

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use STELARA® safely and effectively. See full prescribing information for STELARA®.

STELARA® (ustekinumab) injection, for subcutaneous use
Initial U.S. Approval: 2009

INDICATIONS AND USAGE

STELARA® is a human interleukin-12 and -23 antagonist indicated for the treatment of adult patients (18 years or older) with moderate to severe plaque psoriasis who are candidates for phototherapy or systemic therapy. (1)

DOSAGE AND ADMINISTRATION

STELARA® is administered by subcutaneous injection. (2)

- For patients weighing ≤100 kg (220 lbs), the recommended dose is 45 mg initially and 4 weeks later, followed by 45 mg every 12 weeks. (2.1)
- For patients weighing >100 kg (220 lbs), the recommended dose is 90 mg initially and 4 weeks later, followed by 90 mg every 12 weeks. (2.1)

DOSAGE FORMS AND STRENGTHS

- Injection: 45 mg/0.5 mL in a single-use prefilled syringe (3)
- Injection: 90 mg/1 mL in a single-use prefilled syringe (3)
- Injection: 45 mg/0.5 mL in a single-use vial (3)
- Injection: 90 mg/1 mL in a single-use vial (3)

CONTRAINDICATIONS

None (4)

WARNINGS AND PRECAUTIONS

- Infections:** Serious infections have occurred. Do not start STELARA® during any clinically important active infection. If a serious infection develops, stop STELARA® until the infection resolves. (5.1)
- Theoretical Risk for Particular Infections:** Serious infections from mycobacteria, salmonella and Bacillus Calmette-Guerin (BCG) vaccinations have been reported in patients genetically deficient in IL-12/IL-23. Diagnostic tests for these infections should be considered as dictated by clinical circumstances. (5.2)
- Tuberculosis (TB):** Evaluate patients for TB prior to initiating treatment with STELARA®. Initiate treatment of latent TB before administering STELARA®. (5.3)
- Malignancies:** STELARA® may increase risk of malignancy. The safety of STELARA® in patients with a history of or a known malignancy has not been evaluated. (5.4)
- Anaphylaxis or serious allergic reactions** may occur. (5.5)
- Reversible Posterior Leukoencephalopathy Syndrome (RPLS):** One case was reported. If suspected, treat promptly and discontinue STELARA®. (5.6)

ADVERSE REACTIONS

Most common adverse reactions (incidence >3% and greater than with placebo): Nasopharyngitis, upper respiratory tract infection, headache, and fatigue. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Janssen Biotech, Inc. at 1-800-JANSSEN (1-800-526-7736) or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

- Live vaccines:** Live vaccines should not be given with STELARA®. (7.1)
- Concomitant therapy:** The safety of concomitant use of STELARA® with immunosuppressants or phototherapy has not been evaluated. (7.2)

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide

Revised: 05/2012

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1 **FULL PRESCRIBING INFORMATION**

2
3 **1 INDICATIONS AND USAGE**

4 STELARA[®] is indicated for the treatment of adult patients (18 years or older) with moderate to severe
5 plaque psoriasis who are candidates for phototherapy or systemic therapy.

6
7 **2 DOSAGE AND ADMINISTRATION**

8 **2.1 Dosing**

9 STELARA[®] is administered by subcutaneous injection.

- 10
- 11 • For patients weighing ≤ 100 kg (220 lbs), the recommended dose is 45 mg initially and 4 weeks
12 later, followed by 45 mg every 12 weeks.
 - 13
 - 14 • For patients weighing > 100 kg (220 lbs), the recommended dose is 90 mg initially and 4 weeks
15 later, followed by 90 mg every 12 weeks.

16
17 In subjects weighing > 100 kg, 45 mg was also shown to be efficacious. However, 90 mg resulted in
18 greater efficacy in these subjects [*see Clinical Studies (14)*].

19
20 **2.2 General Considerations for Administration**

21 STELARA[®] is for subcutaneous administration under the supervision of a physician.

22
23 Prior to administration, STELARA[®] should be visually inspected for particulate matter and
24 discoloration. STELARA[®] is colorless to light yellow and may contain a few small translucent or
25 white particles. STELARA[®] should not be used if it is discolored or cloudy, or if other particulate
26 matter is present. STELARA[®] does not contain preservatives; therefore, any unused product remaining
27 in the vial and/or syringe should be discarded.

28
29 The needle cover on the prefilled syringe contains dry natural rubber (a derivative of latex). The
30 needle cover should not be handled by persons sensitive to latex.

