:06:57,520  
actually getting the tissue back to the

177  
00:07:02,550 --> 00:06:59,840  
original structure and function

178  
00:07:06,070 --> 00:07:02,560  
there are a number of factors that come

179  
00:07:08,390 --> 00:07:06,080  
into play across these three

180  
00:07:09,990 --> 00:07:08,400  
processes these three phases such as the

181  
00:07:12,790 --> 00:07:10,000  
immune system growth factors

182  
00:07:13,749 --> 00:07:12,800  
chemoattract and cytokines and oxygen is

183  
00:07:17,110 --> 00:07:13,759  
also

184  
00:07:19,110 --> 00:07:17,120  
very important not initially a hypo

185  
00:07:21,189 --> 00:07:19,120  
hypoxic environment helps promote

186  
00:07:23,189 --> 00:07:21,199  
healing but

187  
00:07:24,309 --> 00:07:23,199  
oxygen is needed needed later on in the

188  
00:07:25,909 --> 00:07:24,319

process

189

00:07:28,550 --> 00:07:25,919

it's also important to consider

190

00:07:31,029 --> 00:07:28,560

psychological stress in large part

191

00:07:33,510 --> 00:07:31,039

because of the hpa axis and the hormonal

192

00:07:36,230 --> 00:07:33,520

cascade i made reference to earlier

193

00:07:38,870 --> 00:07:36,240

because that dysregulates many aspects

194

00:07:41,749 --> 00:07:38,880

of the body including the immune system

195

00:07:46,469 --> 00:07:41,759

and definitely influences negatively the

196

00:07:51,589 --> 00:07:49,270

so in addition to creating this study to

197

00:07:53,430 --> 00:07:51,599

address some of the criticisms that were

198

00:07:55,110 --> 00:07:53,440

levied there were three other purposes

199

00:07:58,309 --> 00:07:55,120

to this study one was to assess the

200

00:08:00,629 --> 00:07:58,319

effectiveness of of ip on wound healing

201  
00:08:03,589 --> 00:08:00,639  
the second to assess the effects of ip

202  
00:08:05,189 --> 00:08:03,599  
on self injurious behavior and the last

203  
00:08:08,309 --> 00:08:05,199  
was to monitor a variety of

204  
00:08:10,790 --> 00:08:08,319  
physiological data some blood data some

205  
00:08:13,350 --> 00:08:10,800  
data relative to the immune system and

206  
00:08:16,070 --> 00:08:13,360  
also levels of cortisol so we had a

207  
00:08:17,830 --> 00:08:16,080  
snapshot of the neuroendocrine system

208  
00:08:19,990 --> 00:08:17,840  
all of which relate to

209  
00:08:22,070 --> 00:08:20,000  
wound healing

210  
00:08:24,390 --> 00:08:22,080  
the animals were garnet bush babies

211  
00:08:26,230 --> 00:08:24,400  
they're prosimian primates they're small

212  
00:08:27,830 --> 00:08:26,240  
relatively easy to handle they're about

213  
00:08:30,469 --> 00:08:27,840

two two and a half pounds depending on

214

00:08:33,190 --> 00:08:30,479

the sex they are nocturnal and provide

215

00:08:35,829 --> 00:08:33,200

the benefits of a true primate model

216

00:08:37,509 --> 00:08:35,839

22 animals were used they were resident

217

00:08:39,589 --> 00:08:37,519

of the jackson state university center

218

00:08:41,829 --> 00:08:39,599

for persimmon studies ranging in age

219

00:08:43,990 --> 00:08:41,839

from two to fifteen years they were

220

00:08:45,670 --> 00:08:44,000

allowed to free feed nothing changed in

221

00:08:48,310 --> 00:08:45,680

terms of their behavior throughout the

222

00:08:50,949 --> 00:08:48,320

study and they were maintained on a 12

223

00:08:53,350 --> 00:08:50,959

12 light dark cycle with dark onset at 8

224

00:08:57,110 --> 00:08:53,360

a.m so that they were active when we

225

00:08:58,389 --> 00:08:57,120

were active coming into the lab

226

00:09:01,269 --> 00:08:58,399

we measured

227

00:09:03,910 --> 00:09:01,279

wound area and severity

228

00:09:06,470 --> 00:09:03,920

some blood measures red blood cell data

229

00:09:08,630 --> 00:09:06,480

including the account of red blood cells

230

00:09:10,630 --> 00:09:08,640

we took a look at levels of hemoglobin

231

00:09:12,470 --> 00:09:10,640

which is the protein that

232

00:09:14,550 --> 00:09:12,480

assists in the transport of oxygen

233

00:09:16,070 --> 00:09:14,560

throughout the body hematocrit to take a

234

00:09:17,590 --> 00:09:16,080

look at the proportion of red blood

235

00:09:19,269 --> 00:09:17,600

cells and the volume of blood we were

236

00:09:21,430 --> 00:09:19,279

looking at

237

00:09:23,350 --> 00:09:21,440

mean corpuscular volume was there

238

00:09:24,310 --> 00:09:23,360

changes in the size of the red blood

239

00:09:25,670 --> 00:09:24,320

cell

240

00:09:27,670 --> 00:09:25,680

what happened to the amount of

241

00:09:29,030 --> 00:09:27,680

hemoglobin that the individual cells

242

00:09:31,350 --> 00:09:29,040

were carrying

243

00:09:33,910 --> 00:09:31,360

there were a variety of leukocyte levels

244

00:09:37,509 --> 00:09:33,920

white blood cells that were assessed and

245

00:09:39,990 --> 00:09:37,519

again plasma cortisol

246

00:09:41,590 --> 00:09:40,000

i was also interested in behavior i

247

00:09:44,310 --> 00:09:41,600

wanted to see what happened with these

248

00:09:47,910 --> 00:09:44,320

animals grooming so they were videotaped

249

00:09:50,070 --> 00:09:47,920

for 15 minute intervals both am and pm

250

00:09:51,509 --> 00:09:50,080

counterbalanced so that we were able to

251

00:09:52,790 --> 00:09:51,519

achieve

252

00:09:55,030 --> 00:09:52,800

some

253

00:09:57,030 --> 00:09:55,040

representative sampling across time

254

00:09:57,910 --> 00:09:57,040

there were two variables of interest to