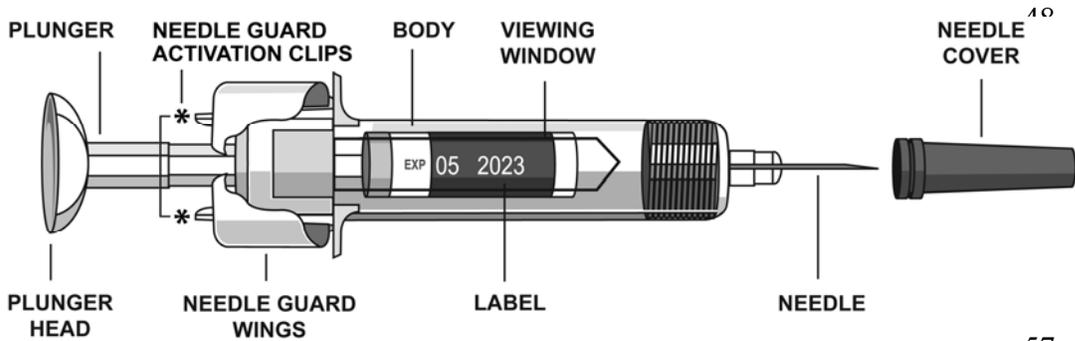
31
32 It is recommended that each injection be administered at a different anatomic location (such as upper
33 arms, gluteal regions, thighs, or any quadrant of abdomen) than the previous injection, and not into
34 areas where the skin is tender, bruised, erythematous, or indurated. When using the single-use vial, a
35 27 gauge, ½ inch needle is recommended.

36
37 STELARA[®] should only be administered by a healthcare provider. STELARA[®] should only be
38 administered to patients who will be closely monitored and have regular follow-up visits with a
39 physician.

40
41 **2.3 Instructions for Administration of STELARA[®] Prefilled Syringes Equipped with Needle
42 Safety Guard**

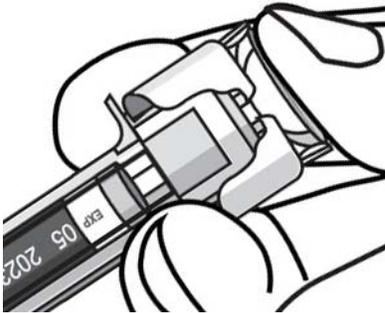
43 Refer to the diagram below for the provided instructions.

44
45 **To prevent premature activation of the needle safety guard, do not touch the NEEDLE GUARD
46 ACTIVATION CLIPS at any time during use.**

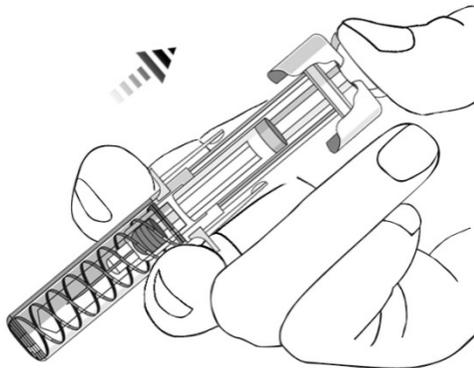


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- Hold the BODY and remove the NEEDLE COVER. **Do not hold the PLUNGER or PLUNGER HEAD while removing the NEEDLE COVER or the PLUNGER may move. Do not use the prefilled syringe if it is dropped without the NEEDLE COVER in place.**
- Inject STELARA[®] subcutaneously as recommended [*see Dosage and Administration (2.2)*].
- Inject all of the medication by pushing in the PLUNGER until the PLUNGER HEAD is completely between the needle guard wings. **Injection of the entire prefilled syringe contents is necessary to activate the needle guard.**



- After injection, maintain the pressure on the PLUNGER HEAD and remove the needle from the skin. Slowly take your thumb off the PLUNGER HEAD to allow the empty syringe to move up until the entire needle is covered by the needle guard, as shown by the illustration below:



106
107 • Used syringes should be placed in a puncture-resistant container.
108

109 **3 DOSAGE FORMS AND STRENGTHS**
110 STELARA[®] solution is colorless to slightly yellow in appearance and contains 90 mg ustekinumab per
111 mL.

- 112 • Injection: 45 mg/0.5 mL in a single-use prefilled syringe
- 113 • Injection: 90 mg/1 mL in a single-use prefilled syringe
- 114 • Injection: 45 mg/0.5 mL in a single-use vial
- 115 • Injection: 90 mg/1 mL in a single-use vial

116

117 **4 CONTRAINDICATIONS**
118 None.
119

120 **5 WARNINGS AND PRECAUTIONS**

121 **5.1 Infections**
122 STELARA[®] may increase the risk of infections and reactivation of latent infections. Serious bacterial,
123 fungal, and viral infections were observed in subjects receiving STELARA[®] [see *Adverse Reactions*
124 (6.1)].
125

126 STELARA[®] should not be given to patients with any clinically important active infection.
127 STELARA[®] should not be administered until the infection resolves or is adequately treated. Instruct
128 patients to seek medical advice if signs or symptoms suggestive of an infection occur. Exercise caution
129 when considering the use of STELARA[®] in patients with a chronic infection or a history of recurrent
130 infection.
131

132 Serious infections requiring hospitalization occurred in the psoriasis development program. These
133 serious infections included cellulitis, diverticulitis, osteomyelitis, viral infections, gastroenteritis,
134 pneumonia, and urinary tract infections.
135

136 **5.2 Theoretical Risk for Vulnerability to Particular Infections**
137 Individuals genetically deficient in IL-12/IL-23 are particularly vulnerable to disseminated infections
138 from mycobacteria (including nontuberculous, environmental mycobacteria), salmonella (including
139 nontyphi strains), and Bacillus Calmette-Guerin (BCG) vaccinations. Serious infections and fatal
140 outcomes have been reported in such patients.
141

142 It is not known whether patients with pharmacologic blockade of IL-12/IL-23 from treatment with
143 STELARA[®] will be susceptible to these types of infections. Appropriate diagnostic testing should be
144 considered, e.g., tissue culture, stool culture, as dictated by clinical circumstances.
145

146 **5.3 Pre-treatment Evaluation for Tuberculosis**
147 Evaluate patients for tuberculosis infection prior to initiating treatment with STELARA[®].
148 Do not administer STELARA[®] to patients with active tuberculosis. Initiate treatment of latent
149 tuberculosis prior to administering STELARA[®]. Consider anti-tuberculosis therapy prior to initiation
150 of STELARA[®] in patients with a past history of latent or active tuberculosis in whom an adequate

151 course of treatment cannot be confirmed. Patients receiving STELARA[®] should be monitored closely
152 for signs and symptoms of active tuberculosis during and after treatment.

153

154 **5.4 Malignancies**

155 STELARA[®] is an immunosuppressant and may increase the risk of malignancy. Malignancies were
156 reported among subjects who received STELARA[®] in clinical studies [see *Adverse Reactions (6.1)*].
157 In rodent models, inhibition of IL-12/IL-23p40 increased the risk of malignancy [see *Nonclinical*
158 *Toxicology (13)*].

159

160 The safety of STELARA[®] has not been evaluated in patients who have a history of malignancy or who
161 have a known malignancy.

162

163 **5.5 Hypersensitivity Reactions**

164 Serious allergic reactions, including angioedema and possible anaphylaxis, have been reported post-
165 marketing. If an anaphylactic or other serious allergic reaction occurs, discontinue STELARA[®] and
166 institute appropriate therapy [see *Adverse Reactions (6.3)*].

167

168 **5.6 Reversible Posterior Leukoencephalopathy Syndrome**

169 One case of reversible posterior leukoencephalopathy syndrome (RPLS) was observed during the
170 clinical development program which included 3523 STELARA[®]-treated subjects. The subject, who
171 had received 12 doses of STELARA[®] over approximately two years, presented with headache,
172 seizures and confusion. No additional STELARA[®] injections were administered and the subject fully
173 recovered with appropriate treatment.

174

175 RPLS is a neurological disorder, which is not caused by demyelination or a known infectious agent.
176 RPLS can present with headache, seizures, confusion and visual disturbances. Conditions with which
177 it has been associated include preeclampsia, eclampsia, acute hypertension, cytotoxic agents and
178 immunosuppressive therapy. Fatal outcomes have been reported.

179

180 If RPLS is suspected, STELARA[®] should be discontinued and appropriate treatment administered.

181

182 **5.7 Immunizations**

183 Prior to initiating therapy with STELARA[®], patients should receive all immunizations appropriate for
184 age as recommended by current immunization guidelines. Patients being treated with STELARA[®]
185 should not receive live vaccines. BCG vaccines should not be given during treatment with
186 STELARA[®] or for one year prior to initiating treatment or one year following discontinuation of
187 treatment. Caution is advised when administering live vaccines to household contacts of patients
188 receiving STELARA[®] because of the potential risk for shedding from the household contact and
189 transmission to patient.

190

191 Non-live vaccinations received during a course of STELARA[®] may not elicit an immune response
192 sufficient to prevent disease.

193

194 **5.8 Concomitant Therapies**

195 The safety of STELARA[®] in combination with other immunosuppressive agents or phototherapy has
196 not been evaluated. Ultraviolet-induced skin cancers developed earlier and more frequently in mice

197 genetically manipulated to be deficient in both IL-12 and IL-23 or IL-12 alone [see *Nonclinical*
198 *Toxicology (13)*].

199

200 **6 ADVERSE REACTIONS**

201 The following serious adverse reactions are discussed elsewhere in the label:

202

- 203 • Infections [see *Warnings and Precautions (5.1)*]
- 204 • Malignancies [see *Warnings and Precautions (5.4)*]
- 205 • Reversible Posterior Leukoencephalopathy Syndrome [see *Warnings and Precautions (5.6)*]

206

207 **6.1 Clinical Studies Experience**

208 Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed
209 in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug
210 and may not reflect the rates observed in practice.

211

212 The safety data reflect exposure to STELARA[®] in 3117 psoriasis subjects, including 2414 exposed for
213 at least 6 months, 1852 exposed for at least one year, 1650 exposed for at least two years, 1129
214 exposed for at least three years, and 619 exposed for at least four years.

215

216 Table 1 summarizes the adverse reactions that occurred at a rate of at least 1% and at a higher rate in
217 the STELARA[®] groups than the placebo group during the placebo-controlled period of STUDY 1 and
218 STUDY 2 [see *Clinical Studies (14)*].

219

Table 1. Adverse reactions reported by $\geq 1\%$ of subjects through Week 12 in STUDY 1 and STUDY 2

	STELARA [®]		
	Placebo	45 mg	90 mg
Subjects treated	665	664	666
Nasopharyngitis	51 (8%)	56 (8%)	49 (7%)
Upper respiratory tract infection	30 (5%)	36 (5%)	28 (4%)
Headache	23 (3%)	33 (5%)	32 (5%)
Fatigue	14 (2%)	18 (3%)	17 (3%)
Diarrhea	12 (2%)	13 (2%)	13 (2%)
Back pain	8 (1%)	9 (1%)	14 (2%)
Dizziness	8 (1%)	8 (1%)	14 (2%)
Pharyngolaryngeal pain	7 (1%)	9 (1%)	12 (2%)
Pruritus	9 (1%)	10 (2%)	9 (1%)
Injection site erythema	3 (<1%)	6 (1%)	13 (2%)
Myalgia	4 (1%)	7 (1%)	8 (1%)
Depression	3 (<1%)	8 (1%)	4 (1%)

220

221 Adverse reactions that occurred at rates less than 1% in the controlled period of STUDIES 1 and 2
222 through week 12 included: cellulitis, herpes zoster, diverticulitis and certain injection site reactions
223 (pain, swelling, pruritus, induration, hemorrhage, bruising, and irritation).

224
225 One case of RPLS occurred during clinical trials [see Warnings and Precautions (5.6)].
226

227 Infections

228 In the placebo-controlled period of clinical studies of psoriasis subjects (average follow-up of 12.6
229 weeks for placebo-treated subjects and 13.4 weeks for STELARA[®]-treated subjects), 27% of
230 STELARA[®]-treated subjects reported infections (1.39 per subject-year of follow-up) compared with
231 24% of placebo-treated subjects (1.21 per subject-year of follow-up). Serious infections occurred in
232 0.3% of STELARA[®]-treated subjects (0.01 per subject-year of follow-up) and in 0.4% of placebo-
233 treated subjects (0.02 per subject-year of follow-up) [see Warnings and Precautions (5.1)].
234

235 In the controlled and non-controlled portions of psoriasis clinical trials (median follow up of 2.6
236 years), representing 6791 subject-years of exposure, 70% of STELARA[®]-treated subjects reported
237 infections (0.98 per subject-years of follow-up). Serious infections were reported in 2% of subjects
238 (0.01 per subject-years of follow-up).
239

240 Malignancies

241 In the controlled and non-controlled portions of psoriasis clinical trials (median follow up of 2.6 years,
242 representing 6791 subject-years of exposure), 1.3% of STELARA-treated subjects reported
243 malignancies excluding non-melanoma skin cancers (0.62 per hundred subject-years of follow-up).
244 Non-melanoma skin cancer was reported in 1.3% of STELARA-treated subjects (0.61 per hundred
245 subject-years of follow-up). [see Warnings and Precautions (5.4)]. The most frequently observed
246 malignancies other than non-melanoma skin cancer during the clinical trials were: prostate, colorectal,
247 melanoma in situ, breast. Malignancies other than non-melanoma skin cancer in STELARA-treated
248 patients during the controlled and uncontrolled portions of studies were similar in type and number to
249 what would be expected in the general U.S. population according to the SEER database (adjusted for
250 age, gender and race).¹
251

252 **6.2 Immunogenicity**

253 The presence of ustekinumab in the serum can interfere with the detection of anti-ustekinumab
254 antibodies resulting in inconclusive results due to assay interference. In STUDIES 1 and 2, antibody
255 testing was done at time points when ustekinumab may have been present in the serum. Table 2
256 summarizes the antibody results from STUDY 1 through year 3 and STUDY 2 through year 4.
257

258 **Table 2: Presence of anti-ustekinumab antibodies in STUDY 1 through Year 3 and STUDY 2**
259 **through Year 4.**

Antibody Results	STUDY 1 (N=746)	STUDY 2 (N=1202)
Positive	39 (5%)	65 (5%)
Negative	124(17%)	150 (12%)
Inconclusive	583 (78%)	987 (82%)

260
261 The data reflect the percentage of subjects whose test results were positive for antibodies to
262 ustekinumab in a bridging immunoassay, and are highly dependent on the sensitivity and specificity of
263 the assay. Additionally, the observed incidence of antibody positivity in an assay may be influenced by
264 several factors, including sample handling, timing of sample collection, concomitant medications and

265 underlying disease. For these reasons, comparison of the incidence of antibodies to ustekinumab with
266 the incidence of antibodies to other products may be misleading.

267

268 **6.3 Post-marketing Experience**

269 Adverse reactions have been reported during post-approval use with STELARA[®]. Because these
270 reactions are reported voluntarily from a population of uncertain size, it is not always possible to
271 reliably estimate their frequency or establish a causal relationship to STELARA[®] exposure.

272 *Immune system disorders:* Serious allergic reactions (including angioedema, dyspnea and
273 hypotension), hypersensitivity reactions (including rash and urticaria).

274

275 **7 DRUG INTERACTIONS**

276 Drug interaction studies have not been conducted with STELARA[®].

277

278 **7.1 Live Vaccines**

279 Live vaccines should not be given concurrently with STELARA[®] [*see Warnings and Precautions*
280 (5.7)].

281

282 **7.2 Concomitant Therapies**

283 The safety of STELARA[®] in combination with immunosuppressive agents or phototherapy has not
284 been evaluated [*see Warnings and Precautions* (5.8)].

285

286 **7.3 CYP450 Substrates**

287 The formation of CYP450 enzymes can be altered by increased levels of certain cytokines (e.g., IL-1,
288 IL-6, IL-10, TNF α , IFN) during chronic inflammation. Thus, STELARA, an antagonist of IL-12 and
289 IL-23, could normalize the formation of CYP450 enzymes. Upon initiation of STELARA in patients
290 who are receiving concomitant CYP450 substrates, particularly those with a narrow therapeutic index,
291 monitoring for therapeutic effect (e.g., for warfarin) or drug concentration (e.g., for cyclosporine)
292 should be considered and the individual dose of the drug adjusted as needed [*see Clinical*
293 *Pharmacology* (12.3)].

294

295 **7.4 Allergen Immunotherapy**

296 STELARA[®] has not been evaluated in patients who have undergone allergy immunotherapy.
297 STELARA[®] may decrease the protective effect of allergen immunotherapy (decrease tolerance) which
298 may increase the risk of an allergic reaction to a dose of allergen immunotherapy. Therefore, caution
299 should be exercised in patients receiving or who have received allergen immunotherapy, particularly
300 for anaphylaxis.

301

302 **8 USE IN SPECIFIC POPULATIONS**

303 **8.1 Pregnancy**

304 *Pregnancy Category B*

305 There are no studies of STELARA[®] in pregnant women. STELARA[®] should be used during
306 pregnancy only if the potential benefit justifies the potential risk to the fetus. No teratogenic effects
307 were observed in the developmental and reproductive toxicology studies performed in cynomolgus
308 monkeys at doses up to 45 mg/kg ustekinumab, which is 45 times (based on mg/kg) the highest
309 intended clinical dose in psoriasis patients (approximately 1 mg/kg based on administration of a 90 mg
310 dose to a 90 kg psoriasis patient).

311
312 Ustekinumab was tested in two embryo-fetal development toxicity studies. Pregnant cynomolgus
313 monkeys were administered ustekinumab at doses up to 45 mg/kg during the period of organogenesis
314 either twice weekly via subcutaneous injections or weekly by intravenous injections. No significant
315 adverse developmental effects were noted in either study.

316
317 In an embryo-fetal development and pre- and post-natal development toxicity study, three groups of 20
318 pregnant cynomolgus monkeys were administered subcutaneous doses of 0, 22.5, or 45 mg/kg
319 ustekinumab twice weekly from the beginning of organogenesis in cynomolgus monkeys to Day 33
320 after delivery. There were no treatment-related effects on mortality, clinical signs, body weight, food
321 consumption, hematology, or serum biochemistry in dams. Fetal losses occurred in six control
322 monkeys, six 22.5 mg/kg-treated monkeys, and five 45 mg/kg-treated monkeys. Neonatal deaths
323 occurred in one 22.5 mg/kg-treated monkey and in one 45 mg/kg-treated monkey. No ustekinumab-
324 related abnormalities were observed in the neonates from birth through six months of age in clinical
325 signs, body weight, hematology, or serum biochemistry. There were no treatment-related effects on
326 functional development until weaning, functional development after weaning, morphological
327 development, immunological development, and gross and histopathological examinations of offsprings
328 by the age of 6 months.

329

330 **8.3 Nursing Mothers**

331 Caution should be exercised when STELARA[®] is administered to a nursing woman. The unknown
332 risks to the infant from gastrointestinal or systemic exposure to ustekinumab should be weighed
333 against the known benefits of breast-feeding. Ustekinumab is excreted in the milk of lactating
334 monkeys administered ustekinumab. IgG is excreted in human milk, so it is expected that STELARA[®]
335 will be present in human milk. It is not known if ustekinumab is absorbed systemically after ingestion;
336 however, published data suggest that antibodies in breast milk do not enter the neonatal and infant
337 circulation in substantial amounts.

338

339 **8.4 Pediatric Use**

340 Safety and effectiveness of STELARA[®] in pediatric patients have not been evaluated.

341

342 **8.5 Geriatric Use**

343 Of the 3117 psoriasis subjects exposed to STELARA[®], a total of 183 were 65 years or older, and 21
344 subjects were 75 years or older. Although no differences in safety or efficacy were observed between
345 older and younger subjects, the number of subjects aged 65 and over is not sufficient to determine
346 whether they respond differently from younger subjects.

347

348 **10 OVERDOSAGE**

349 Single doses up to 4.5 mg/kg intravenously have been administered in clinical studies without dose-
350 limiting toxicity. In case of overdosage, it is recommended that the patient be monitored for any signs
351 or symptoms of adverse reactions or effects and appropriate symptomatic treatment be instituted
352 immediately.

353

354 **11 DESCRIPTION**

355 STELARA[®] is a human IgG1κ monoclonal antibody against the p40 subunit of the IL-12 and IL-23
356 cytokines. Using DNA recombinant technology, STELARA[®] is produced in a well characterized

357 recombinant cell line and is purified using standard bio-processing technology. The manufacturing
358 process contains steps for the clearance of viruses. STELARA[®] is comprised of 1326 amino acids and
359 has an estimated molecular mass that ranges from 148,079 to 149,690 Daltons.

360
361 STELARA[®], for subcutaneous use, is available as: 45 mg of ustekinumab in 0.5 mL and 90 mg of
362 ustekinumab in 1 mL. STELARA[®] is supplied as a sterile solution in a single-use prefilled syringe
363 with a 27 gauge fixed ½ inch needle, or a single-use 2 mL Type I glass vial with a coated stopper. The
364 syringe is fitted with a passive needle guard and a needle cover that is manufactured using a dry
365 natural rubber (a derivative of latex).

366
367 Each 45 mg ustekinumab prefilled syringe also contains: L-histidine and L-histidine
368 monohydrochloride monohydrate (0.5 mg), Polysorbate 80 (0.02 mg), and sucrose (38 mg) to fill to a
369 final volume of 0.5 mL.

370
371 Each 90 mg ustekinumab prefilled syringe also contains: L-histidine and L-histidine
372 monohydrochloride monohydrate (1 mg), Polysorbate 80 (0.04 mg), and sucrose (76 mg) to fill to a
373 final volume of 1 mL.

374
375 Each 45 mg ustekinumab vial also contains: L-histidine and L-histidine monohydrochloride
376 monohydrate (0.5 mg), Polysorbate 80 (0.02 mg), and sucrose (38 mg) to fill to a final volume of 0.5
377 mL.

378
379 Each 90 mg ustekinumab vial also contains: L-histidine and L-histidine monohydrochloride
380 monohydrate (1 mg), Polysorbate 80 (0.04 mg), and sucrose (76 mg) to fill to a final volume of 1 mL.

381
382 The STELARA[®] solution is colorless to slightly yellow in appearance and has a pH of 5.7-6.3.
383 STELARA[®] does not contain preservatives.

384

385 **12 CLINICAL PHARMACOLOGY**

386 **12.1 Mechanism of Action**

387 Ustekinumab is a human IgG1κ monoclonal antibody that binds with high affinity and specificity to
388 the p40 protein subunit used by both the interleukin (IL)-12 and IL-23 cytokines. IL-12 and IL-23 are
389 naturally occurring cytokines that are involved in inflammatory and immune responses, such as natural
390 killer cell activation and CD4+ T-cell differentiation and activation. In *in vitro* models, ustekinumab
391 was shown to disrupt IL-12 and IL-23 mediated signaling and cytokine cascades by disrupting the
392 interaction of these cytokines with a shared cell-surface receptor chain, IL-12 β1.

393

394 **12.2 Pharmacodynamics**

395 In a small exploratory study, a decrease was observed in the expression of mRNA of its molecular
396 targets IL-12 and IL-23 in lesional skin biopsies measured at baseline and up to two weeks post-
397 treatment in psoriatic subjects.

398

399 **12.3 Pharmacokinetics**

400 Absorption

401 In psoriasis subjects, the median time to reach the maximum serum concentration (T_{max}) was 13.5 days
402 and 7 days, respectively, after a single subcutaneous administration of 45 mg (N=22) and 90 mg

403 (N=24) of ustekinumab. In healthy subjects (N=30), the median T_{max} value (8.5 days) following a
404 single subcutaneous administration of 90 mg of ustekinumab was comparable to that observed in
405 psoriasis subjects. Following multiple subcutaneous doses of STELARA[®], the steady-state serum
406 concentrations of ustekinumab were achieved by Week 28. The mean (\pm SD) steady-state trough serum
407 concentration ranged from 0.31 ± 0.33 mcg/mL (45 mg) to 0.64 ± 0.64 mcg/mL (90 mg). There was
408 no apparent accumulation in serum ustekinumab concentration over time when given subcutaneously
409 every 12 weeks.

410

411 Distribution

412 Following subcutaneous administration of 45 mg (N=18) and 90 mg (N=21) of ustekinumab to
413 psoriasis subjects, the mean (\pm SD) apparent volume of distribution during the terminal phase (V_z/F)
414 was 161 ± 65 mL/kg and 179 ± 85 mL/kg, respectively. The mean (\pm SD) volume of distribution
415 during the terminal phase (V_z) following a single intravenous administration to subjects with psoriasis
416 ranged from 56.1 ± 6.5 to 82.1 ± 23.6 mL/kg.

417

418 Metabolism

419 The metabolic pathway of ustekinumab has not been characterized. As a human IgG1 κ monoclonal
420 antibody ustekinumab is expected to be degraded into small peptides and amino acids via catabolic
421 pathways in the same manner as endogenous IgG.

422

423 Elimination

424 The mean (\pm SD) systemic clearance (CL) following a single intravenous administration of
425 ustekinumab to psoriasis subjects ranged from 1.90 ± 0.28 to 2.22 ± 0.63 mL/day/kg. The mean
426 (\pm SD) half-life ranged from 14.9 ± 4.6 to 45.6 ± 80.2 days across all psoriasis studies following
427 intravenous and subcutaneous administration.

428

429 Weight

430 When given the same dose, subjects weighing >100 kg had lower median serum ustekinumab
431 concentrations compared with those subjects weighing ≤ 100 kg. The median trough serum
432 concentrations of ustekinumab in subjects of higher weight (>100 kg) in the 90 mg group were
433 comparable to those in subjects of lower weight (≤ 100 kg) in the 45 mg group.

434

435 Hepatic and Renal Impairment

436 No pharmacokinetic data are available in patients with hepatic or renal impairment.

437

438 Elderly

439 A population pharmacokinetic analysis (N=106/1937 subjects greater than or equal to 65 years old)
440 was performed to evaluate the effect of age on the pharmacokinetics of ustekinumab. There were no
441 apparent changes in pharmacokinetic parameters (clearance and volume of distribution) in subjects
442 older than 65 years old.

443

444 Drug-Drug Interactions

445 The effects of IL-12 or IL-23 on the regulation of CYP450 enzymes were evaluated in an *in vitro*
446 study using human hepatocytes, which showed that IL-12 and/or IL-23 at levels of 10 ng/mL did not
447 alter human CYP450 enzyme activities (CYP1A2, 2B6, 2C9, 2C19, 2D6, or 3A4). However, the
448 clinical relevance of *in vitro* data has not been established [*see Drug Interactions (7.3)*].

449

450 **13 NONCLINICAL TOXICOLOGY**

451 **13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility**

452 Animal studies have not been conducted to evaluate the carcinogenic or mutagenic potential of
453 STELARA[®]. Published literature showed that administration of murine IL-12 caused an anti-tumor
454 effect in mice that contained transplanted tumors and IL-12/IL-23p40 knockout mice or mice treated
455 with anti-IL-12/IL-23p40 antibody had decreased host defense to tumors. Mice genetically
456 manipulated to be deficient in both IL-12 and IL-23 or IL-12 alone developed UV-induced skin
457 cancers earlier and more frequently compared to wild-type mice. The relevance of these experimental
458 findings in mouse models for malignancy risk in humans is unknown.

459

460 A male fertility study was conducted with only 6 male monkeys per group administered subcutaneous
461 doses of 0, 22.5, or 45 mg/kg ustekinumab twice weekly prior to mating and during the mating period
462 for 13 weeks, followed by a 13-week treatment-free period. Although fertility and pregnancy
463 outcomes were not evaluated in mated females, there were no treatment-related effects on parental
464 toxicity or male fertility parameters.

465

466 A female fertility study was conducted in mice using an analogous IL-12/IL-23p40 antibody by
467 subcutaneous administration at doses up to 50 mg/kg, twice weekly, beginning 15 days before
468 cohabitation and continuing through GD 7. There were no treatment-related effects on maternal
469 toxicity or female fertility parameters.

470

471 **13.2 Animal Toxicology and/or Pharmacology**

472 In a 26-week toxicology study, one out of 10 monkeys subcutaneously administered 45 mg/kg
473 ustekinumab twice weekly for 26 weeks had a bacterial infection.

474

475 **14 CLINICAL STUDIES**

476 Two multicenter, randomized, double-blind, placebo-controlled studies (STUDY 1 and STUDY 2)
477 enrolled a total of 1996 subjects 18 years of age and older with plaque psoriasis who had a minimum
478 body surface area involvement of 10%, and Psoriasis Area and Severity Index (PASI) score ≥ 12 , and
479 who were candidates for phototherapy or systemic therapy. Subjects with guttate, erythrodermic, or
480 pustular psoriasis were excluded from the studies.

481

482 STUDY 1 enrolled 766 subjects and STUDY 2 enrolled 1230 subjects. The studies had the same
483 design through Week 28. In both studies, subjects were randomized in equal proportion to placebo, 45
484 mg or 90 mg of STELARA[®]. Subjects randomized to STELARA[®] received 45 mg or 90 mg doses,
485 regardless of weight, at Weeks 0, 4, and 16. Subjects randomized to receive placebo at Weeks 0 and 4
486 crossed over to receive STELARA[®] (either 45 mg or 90 mg) at Weeks 12 and 16.

487

488 In both studies, the endpoints were the proportion of subjects who achieved at least a 75% reduction in
489 PASI score (PASI 75) from baseline to Week 12 and treatment success (cleared or minimal) on the
490 Physician's Global Assessment (PGA). The PGA is a 6-category scale ranging from 0 (cleared) to 5
491 (severe) that indicates the physician's overall assessment of psoriasis focusing on plaque
492 thickness/induration, erythema, and scaling.

493

494 In both studies, subjects in all treatment groups had a median baseline PASI score ranging from
 495 approximately 17 to 18. Baseline PGA score was marked or severe in 44% of subjects in STUDY 1
 496 and 40% of subjects in STUDY 2. Approximately two-thirds of all subjects had received prior
 497 phototherapy, 69% had received either prior conventional systemic or biologic therapy for the
 498 treatment of psoriasis, with 56% receiving prior conventional systemic therapy and 43% receiving
 499 prior biologic therapy. A total of 28% of study subjects had a history of psoriatic arthritis.

500

501 Clinical Response

502 The results of STUDY 1 and STUDY 2 are presented in Table 3 below.

503

Table 3. Clinical Outcomes STUDY 1 and STUDY 2

<u>Week 12</u>	<u>STUDY 1</u>			<u>STUDY 2</u>		
		STELARA®			STELARA®	
	<u>Placebo</u>	<u>45 mg</u>	<u>90 mg</u>	<u>Placebo</u>	<u>45 mg</u>	<u>90 mg</u>
Subjects randomized	255	255	256	410	409	411
PASI 75 response	8 (3%)	171 (67%)	170 (66%)	15 (4%)	273 (67%)	311 (76%)
PGA of Cleared or Minimal	10 (4%)	151 (59%)	156 (61%)	18 (4%)	277 (68%)	300 (73%)

504

505 Examination of age, gender, and race subgroups did not identify differences in response to
 506 STELARA® among these subgroups.

507

508 In subjects who weighed <100 kg, response rates were similar with both the 45 mg and 90 mg doses;
 509 however, in subjects who weighed >100 kg, higher response rates were seen with 90 mg dosing
 510 compared with 45 mg dosing (Table 4 below).

Table 4. Clinical Outcomes by Weight STUDY 1 and STUDY 2

	<u>STUDY 1</u>			<u>STUDY 2</u>		
		STELARA®			STELARA®	
	<u>Placebo</u>	<u>45 mg</u>	<u>90 mg</u>	<u>Placebo</u>	<u>45 mg</u>	<u>90 mg</u>
Subjects randomized	255	255	256	410	409	411
PASI 75 response at Week 12*						
≤100 kg	4% 6/166	74% 124/168	65% 107/164	4% 12/290	73% 218/297	78% 225/289
>100 kg	2% 2/89	54% 47/87	68% 63/92	3% 3/120	49% 55/112	71% 86/121
PGA of Cleared or Minimal at Week 12*						
≤100 kg	4% 7/166	64% 108/168	63% 103/164	5% 14/290	74% 220/297	75% 216/289
>100 kg	3% 3/89	49% 43/87	58% 53/92	3% 4/120	51% 57/112	69% 84/121

511 *Patients were dosed with study medication at Weeks 0 and 4.
512

513 Subjects in STUDY 1 who were PASI 75 responders at both Weeks 28 and 40 were re-randomized at
514 Week 40 to either continued dosing of STELARA[®] (STELARA[®] at Week 40) or to withdrawal of
515 therapy (placebo at Week 40). At Week 52, 89% (144/162) of subjects re-randomized to STELARA[®]
516 treatment were PASI 75 responders compared with 63% (100/159) of subjects re-randomized to
517 placebo (treatment withdrawal after Week 28 dose). The median time to loss of PASI 75 response
518 among the subjects randomized to treatment withdrawal was 16 weeks.
519

520 **15 REFERENCES**

521 ¹Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov)
522 SEER*Stat Database: Incidence - SEER 6.6.2 Regs Research Data, Nov 2009 Sub (1973-2007) -
523 Linked To County Attributes - Total U.S., 1969-2007 Counties, National Cancer Institute, DCCPS,
524 Surveillance Research Program, Surveillance Systems Branch, released April 2010, based on the
525 November 2009 submission.
526

527 **16 HOW SUPPLIED/STORAGE AND HANDLING**

528 STELARA[®] does not contain preservatives. STELARA[®] is available in single-use prefilled syringes
529 or single-use vials containing 45 mg or 90 mg of ustekinumab. Each prefilled syringe is equipped
530 with a needle safety guard.
531

532 The NDC number for the 45 mg prefilled syringe is 57894-060-03.
533

534 The NDC number for the 90 mg prefilled syringe is 57894-061-03.
535

536 The NDC number for the 45 mg vial is 57894-060-02.
537

538 The NDC number for the 90 mg vial is 57894-061-02.
539

540 *Storage and Stability*

541 STELARA[®] vials and prefilled syringes must be refrigerated at 2°C to 8°C (36°F to 46°F). Store
542 STELARA[®] vials upright. Keep the product in the original carton to protect from light until the time
543 of use. Do not freeze. Do not shake. STELARA[®] does not contain a preservative; discard any unused
544 portion.
545

546 **17 PATIENT COUNSELING INFORMATION**

547 “See FDA-approved patient labeling (Medication Guide)”
548

549 Instruct patients to read the Medication Guide before starting STELARA[®] therapy and to reread the
550 Medication Guide each time the prescription is renewed.
551

552 *Infections*

553 Inform patients that STELARA[®] may lower the ability of their immune system to fight infections.
554 Instruct patients of the importance of communicating any history of infections to the doctor, and
555 contacting their doctor if they develop any symptoms of infection.
556

557 Malignancies
558 Patients should be counseled about the risk of malignancies while receiving STELARA®.

559
560 Allergic Reactions
561 Advise patients to seek immediate medical attention if they experience any symptoms of serious
562 allergic reactions.

563
564 Prefilled Syringe Manufactured by: Janssen Biotech, Inc., Horsham, PA 19044, License No. 1864 at
565 Baxter Pharmaceutical Solutions, Bloomington, IN 47403

566
567 Vial Manufactured by: Janssen Biotech, Inc., Horsham, PA 19044, License No. 1864 at Cilag AG,
568 Schaffhausen, Switzerland

569
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